# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum



By Colorado Natural Heritage Program
For
The Colorado Rare Plant Conservation Initiative
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Cover photos: Background – shortgrass prairie (Renée Rondeau); foreground – *Asclepias uncialis* (Steve Olson).

#### **EXECUTIVE SUMMARY**

The purpose of this proposed Addendum to Colorado's State Wildlife Action Plan (SWAP) (CDOW 2006) is to set a statewide strategic direction for the conservation of Colorado's most imperiled plant species and their habitats, and to establish a coordinated statewide approach for partners working on rare plant conservation. The Colorado Rare Plant Conservation Initiative (RPCI) compiled the information in this document, and developed much of the conservation strategy reflected in the contents herein, to set a conservation direction for Colorado's imperiled plants and their habitats. This Addendum, and the Colorado Rare Plant Conservation Strategy upon which it is based (Neely et al. 2008), represent a collective vision for plant conservation in Colorado, emphasizing a proactive approach to ensure the long-term stewardship and viability of Colorado's rarest plants. If implemented, this plan will enable concerned partners to systematically and meaningfully advance urgently needed plant conservation in Colorado, thus avoiding the need for federal listings.

Using the RPCI Strategy as a starting point, botanists and planners from CNHP, CNAP, and TNC developed the draft components of this Addendum. Draft components were circulated among all RPCI members for review and revision. The development of this Addendum was guided by the eight required elements set forth in the U.S. Fish and Wildlife Service's guidance on State Wildlife Action Plans.

#### **Plants of Greatest Conservation Need**

Plants of Greatest Conservation Need (PGCN) are defined as the 121 critically imperiled and imperiled plant species in Colorado. These are globally rare species with NatureServe Conservation Status ranks of G1 (critically imperiled) and G2 (imperiled). These species are considered to be at risk throughout their range and vulnerable to extinction. Rare plant experts within RPCI prioritized this list into Tier 1 species and Tier 2 species (Table 1, Figure 1):

**Tier 1 Plants of Greatest Conservation Need** – all G1 species, all federally listed species; **Tier 2 Plants of Greatest Conservation Need** – all G2 species not federally listed.

# **Key Habitats**

Colorado's imperiled plants occur within eight major habitat types: *alpine*, *barrens*, *cliffs and canyons*, *grasslands*, *forests*, *pinyon-juniper woodlands*, *shrublands*, and *wetlands* (CNHP 2011; CNHP and TNC 2011; Colorado Native Plant Society 1997). Colorado's barrens and

shrublands are especially rich habitats for imperiled plant species, followed by pinyon-juniper woodlands, cliffs and canyons, and alpine habitats (CNHP and TNC 2011). Barrens occupy less than 1% of Colorado, but nearly 25 of our rarest plants are primarily associated with barrens (23% of imperiled species). Shrublands are Colorado's second most important habitat for rare plants (supporting 21% of the imperiled species), occupying 19% of the state's acreage. Pinyon-juniper woodlands cover nearly 10% of Colorado, providing habitat for at least 16% of the rare plant species (Figures 2 and 3). Mapping of habitat types is from SWReGAP (Prior-Magee et al. 2007).

#### **Conservation Issues**

Colorado's irreplaceable native plants, plant communities, and ecosystems are thus increasingly being threatened. Most of Colorado's imperiled plants are naturally rare. They are rare because they are restricted to very specific, narrowly distributed habitats, rather than as a result of human actions, per se. However, because these species occupy such small areas, planning is necessary to avoid placing these species at further risk from human activities. Degradation, fragmentation, and loss of habitat are major reasons plant species and their habitats are imperiled or vulnerable in Colorado. The primary contributors to habitat degradation for imperiled plants are *energy development*, *motorized recreation*, *residential development*, and *road construction and maintenance* (CNHP and TNC 2011). Other risk factors include altered hydrologic regime, invasive species, agricultural development, loss of pollinators, incompatible grazing/trampling, and plant collecting (CNHP and TNC 2011). Additionally, there is strong scientific consensus that human-induced climate change is affecting species and ecological systems, and this is likely to exacerbate the effects of other human activities on plants (Enquist and Gori 2008).

One of the biggest issues is a *lack of awareness* and information regarding the presence, distribution, and precarious status of Colorado's native and imperiled plant species. Many rare plants inhabit small areas, have specialized needs, and have unique habitat requirements that are often missed by other approaches to conservation (e.g., those focused primarily on wildlife).

# **Conservation Objectives**

The following statewide conservation objectives, adapted from the RPCI Rare Plant Conservation Strategy, are necessary to meet the conservation needs of Colorado's PGCN. These objectives represent the most urgent and critical actions needed to effectively conserve Colorado's imperiled plant species. These objectives will guide conservation activities and catalyze collaborative conservation action over the next decade.

The following Objectives and Conservation Actions are statewide in scope, and are applicable to all PGCN. Table 3 presents specific, prioritized conservation actions on a species-by-species basis.

The six statewide conservation objectives are:

- 1. **Secure on-the-ground, site-specific habitat protection and/or management** to achieve specific goals for all of Colorado's imperiled plants on public and private lands. Focus these activities in places that are likely to remain stable under predicted climate change scenarios, and on areas needed to maintain habitat connectivity (e.g., to facilitate climate-related distributional shifts).
- 2. *Minimize threats* from specific land uses that impact many of Colorado's imperiled plants statewide, and *develop climate change adaptation strategies* for vulnerable species.
- 3. *Improve scientific understanding* of the distribution, natural history, response to climate change, and status of Colorado's most imperiled plants through inventory, research, and monitoring.
- 4. **Develop and implement a state program and policies** to enhance the conservation of Colorado's most imperiled plants in cooperation with public land managers, private landowners, and other interested stakeholders.
- 5. *Facilitate the stewardship* of Colorado's most imperiled plants through education, outreach, and coordination.
- 6. *Adopt measures for the ex situ (off site) conservation* of Colorado's most imperiled plants in case native populations are extirpated due to stochastic events, anthropogenic impacts, and/or climate change.

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### INTRODUCTION

The purpose of this proposed Addendum to Colorado's State Wildlife Action Plan (CDOW 2006) is to set a statewide strategic direction for the conservation of Colorado's most imperiled plant species and their habitats, and to establish a coordinated statewide approach for partners working on rare plant conservation. The Colorado Rare Plant Conservation Initiative (RPCI) compiled the information in this document, and developed much of the conservation strategy reflected in the contents herein, to set a conservation direction for Colorado's imperiled plants and their habitats. This Addendum, and the Colorado Rare Plant Conservation Strategy upon which it is based, represent a collective vision for plant conservation in Colorado, emphasizing a proactive approach to ensure the long-term stewardship and viability of Colorado's rarest plants. If implemented, this plan will enable concerned partners to systematically and meaningfully advance urgently needed plant conservation in Colorado, thus avoiding the need for federal listings.

#### The Rare Plant Conservation Initiative

The Rare Plant Conservation Initiative is a diverse partnership of state and federal agencies, private organizations, academic institutions, and individuals concerned with the stewardship and survival of imperiled plants in Colorado (see frontispiece for list of RPCI members). The RPCI grew out of the Colorado Rare Plant Technical Committee (RPTC), a statewide group of botanists, ecologists, and planners that have been meeting regularly since 1992 to exchange information, assess plant species conservation status, and identify and prioritize management and stewardship actions for plants. In 2007, the group determined that there was a growing need to improve coordination and take proactive steps to address rapidly increasing impacts to rare plants in Colorado. This Initiative has built on previous RPTC and partnership efforts, including the Colorado Rare Plant Field Guide (Spackman et al. 1997), Rare Plants of Colorado (Colorado Native Plant Society 1997), on-the-ground conservation of imperiled plants in the Adobe Hills and Arkansas Valley, Annual Colorado Rare Plant Symposia, Colorado Natural Areas Program (CNAP) special designations, U.S. Forest Service species assessments, and the Denver Botanic Gardens (DBG) monitoring projects. The RPCI is committed to achieving results through a collaborative approach that is based on the best available science, close coordination, data sharing, and taking strategic action.

### **RPCI** and the Development of this Addendum

In 2009, the RPCI published their Colorado Rare Plant Conservation Strategy (Strategy). This was a collaborative effort among many partners, and represents the collective knowledge, expertise, and priorities of all major agencies, non-profits, and educational institutions involved in conservation of Colorado's rarest plants. The Strategy was thoroughly vetted by Colorado's rare plant conservation community, and presents a summary of status, threats, and conservation goals and objectives for 121 of Colorado's rarest plant species.

Chief among the conservation objectives that RPCI has identified for rare plants is the need for focused state-level conservation. They identified the incorporation of rare plants into Colorado's SWAP as one significant step to take in that direction. To that end, RPCI has prepared this Addendum to Colorado's SWAP, in collaboration with the Colorado Division of Wildlife, and with assistance from the Colorado Natural Heritage Program (CNHP), Colorado Natural Areas Program (CNAP), and The Nature Conservancy (TNC). This Addendum is closely based on the RPCI Strategy, and much of the information herein was taken directly from that document. The Addendum goes further, in that it:

- 1) makes direct links between specific plant species and species-level threats and conservation actions;
- 2) sets priorities for specific conservation actions on a species-by-species basis;
- 3) includes species-specific assessments of vulnerability to climate change; and
- 4) makes rare plant information, and the opportunity to review and comment on priority conservation actions, available to new audiences.

# **The Addendum Development Process**

Using the RPCI Strategy as a starting point, botanists and planners from CNHP, CNAP, and TNC developed the draft components of this Addendum. Draft components were circulated among all RPCI members for review and revision. The development of this Addendum was guided by the eight required elements set forth in the U.S. Fish and Wildlife Service's guidance on State Wildlife Action Plans. Details of the process for addressing each required element are described in the following sections.

#### Element 1: Information on the distribution and abundance of species

The RPCI Strategy identified the 121 plant species of greatest conservation need in Colorado (PGCN) (Table 1). These are globally rare species with NatureServe Conservation Status ranks of G1 (critically imperiled) and G2 (imperiled). These species are considered to be at risk throughout their range and vulnerable to extinction. Rare plant experts within RPCI prioritized this list into Tier 1 species and Tier 2 species:

**Tier 1 Plants of Greatest Conservation Need** – all G1 species, all federally listed species; **Tier 2 Plants of Greatest Conservation Need** – all G2 species not federally listed.

Information on distribution, population status, and trends for all PGCN was compiled from a variety of sources. Data sources included:

- 1) the Colorado Natural Heritage Program's conservation databases (Element Occurrence records, Element Tracking records, Element Rank forms, and characterization abstracts);
- 2) Colorado's Biodiversity Scorecard (CNHP and TNC 2011);
- 3) U.S. Forest Service species assessments (<a href="http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml">http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml</a>);
- 4) the Colorado Rare Plant Field Guide (<a href="http://www.cnhp.colostate.edu/">http://www.cnhp.colostate.edu/</a>);
- 5) published and unpublished literature, and herbarium collections;
- 6) expert opinion of Colorado's scientific community, via the RPCI and the NS network of Heritage Programs.

These data were compiled in an Access database to support data organization and reporting for this Addendum in the same format as the wildlife SWAP, as well as to allow for ease in future updating as new information becomes available. Distribution information is based primarily on CNHP's element occurrence database. Population status information is based on Colorado's Biodiversity Scorecard, and trend information is based on CNHP's Element Rank database. Where appropriate, these data were augmented or amended by expert review. Results are presented in Part 1 and Table 6 of this document.

#### Element 2: Locations and relative condition of key habitats

Colorado's SWAP addressed key habitats from a wildlife perspective. RPCI botanists reviewed this component of the SWAP for any additions necessary to complete the picture from a rare plant perspective. Two additional key habitat types were identified (barrens, cliffs and canyons), and the habitat distribution map was adjusted to display all key rare plant habitats. The Access database was updated to reflect the plant species that occur in each habitat type, as well as the threats and conservation actions for the two additional habitats. These data were augmented,

amended, and confirmed by expert review. Results are presented in Part 2 and Table 4 of this document.

# Element 3: Issues that may adversely affect PGCN or their habitats, and priority research and survey efforts needed

The RPCI Strategy identified five significant issues that adversely affect many of the PGCN across Colorado: *energy development, motorized recreation, residential development, road construction and maintenance*, and *climate change*. In developing this Addendum, RPCI botanists consulted the data sources listed above to expand this list, and to provide more detail on a species-by-species basis. Plants that warrant significant research and survey efforts were also identified during this process. This information was captured in the same Access database used to compile distribution/abundance and habitat information for each PGCN (Table 3). In order to capture similar concepts in as consistent a way as possible, we used a "Threats Taxonomy" to categorize threats in the Access database (Appendix A). The Threats Taxonomy was based on a taxonomy originally developed by The Nature Conservancy, and adapted for use in the SWAP and this Addendum.

Because climate change is potentially a very significant issue for rare plants, we conducted a focused analysis on this topic using NatureServe's Climate Change Vulnerability Index. The Index is an Excel-based tool that uses a scoring system to integrate species' predicted exposure to climate change and three sets of factors associated with climate change sensitivity: 1) indirect exposure to climate change, 2) species-specific factors (including dispersal ability, temperature and precipitation sensitivity, physical habitat specificity, interspecific interactions, and genetic factors), and 3) documented response to climate change.

Content of the Access database and results of the CCVI analysis were submitted to RPCI botanists for expert review. Results are presented in Part 3-4, and Tables 3-5 of this document. Details of CCVI methods are in Appendix B.

# Element 4: Conservation actions necessary to conserve the PGCN and their habitats, and priorities for implementing

The RPCI Strategy identified six broad conservation objectives that are needed to conserve Colorado's PGCN, including land conservation and management, threat abatement, research, policy, education, and *ex situ* conservation. In developing this Addendum, RPCI used these broad objectives, as well as the data sources listed above, to identify specific conservation actions that are needed on a species-by-species basis, and to relate these actions directly to each species' most pressing threats. This information was captured in the same Access database used to

compile distribution/ abundance, habitat, and conservation issues information for each PGCN. In order to capture similar concepts in as consistent a way as possible, we used a "Conservation Actions Taxonomy" to categorize actions in the Access database (Appendix A). The Conservation Actions Taxonomy was based on a taxonomy originally developed by The Nature Conservancy, and adapted for use in the SWAP and this Addendum. Content of the database was submitted to RPCI botanists for expert review. Results are presented in Part 5 and Tables 3 and 4 of this document.

# Element 5: Strategies for monitoring PGCN, their habitats, and the effectiveness of conservation actions

The monitoring strategies and objectives presented in this Addendum were taken from the RPCI Strategy. They have been widely vetted by Colorado's botanical community, and represent a consensus on the steps needed to determine the status of Colorado's PGCN and identify early warning signs of declining trends. They are presented in Part 6 of this document.

# Element 6: Procedures to review the Comprehensive Wildlife Conservation Strategy (referred to hereafter as "SWAP")

This element is tiered to the CWCS published in 2006. The next revision of that document is scheduled to begin in 2011. During that revision, we hope to update the content of this Addendum as necessary, and have it incorporated into Colorado's newly updated SWAP. The review process established in the SWAP is presented in Part 7 of this document.

# Element 7: Coordination with federal, state, and local agencies and Native American Tribes

The Rare Plant Conservation Initiative was the primary means of coordination with federal, state, and local agencies on the development and content of this Addendum.

#### **Element 8: Public participation**

Agencies, technical experts, and non-governmental organizations have been engaged throughout the RPCI's efforts to develop their Conservation Strategy and this SWAP Addendum, as summarized in the Introduction section of this document. The RPCI partners are working with the Colorado Division of Wildlife to achieve consensus on including rare plants in the next iteration of the State's SWAP. If successful, all interested parties within Colorado will be invited and encouraged to comment on the information presented in this Addendum during the

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upcoming statewide SWAP revision. This portion of the document will be updated accordingly at that time.

#### Part 1: PLANTS OF GREATEST CONSERVATION NEED

In a comprehensive evaluation of the Colorado flora completed over a decade ago (Weber and Wittmann 1992), a total of 3,088 vascular plant species were documented to occur in Colorado; 2,596 of these were native, and 492 non-native but variously naturalized. Some 125 of the native species are endemic to Colorado. The plant families with the greatest number of rare plants in Colorado are the legume, sunflower, mustard, and figwort families. The Colorado Natural Heritage Program (CNHP) at Colorado State University currently tracks approximately 520 rare plant species in Colorado; of these, 121 species are ranked critically imperiled (G1) or imperiled (G2) on a global level. Sixty-eight of these are endemic to Colorado, occurring only here and nowhere else in the world. Another 140 species are vulnerable to extinction (ranked G3) (CNHP 2011). Eighty-two plant species are on the BLM Sensitive Species List, and approximately 70 on the U.S. Forest Service Sensitive Species List. Currently, 13 Colorado native plant species are federally listed by the U.S. Fish and Wildlife Service as Threatened or Endangered; another five species are candidates for listing.

Plants of Greatest Conservation Need (PGCN) are defined as the 121 critically imperiled and imperiled plant species in Colorado. These are globally rare species with NatureServe Conservation Status ranks of G1 (critically imperiled) and G2 (imperiled). These species are considered to be at risk throughout their range and vulnerable to extinction. Rare plant experts within RPCI prioritized this list into Tier 1 species and Tier 2 species (Table 1, Figure 1):

**Tier 1 Plants of Greatest Conservation Need** – all G1 species, all federally listed species; **Tier 2 Plants of Greatest Conservation Need** – all G2 species not federally listed.

Table 1 lists all PGCN, along with each species' priority tier, NatureServe global and state status ranks, federal agency status, and the extent of its range relative to Colorado's state boundary. Species are listed alphabetically by the scientific name used in Colorado (Weber and Wittmann 2001). NatureServe status ranks are: 1 = Critically Imperiled; 2 = Imperiled; 3 = Vulnerable; 4 = Apparently Secure; 5 = Demonstrably Secure; T = subspecies; Q = taxonomic question; SNR = not ranked; SNA = Not Applicable (not in Colorado); U = Unknown. Agency status indicates federal listing under the U.S. Endangered Species Act (LE = Listed Endangered; LT = Listed Threatened; C = Candidate for listing), and/or inclusion on the Sensitive Species lists of the Bureau of Land Management (BLM) Colorado Office or US Forest Service (USFS) Region 2. The percent of a species' range in Colorado is calculated as: Endemic = 100% of range within Colorado; Very High = 75-99% of range within Colorado; High = 50-75% of range within Colorado (Source: Colorado Natural Heritage Program).

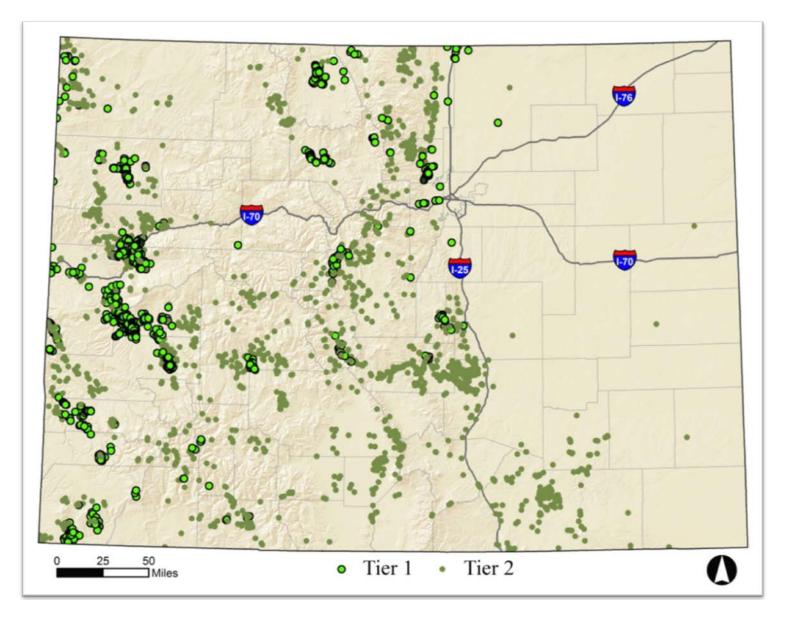


Figure 1. Distribution of Colorado's Plants of Greatest Conservation Need.

Table 1. Plants of Greatest Conservation Need

| Scientific Name                           | Common Name               | Species<br>Priority | Global & State<br>Status Ranks | Federal<br>Agency<br>Status | Percent of<br>Range<br>in Colorado |
|---|---------------------------|---------------------|--------------------------------|-----------------------------|------------------------------------|
| Aletes humilis                            | Larimer aletes            | Tier 2              | G2G3 / S2S3                    |                             | Endemic                            |
| Aletes latilobus                          | Canyonlands aletes        | Tier 1              | G1 / S1                        | BLM                         | Medium                             |
| Aletes macdougalii ssp. breviradiatus     | Mesa Verde aletes         | Tier 2              | G3T2T3 / S1                    |                             | Medium                             |
| Aliciella sedifolia                       | Stonecrop gilia           | Tier 1              | G1 / S1                        | USFS                        | Endemic                            |
| Anticlea vaginatus                        | Alcove death camas        | Tier 2              | G2 / S2                        |                             | Low                                |
| Aquilegia chrysantha var. rydbergii       | Golden columbine          | Tier 2              | G4T1Q / S1                     | BLM/USFS                    | Endemic                            |
| Asclepias uncialis ssp. uncialis          | Dwarf milkweed            | Tier 2              | G3G4T2T3 / S2                  | BLM/USFS                    | Very High                          |
| Astragalus anisus                         | Gunnison milkvetch        | Tier 2              | G2G3 / S2S3                    | BLM                         | Endemic                            |
| Astragalus cronquistii                    | Cronquist milkvetch       | Tier 2              | G2 / S2                        | BLM                         | High                               |
| Astragalus debequaeus                     | DeBeque milkvetch         | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Astragalus deterior                       | Cliff-palace milkvetch    | Tier 1              | G1G2 / S1S2                    |                             | Endemic                            |
| Astragalus equisolensis                   | Horseshoe milkvetch       | Tier 2              | G5T1 / S1                      |                             | Low                                |
| Astragalus humillimus                     | Mancos milkvetch          | Tier 1              | G1 / S1                        | LE                          | Low                                |
| Astragalus iodopetalus                    | Violet milkvetch          | Tier 2              | G2 / S1                        |                             | Medium                             |
| Astragalus lonchocarpus var. hamiltonii   | Hamilton milkvetch        | Tier 1              | G1 / S1                        |                             | Low                                |
| Astragalus microcymbus                    | Skiff milkvetch           | Tier 1              | G1 / S1                        | BLM                         | Endemic                            |
| Astragalus missouriensis var. humistratus | Missouri milkvetch        | Tier 2              | G5T1 / S1                      | USFS                        | Endemic                            |
| Astragalus naturitensis                   | Naturita milkvetch        | Tier 2              | G2G3 / S2S3                    | BLM                         | High                               |
| Astragalus osterhoutii                    | Kremmling milkvetch       | Tier 1              | G1 / S1                        | LE                          | Endemic                            |
| Astragalus piscator                       | Fisher Towers milkvetch   | Tier 2              | G2G3 / S1                      | BLM                         | Low                                |
| Astragalus rafaelensis                    | San Rafael milkvetch      | Tier 2              | G2G3 / S1                      | BLM                         | High                               |
| Astragalus schmolliae                     | Schmoll milkvetch         | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Astragalus tortipes                       | Sleeping Ute milkvetch    | Tier 1              | G1 / S1                        | С                           | Endemic                            |
| Boechera crandallii                       | Crandall's rock-cress     | Tier 2              | G2/S2                          | BLM                         | High                               |
| Boechera glareosa                         |                           | Tier 1              | G1G2 / S1                      |                             | Medium                             |
| Botrychium tax. nov. "furcatum"           | Fork-leaved moonwort      | Tier 2              | G1? / SNR                      |                             | Unknown                            |
| Botrychium lineare                        | Narrowleaf grape fern     | Tier 1              | G2? / S1                       | USFS                        | Medium                             |
| Caesalpinia repens                        | Creeping rush-pea         | Tier 2              | G2 / S1                        |                             | Medium-low                         |
| Camissonia eastwoodiae                    | Eastwood evening primrose | Tier 2              | G2 / S1                        |                             | Medium                             |
| Carex stenoptila                          | Small-winged sedge        | Tier 2              | G2 / S2                        |                             | Medium                             |

| Scientific Name                     | Common Name                | Species<br>Priority | Global & State<br>Status Ranks | Federal<br>Agency<br>Status | Percent of<br>Range<br>in Colorado |
|-------------------------------------|----------------------------|---------------------|--------------------------------|-----------------------------|------------------------------------|
| Castilleja puberula                 | Downy Indian-paintbrush    | Tier 2              | G2G3 / S2S3                    |                             | Endemic                            |
| Cirsium perplexans                  | Adobe thistle              | Tier 2              | G2G3 / S2S3                    | BLM/USFS                    | Endemic                            |
| Cirsium scapanolepis                | Mountain-slope thistle     | Tier 1              | G1G2Q / S1                     |                             | Endemic                            |
| Cleome multicaulis                  | Slender spiderflower       | Tier 2              | G2G3 / S2S3                    | BLM                         | High                               |
| Corispermum navicula                | Boat-shaped bugseed        | Tier 1              | G1? / S1                       |                             | Endemic                            |
| Cryptantha gypsophila               | Gypsum Valley cat's- eye   | Tier 1              | G1G2 / S1S2                    |                             | Endemic                            |
| Delphinium ramosum var. alpestre    | Colorado larkspur          | Tier 2              | G2 / S2                        |                             | High                               |
| Delphinium robustum                 | Wahatoya Creek larkspur    | Tier 2              | G2? / S2?                      |                             | Medium                             |
| Descurainia kenheilii               | Heil's tansy mustard       | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Dicoria wetherillii                 | Wetherill's dicoria        | Tier 2              | G4T2?Q / SU                    |                             | Unknown                            |
| Draba exunguiculata                 | Clawless draba             | Tier 2              | G2 / S2                        | USFS                        | Endemic                            |
| Draba graminea                      | San Juan whitlow-grass     | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Draba grayana                       | Gray's Peak whitlow-grass  | Tier 2              | G2 / S2                        | USFS                        | Endemic                            |
| Draba malpighiacea                  | Whitlow-grass              | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Draba smithii                       | Smith whitlow-grass        | Tier 2              | G2 / S2                        | USFS                        | Endemic                            |
| Draba weberi                        | Weber's draba              | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Erigeron kachinensis                | Kachina daisy              | Tier 2              | G2 / S1                        | BLM                         | Low                                |
| Erigeron wilkenii                   | Wilken fleabane            | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Eriogonum brandegeei                | Brandegee wild buckwheat   | Tier 1              | G1G2 / S1S2                    | BLM/USFS                    | Endemic                            |
| Eriogonum clavellatum               | Comb Wash buckwheat        | Tier 2              | G2 / S1                        | BLM                         | Medium                             |
| Eriogonum coloradense               | Colorado wild buckwheat    | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Eriogonum pelinophilum              | Clay-loving wild buckwheat | Tier 1              | G2 / S2                        | LE                          | Endemic                            |
| Eutrema edwardsii ssp. penlandii    | Penland alpine fen mustard | Tier 1              | G1G2 / S1S2                    | LT                          | Endemic                            |
| Gaura neomexicana ssp. coloradensis | Colorado butterfly plant   | Tier 1              | G3T2 / S1                      | LT                          | Medium                             |
| Gutierrezia elegans                 | Lone Mesa snakeweed        | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Hackelia besseyi                    | Bessey's stickseed         | Tier 2              | G2G3 / SNR                     |                             | Low                                |
| Hackelia gracilenta                 | Mesa Verde stickseed       | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Herrickia horrida                   | Canadian River spiny aster | Tier 2              | G2? / S1                       |                             | Medium                             |
| Ipomopsis aggregata ssp. weberi     | Rabbit Ears gilia          | Tier 2              | G5T2 / S2                      | USFS                        | Very High                          |
| Ipomopsis globularis                | Globe gilia                | Tier 2              | G2 / S2                        | USFS                        | Endemic                            |
| Ipomopsis polyantha                 | Pagosa skyrocket           | Tier 1              | G1 / S1                        | C,<br>BLM/USFS              | Endemic                            |

| Scientific Name                      | Common Name                      | Species<br>Priority | Global & State<br>Status Ranks | Federal<br>Agency<br>Status | Percent of<br>Range<br>in Colorado |
|--------------------------------------|----------------------------------|---------------------|--------------------------------|-----------------------------|------------------------------------|
| Lepidium crenatum                    | Alkaline pepperwort              | Tier 2              | G2 / S2                        |                             | Medium                             |
| Lesquerella calcicola                | Rocky Mountain bladderpod        | Tier 2              | G2 / S2                        |                             | High                               |
| Lesquerella congesta                 | Dudley Bluffs bladderpod         | Tier 1              | G1 / S1                        | LT                          | Endemic                            |
| Lesquerella parviflora               | Piceance bladderpod              | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Lesquerella pruinosa                 | Pagosa bladderpod                | Tier 2              | G2 / S2                        | BLM/USFS                    | Endemic                            |
| Lesquerella vicina                   | Good-neighbor bladderpod         | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Limnorchis zothecina                 | Alcove bog orchid                | Tier 2              | G2 / S1                        |                             | Low                                |
| Lomatium concinnum                   | Colorado desert-parsley          | Tier 2              | G2G3 / S2S3                    | BLM                         | Endemic                            |
| Lupinus crassus                      | Payson lupine                    | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Lygodesmia doloresensis              | Dolores River skeletonplant      | Tier 1              | G1G2 / S1                      | BLM                         | High                               |
| Machaeranthera coloradoensis         | Colorado tansy-aster             | Tier 2              | G2 / S2                        | USFS                        | High                               |
| Mentzelia rhizomata                  | Roan Cliffs blazing star         | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Mertensia humilis                    | Rocky Mountain bluebells         | Tier 2              | G2 / S1                        |                             | Medium                             |
| Mimulus gemmiparus                   | Budding monkey flower            | Tier 1              | G1 / S1                        | USFS                        | Endemic                            |
| Nuttallia chrysantha                 | Golden blazing star              | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Nuttallia densa                      | Arkansas Canyon stickleaf        | Tier 2              | G2 / S2                        | BLM                         | Endemic                            |
| Oenothera acutissima                 | Narrow-leaf evening primrose     | Tier 2              | G2 / S2                        | BLM                         | Medium                             |
| Oenothera harringtonii               | Arkansas Valley evening primrose | Tier 2              | G2G3 / S2S3                    | USFS                        | Endemic                            |
| Oonopsis foliosa var. monocephala    | Rayless goldenweed               | Tier 2              | G3G4T2 / S2                    |                             | Endemic                            |
| Oonopsis puebloensis                 | Pueblo goldenweed                | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Opuntia heacockiae                   | Heacock's prickly-pear           | Tier 2              | G2G3Q / S2S3                   |                             | Endemic                            |
| Oreocarya osterhoutii                | Osterhout cat's-eye              | Tier 2              | G2G3 / S2                      | BLM                         | Low                                |
| Oreoxis humilis                      | Pikes Peak spring parsley        | Tier 1              | G1 / S1                        | USFS                        | Endemic                            |
| Oxybaphus rotundifolius              | Round-leaf four o'clock          | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Oxytropis besseyi var. obnapiformis  | Bessey locoweed                  | Tier 2              | G5T2 / S2                      |                             | Very High                          |
| Pediocactus knowltonii               | Knowlton cactus                  | Tier 1              | G1 / SNA                       | LE                          | Historical                         |
| Penstemon crandallii ssp. procumbens | Crandall's beardtongue           | Tier 2              | G4T2Q / SU                     |                             | Endemic                            |
| Penstemon debilis                    | Parachute penstemon              | Tier 1              | G1 / S1                        | С                           | Endemic                            |
| Penstemon degeneri                   | Degener beardtongue              | Tier 2              | G2 / S2                        | BLM/USFS                    | Endemic                            |
| Penstemon fremontii var. glabrescens | Fremont's beardtongue            | Tier 2              | G3G4T2 / S2                    |                             | Endemic                            |

| Scientific Name                        | Common Name                | Species<br>Priority | Global & State<br>Status Ranks | Federal<br>Agency<br>Status | Percent of<br>Range<br>in Colorado |
|--|----------------------------|---------------------|--------------------------------|-----------------------------|------------------------------------|
| Penstemon gibbensii                    | Gibben's beardtongue       | Tier 1              | G1 / S1                        | BLM                         | High                               |
| Penstemon grahamii                     | Graham beardtongue         | Tier 2              | G2 / S1                        |                             | Low                                |
| Penstemon penlandii                    | Penland penstemon          | Tier 1              | G1 / S1                        | LE                          | Endemic                            |
| Penstemon scariosus var. albifluvis    | White River penstemon      | Tier 1              | G4T1 / S1                      | С                           | Low                                |
| Penstemon scariosus var. cyanomontanus | Plateau penstemon          | Tier 2              | G4T2 / S2                      |                             | High                               |
| Penstemon teucrioides                  | Germander beardtongue      | Tier 2              | G2G3Q / S2S3                   |                             | Endemic                            |
| Phacelia formosula                     | North Park phacelia        | Tier 1              | G1 / S1                        | LE                          | Endemic                            |
| Phacelia submutica                     | DeBeque phacelia           | Tier 1              | G2 / S2                        | C, USFS                     | Endemic                            |
| Physaria alpina                        | Avery Peak twinpod         | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Physaria bellii                        | Bell's twinpod             | Tier 2              | G2G3 / S2S3                    |                             | Endemic                            |
| Physaria obcordata                     | Piceance twinpod           | Tier 1              | G1G2 / S1S2                    | LT                          | Endemic                            |
| Physaria pulvinata                     | Cushion bladderpod         | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Physaria rollinsii                     | Rollins twinpod            | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Physaria scrotiformis                  | West Silver bladderpod     | Tier 1              | G1 / S1                        |                             | Endemic                            |
| Potentilla rupincola                   | Rocky Mountain cinquefoil  | Tier 2              | G2 / S2                        | USFS                        | Endemic                            |
| Ptilagrostis porteri                   | Porter feathergrass        | Tier 2              | G2 / S2                        | BLM/USFS                    | Endemic                            |
| Puccinellia parishii                   | Parish's alkali grass      | Tier 2              | G2G3 / S1                      |                             | Low                                |
| Salix arizonica                        | Arizona willow             | Tier 2              | G2G3 / S1                      | USFS                        | Low                                |
| Saussurea weberi                       | Weber saussurea            | Tier 2              | G2G3 / S2                      | BLM                         | High                               |
| Sclerocactus glaucus                   | Colorado hookless cactus   | Tier 1              | G3 / S3                        | LT                          | High                               |
| Sclerocactus mesae-verdae              | Mesa Verde hookless cactus | Tier 1              | G2 / S2                        | LT                          | Low                                |
| Sisyrinchium pallidum                  | Pale blue-eyed-grass       | Tier 2              | G2G3 / S2                      | BLM                         | High                               |
| Spiranthes diluvialis                  | Ute ladies'-tresses        | Tier 1              | G2G3 / S2                      | LT                          | Medium                             |
| Telesonix jamesii                      | James telesonix            | Tier 2              | G2 / S2                        |                             | Very High                          |
| Thalictrum heliophilum                 | Sun-loving meadow rue      | Tier 2              | G2 / S2                        | USFS                        | Endemic                            |
| Thelypodiopsis juniperorum             | Juniper tumble mustard     | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Thelypodium paniculatum                | Northwestern thelypody     | Tier 2              | G2 / S1                        |                             | Low                                |
| Townsendia fendleri                    | Fendler's townsend-daisy   | Tier 2              | G2 / S1                        |                             | High                               |
| Townsendia glabella                    | Gray's townsend-daisy      | Tier 2              | G2 / S2                        |                             | Endemic                            |
| Townsendia rothrockii                  | Rothrock townsend-daisy    | Tier 2              | G2G3 / S2S3                    |                             | Endemic                            |

#### Part 2: KEY HABITATS

Colorado's imperiled plants occur within eight major habitat types: *alpine*, *barrens*, *cliffs and canyons*, *grasslands*, *forests*, *pinyon-juniper woodlands*, *shrublands*, and *wetlands* (CNHP 2011; CNHP and TNC 2011; Colorado Native Plant Society 1997). Colorado's barrens and shrublands are especially rich habitats for imperiled plant species, followed by pinyon-juniper woodlands, cliffs and canyons, and alpine habitats (CNHP and TNC 2011). Barrens occupy less than 1% of Colorado, but nearly 25 of our rarest plants are primarily associated with barrens (23% of imperiled species). Shrublands are Colorado's second most important habitat for rare plants (supporting 21% of the imperiled species), occupying 19% of the state's acreage. Pinyon-juniper woodlands cover nearly 10% of Colorado, providing habitat for at least 16% of the rare plant species (Figures 2 and 3). Mapping of habitat types is from SWReGAP (Prior-Magee et al. 2007).

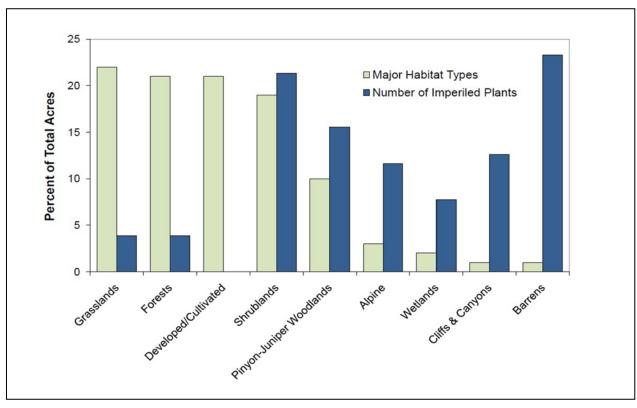


Figure 2. Key habitats as percentage of Colorado and number of PGCN.

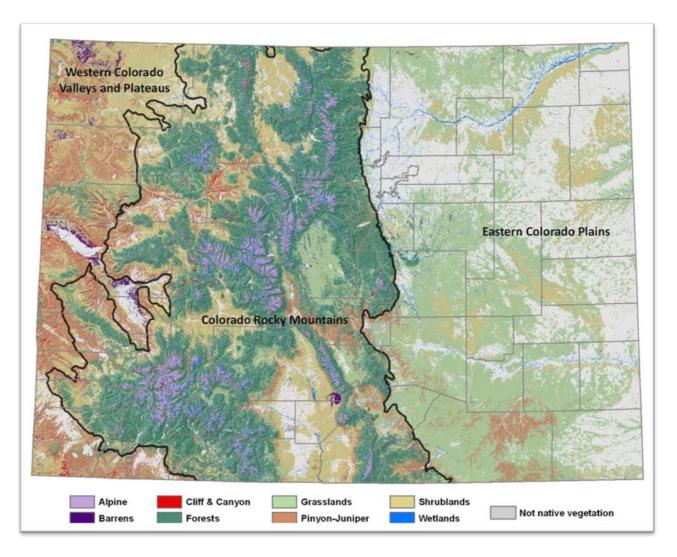


Figure 3. Distribution of major rare plant habitat types in Colorado.

# Relationship Between Key Habitats for Wildlife and Plants

The way that rare plant habitat types have been categorized (Neely et al. 2009, CNHP and TNC 2011) is slightly different from the habitat categorization used for animals in Colorado's SWAP. Categories that are common to both plants (in this Addendum) and animals (in the SWAP) are grasslands, forests, shrublands, pinyon-juniper woodlands, alpine habitats, and wetlands. However, the SWAP did not specifically recognize two habitat types for wildlife that are, in fact, among the highest priority habitat types for plants: barrens, and cliffs and canyons.

In the SWAP, grassland, forest, shrubland, and wetland categories all had some habitat types that were considered high priority. For plants, all habitat types discussed in this Addendum are considered priority habitats, since they all support globally imperiled species that are at risk of extinction. However, based on the concentration of rare plants in each habitat type relative to

the percentage of Colorado covered by that habitat type (Figure 2), five habitat types stand out as being critically important to conservation of imperiled plant species: barrens, shrublands, pinyon-juniper woodlands, cliffs and canyons, and alpine (Figure 3, Table 2). This Addendum does not change the conservation priorities for habitats presented in the SWAP; rather, it expands the priority list to include the barrens and cliff/canyon habitats specific to rare plant conservation. Details on species supported, key threats, and prioritized conservation actions for PGCN habitats can be found in Part 6, Table 4.

Table 2. Relative priorities for key rare plant habitats based on the concentration of rare plants in each habitat type relative to the percentage of Colorado covered by that habitat type.

| Habitat Priority | Habitat Category                      | Habitat Type                   |  |  |
|------------------|---------------------------------------|--------------------------------|--|--|
|                  |                                       | Exposed Rock (alpine)          |  |  |
|                  | Alpine                                | Meadow Tundra                  |  |  |
| Very High        |                                       | Shrub Tundra                   |  |  |
|                  | Barrens                               | Barrens                        |  |  |
|                  |                                       | Exposed Rock                   |  |  |
|                  | Cliff and Canyon                      | Cliff and Canyon               |  |  |
|                  | Pinyon-Juniper Woodlands and Savannas | Pinyon-Juniper                 |  |  |
|                  |                                       | Deciduous Oak                  |  |  |
|                  |                                       | Desert Shrub                   |  |  |
|                  | Shrublands                            | Sagebrush                      |  |  |
|                  |                                       | Saltbrush Fans and Flats       |  |  |
| High             |                                       | Sand Dunes Complex (Shrubland) |  |  |
|                  |                                       | Upland Shrub                   |  |  |
|                  |                                       | Eastern Plains Streams         |  |  |
|                  |                                       | Grass/Forb Dominated Wetlands  |  |  |
|                  | Wetlands                              | Mountain Streams               |  |  |
|                  |                                       | Shrub-dominated Wetlands       |  |  |
|                  |                                       | Playas                         |  |  |
|                  |                                       | Seeps and Springs              |  |  |
|                  |                                       | Aspen Forest                   |  |  |
| Moderate         |                                       | Douglas Fir                    |  |  |
|                  | Forests                               | Mixed Conifer                  |  |  |
|                  |                                       | Ponderosa Pine                 |  |  |
|                  |                                       | Rocky Mtn Bristlecone Pine     |  |  |
|                  |                                       | Spruce-Fir                     |  |  |
|                  | Grasslands                            | Foothill/Mountain Grassland    |  |  |

### **Condition of Key Habitats**

Colorado's SWAP addresses the condition of all key habitats pertinent to PGCN, with the exception of barrens, and cliffs and canyons. The current overall condition of barrens and cliff/canyon habitats in Colorado is good. These are harsh environments that generally do not support significant weed populations, and have not been among the higher priority areas for many common human uses (e.g., urban development, roads and infrastructure, agriculture). However, there is concern for downward trends in future condition of these habitats as human activities continue to expand. Specifically, these areas are impacted by motorized uses (including recreation – a significant threat in some places, as well as military use in certain areas). They are also experiencing increased urban and energy development in some places (e.g., some areas are becoming popular for second home and ranchette development). Increasing interest in renewable energy, and focus on natural gas as a "green" energy source, could push additional development of these resources into these habitats. These issues are discussed further in the following section. Habitat-specific threats and conservation actions are listed in Part 6, Table 7.

### Part 3: PROBLEMS AFFECTING THE SPECIES

Colorado's human population is soaring and land uses, such as energy and residential development, are increasing impacts to Colorado's native plants and their habitats. Colorado continues to be one of the fastest growing states in the country. The population is expected to grow from approximately 5 million to over 7.5 million by 2030 and to double to 10 million by 2050. The statewide development footprint increased from 1.3 million acres in 1970 to 2.5 million acres in 2000 and is expected to expand to more than 3.5 million acres by 2030. The state is losing its largest privately owned agricultural and natural lands many times faster than any other state in the nation (Colorado Conservation Trust 2007).

Colorado's irreplaceable native plants, plant communities, and ecosystems are thus increasingly being threatened. Most of Colorado's imperiled plants are naturally rare. They are rare because they are restricted to very specific, narrowly distributed habitats, rather than as a result of human actions, per se. However, because these species occupy such small areas, planning is necessary to avoid placing these species at further risk from human activities. Degradation, fragmentation, and loss of habitat are major reasons plant species and their habitats are imperiled or vulnerable in Colorado. The primary contributors to habitat degradation for imperiled plants are *energy development*, *motorized recreation*, *residential development*, and *road construction and maintenance* (CNHP and TNC 2011). Other risk factors include altered hydrologic regime, invasive species, agricultural development, loss of pollinators, incompatible grazing/trampling, and plant collecting (CNHP and TNC 2011). Additionally, there is strong scientific consensus that human-induced climate change is affecting species and ecological systems, and this is likely to exacerbate the effects of other human activities on plants (Enquist and Gori 2008).

One of the biggest issues is a *lack of awareness* and information regarding the presence, distribution, and precarious status of Colorado's native and imperiled plant species. Many rare plants inhabit small areas, have specialized needs, and have unique habitat requirements that are often missed by other approaches to conservation (e.g., those focused primarily on wildlife).

The following issues are statewide in scope, and apply to many PGCN. Table 7 presents general and specific threats on a species-by-species basis.

# **Energy Development**

The region's recent energy boom has rapidly transformed areas of Colorado, both economically and environmentally. According to Colorado Conservation Trust (2007), applications for oil and gas drilling permits increased by almost 500% from 1999 (1,010) to 2006 (5,904). Also, over

6,000 drilling permit applications were approved in 2007 — more than two-and-a-half times the 2,378 permits approved during Colorado's last energy development boom in 1981. More than 30,000 oil and gas wells are currently operating statewide and production has grown by almost 60% since 2000 (Colorado Conservation Trust 2007). The habitat that supports several rare plants is underlain by rich deposits of oil and natural gas. Oil and gas development activities and associated infrastructure can cause population fragmentation, habitat destruction and degradation, introduction of non-native plants, and alteration of surface hydrology. Oil and gas development often creates a high density of roads; these roads can provide easy access to new areas for off-road vehicle use (Center for Native Ecosystems et al. 2005). The habitat for rare plant species restricted to the Green River Formation in the Piceance Basin contains high grade oil shale deposits. The Parachute Creek Member of the Green River Formation is reported to have the best deposits of oil shale known in the world and is considered to be a major potential source of oil in the United States. However, millions of tons of shale must be mined each year to make the process economically feasible. The impacts of oil shale mining and processing can increase erosion due to vegetation removal, increase air pollution, fragment and/or eliminate some plant populations, and degrade remaining habitat, e.g., by spread of introduced invasive plant species (Center for Native Ecosystems et al. 2005).

#### **Motorized Recreational Activities**

Motorized recreation (including off highway, off road, all terrain, and four-wheel drive vehicles, motorcycles, and snowmobiles) is rapidly increasing in many areas where Colorado's rare plants grow and it is often difficult to enforce regulations or close access to protect plant habitat. Motorized recreation can reduce natural habitat for plants, impacting individual plants and populations. Roads and trails created by off-road vehicles impact plants by altering habitat, killing plants, increasing erosion, and creating dispersal corridors for invasive plant species.

# **Residential Development**

Twenty-four percent of the habitat occupied by imperiled plants in Colorado is found on private land. Accelerating residential and urban development, along with associated infrastructure such as roads and utilities, is consuming and fragmenting important habitat for native plants and plant communities. Exurban development (low-density rural development), the fastest growing land use in the United States, has been found to reduce many native species near homes and increase exotic species, with effects manifested over decades (Hansen et al. 2005). In addition to local effects, exurban development may alter ecological processes and biodiversity on adjacent and distant public lands. Underlying mechanisms involve alteration of habitat, ecological processes, biotic interactions, and increased human disturbance (Hansen et al. 2005).

#### **Road Construction and Maintenance**

Roads can have a serious impact upon the natural integrity and habitat effectiveness of rare plant sites. Along with extirpating populations and destroying habitat, roads contribute to fragmentation that may interfere with natural processes such as pollination and seed dispersal. Roads can act as barriers to insect pollinators for some plants. Other impacts from road construction and maintenance (e.g., mowing and herbicide application) include erosion and sedimentation, as well as introduction of invasive species.

#### **Other Factors**

Many rare plants are restricted to unusual substrates and comprise very small populations, thereby rendering them subject to random catastrophic events such as landslides or infestation. Other factors that impact Colorado's rare plants include: 1) widespread lack of awareness regarding their existence and precarious status; 2) inadequate funding for conservation and research; 3) inadequate legal protection for plants; and 4) over-collection for horticultural purposes (e.g., penstemons, cacti, orchids) or medicinal uses (e.g., arnica).

### **Climate Change**

Climate change is already having serious impacts across the globe. In the 20th century, global temperatures increased by 0.7 °C (1.3 °F) and Northern Hemisphere snow cover declined by 7% (Intergovernmental Panel on Climate Change 2007). The western United States has experienced an increase in average temperature during the last five years that is 70% greater than the world as a whole (Saunders et al. 2008).

The change in climate is driving plants out of their current geographic ranges and will likely result in regional extirpation and even extinction for some plant species (Schneider et al. 2007). Warmer temperatures and changing rainfall have shifted vegetation in several ecosystems up mountain slopes and towards polar regions. Alteration of seasons has changed the timing of lifecycle events of plants and animals, potentially resulting in an asynchrony between plants, environmental cues, and interacting organisms such as pollinators (Joyce 2008). The United Nations Intergovernmental Panel on Climate Change (IPCC 2007) predicts that all of North America is likely to warm by 2 °C (3.6 °F) during this century. There will likely be more droughts and other extreme weather events. Colorado will likely become hotter and drier with shorter snow seasons, earlier snow melt, and longer fire seasons. These potential impacts will interact with the other stresses to rare plants, e.g., loss or fragmentation of habitat from development, mining, and introduction of invasive species. The full impacts of climate change

on imperiled species are likely to significantly reduce habitat, which is particularly problematic for rare plants that demand very specific growing conditions (Loarie et al. 2008).

To get a better sense of the relative vulnerability of the PGCN to climate change, the Colorado Natural Heritage Program (CNHP) conducted a rapid, first-iteration assessment using NatureServe's Climate Change Vulnerability Index (CCVI) (Appendix B). They used available data sources, including CNHP's databases and the U.S. Forest Service species assessments. However, there are significant data gaps for most of the PGCN. Therefore, many assumptions were made based on field observations, expert judgment, information on related species, and general habitat-level information.

Not surprisingly, the majority of the 121 PGCN scored Extremely Vulnerable or Highly Vulnerable (Table 3). Exceptions were *Carex stenoptila* and *Ptilagrostis porteri*, which scored Moderately Vulnerable, and *Ipomopsis aggregata* ssp. weberi, which scored Presumed Stable. There was insufficient information to complete the Index for 11 species. Overall, the most significant factors contributing to PGCN vulnerability to climate change are:

- restricted range,
- inability to disperse long distances,
- restricted habitats and natural barriers that prevent range/distribution shifting, and
- moisture regimes (reduced future moisture availability, physiological hydrological niche (micro-habitats), and historic hydrological niche (surrogate for species' tolerance for fluctuations in moisture availability).

Over half of Colorado's PGCN (69) have their entire range within the state, which is projected to experience temperature increases of approximately 5 – 5.5 degrees Fahrenheit (www.climatewizard.org). For most PGCN (89), natural barriers such as major rivers, mountain ranges, restriction of required substrates, and/or other environmental conditions exist that may inhibit or prevent range/distribution shifts in response to climate change. This is especially true for the species that inhabit alpine, barrens, and cliff/canyon habitats.

With a few exceptions, anthropogenic barriers are generally not as significant a factor in climate change vulnerability. However, the anthropogenic barrier factor was one of the factors with more significant uncertainty in the scoring, along with moisture regimes and climate change mitigation land uses. Anthropogenic barrier scores were estimated using coarse scale data in GIS. The degree to which coarse scale assessments are accurate at rare plant occurrence scales is unknown.

Among climate change projection models, there is much less agreement on precipitation projections for Colorado than there is on temperature. Scoring factors related to hydrology are

significant for some species, particularly those that inhabit riparian or wetland habitats, and those that seek out cool/moist micro-climates. Therefore, this factor should be re-assessed as climate change models improve.

Roughly half of the PGCN were rated vulnerable to potential future threats from land uses designed to mitigate climate change (e.g., renewable energy development such as wind, solar). However, there are many influences over land use – economic, political, social – and how actual land use plays out over future years is highly uncertain.

The most significant data gaps are pollinators and mutualisms such as mycorrhizal relationships. A significant issue that was beyond the scope of this project is estimating how and where rare plant habitats and distributions may shift as a result of changing climate. This is a crucial next step in refining conservation and adaptation strategies for Colorado's PGCN.

### Part 4: PRIORITIES FOR CONSERVATION ACTION

The following statewide conservation objectives, adapted from the RPCI Rare Plant Conservation Strategy, are necessary to meet the conservation needs of Colorado's PGCN. These objectives represent the most urgent and critical actions needed to effectively conserve Colorado's imperiled plant species. These objectives will guide conservation activities and catalyze collaborative conservation action over the next decade.

The following Objectives and Conservation Actions are statewide in scope, and are applicable to all PGCN. Table 3 presents specific, prioritized conservation actions on a species-by-species basis.

### **Statewide Conservation Objectives**

The six statewide conservation objectives are:

- 1. Secure on-the-ground, site-specific habitat protection and/or management to achieve specific goals for all of Colorado's imperiled plants on public and private lands. Focus these activities in places that are likely to remain stable under predicted climate change scenarios, and on areas needed to maintain habitat connectivity (e.g., to facilitate climate-related distributional shifts).
- 2. *Minimize threats* from specific land uses that impact many of Colorado's imperiled plants statewide, and *develop climate change adaptation strategies* for vulnerable species.
- 3. *Improve scientific understanding* of the distribution, natural history, response to climate change, and status of Colorado's most imperiled plants through inventory, research, and monitoring.
- 4. **Develop and implement a state program and policies** to enhance the conservation of Colorado's most imperiled plants in cooperation with public land managers, private landowners, and other interested stakeholders.
- 5. *Facilitate the stewardship* of Colorado's most imperiled plants through education, outreach, and coordination.

6. *Adopt measures for the ex situ (off site) conservation* of Colorado's most imperiled plants in case native populations are extirpated due to stochastic events, anthropogenic impacts, and/or climate change.

### **Recommended Conservation Actions for Short-term (1-5 years)**

- 1. Select targeted PGCN for site-specific conservation action each year (e.g., select "poorly conserved" species from Colorado's Biodiversity Scorecard).
- 2. Prioritize the 32 Important Plant Areas ranked (B1) for action in 2009-2013. Develop and implement conservation action plans with working groups consisting of local experts, land trusts, and land managers. Identify appropriate actions for each area.
  - a. Work with land trusts and willing landowners to place conservation easements on private lands within the 32 B1 Important Plant Areas (and selected B2s).
  - b. Develop multi-species proposals to fund habitat protection of imperiled plant species across Colorado.
- 3. Work with public agencies to collect/share best available data, develop and implement best management practices, and pursue special agency designations for PGCNs.
- 4. Develop a plant policy for the Colorado Department of Natural Resources, General Assembly joint resolution, and Governor's executive order.
- 5. Develop a bill for a state plant statute that establishes a legally-recognized list of PGCN, acknowledges Colorado's interest in protecting them, and provides a variety of resources for their conservation.
- 6. Integrate the PGCN into other statewide conservation planning and protection efforts in addition to the SWAP. Examples include the Statewide Forest Assessment, Colorado Conservation Partnership, Colorado Conservation Summit, federal management plan revisions, and local planning efforts.
- 7. Improve scientific understanding of the distribution, natural history, response to climate change, and status of PGCN through inventory, research and monitoring.
- 8. Adopt measures for ex situ (off site) conservation in case native populations are extirpated.

# Long-term Recommendations (5-10 years)

- 1. Update the *Biodiversity Scorecard* every five years and address climate change and other emerging impacts in future iterations.
- 2. Update the *Colorado Rare Plant Conservation Strategy and any rare plant component of Colorado's SWAP* every five years, starting in 2014, and include consideration of other plant species groups such as vulnerable vascular plant species (ranked G3 by CNHP and NatureServe) and non-vascular plants (lichens, mosses, and liverworts).

- 3. Develop conservation action plans for all high priority B2 Important Plant Areas, working with local experts, land trusts, and land managers.
- 4. Assess status of threats, protection/conservation, and viability of Colorado's PGCN every five years.

### **Important Plant Areas**

Over 200 Important Plant Areas (IPAs) have been identified by the Colorado Natural Heritage Program and recognized by RPCI (Figure 4). These IPAs are based on CNHP's Potential Conservation Areas, and include the highest quality locations for PGCN. IPAs represent our best estimate of the areas needed to support the continued existence of Colorado's most imperiled

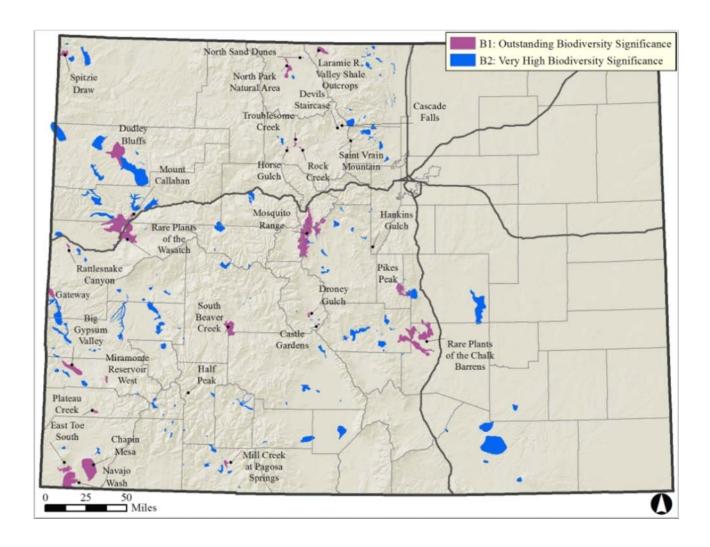


Figure 4. Important Plant Areas for PGCN. To improve map readability, only the B1 Important Plant Areas are labeled.

plant species in places where they currently occur. Potential distribution shifts in response to climate change are not incorporated in this iteration. Although IPAs do not carry any regulatory authority, they can provide guidance on opportunities for conservation, and highlight places where public land managers and private landowners can help conserve plant species and habitats. These IPAs are ranked by CNHP on a scale as having either Outstanding Biodiversity Significance (B1) or Very High Significance (B2).

#### **Priority Research and Survey Efforts Needed**

#### Research

Very little is known about the life history and reproductive biology of most Colorado's PGCN. Additionally, some species need taxonomic work, including golden columbine (*Aquilegia chrysantha* var. *rydbergii*) and boat-shaped bugseed (*Corispermum navicula*), among others (Table 3). Increased collaboration with academic institutions will help address the key research needs of Colorado's imperiled plants.

Recommended research and research-related activities include:

- Prioritize research needs for Colorado's PGCN annually (for example, during Annual Colorado Rare Plant Technical Committee Symposia, Biodiversity Scorecard updates, etc.) and share priorities with the academic community and other partners.
- Support and conduct research that seeks to better understand how human activities, such as dust from energy development, ORV use, or herbicide application may impact PGCN, and inform mitigation of the impacts of these activities (e.g., through use of Best Management Practices, reintroductions, etc.).
- Conduct systematic and genetic research on those PGCN for which there are taxonomic questions. Conduct analyses for plant chemicals that could be effective in medicines.
- Support and conduct species-specific research to answer basic questions about the natural history of PGCN, including response to climate change. Priorities include reproductive biology (e.g., pollination, breeding system, and seed dispersal mechanisms), life history (e.g., germination requirements and survival to reproduction), and ecology (e.g., edaphic or soil requirements and mycorrhizal relationships), as well as other important ecological processes needed for their survival (e.g., fire or other disturbance). Priority research needs

for climate change include response to, and tolerable thresholds for, increasing temperatures, and both increasing and decreasing moisture availability.

• Model how species' habitat and distributions may shift in response to climate change.

#### Survey

A number of PGCN are in particular need of focused field surveys to inform understanding of distribution, level of rarity and imperilment, and status. These include Cronquist milkvetch (*Astragalus cronquistii*), Mancos milkvetch (*Astragalus humillimus*), Comb Wash buckwheat (*Erigonum clavellatum*), and Piceance bladderpod (*Lesquerella parviflora*).

Recommended surveys and survey-related actions include the following. See Part 7 for monitoring recommendations.

- Prioritize survey needs for PGCN annually (for example, during Annual Colorado Rare Plant Technical Committee Symposia, Biodiversity Scorecard updates, etc.).
- Conduct targeted surveys of Colorado's PGCN to fill data gaps and increase knowledge about geographic range, distribution, population size, condition, threats, and status.
   Document the occurrence and distribution of PGCN with CNHP occurrence records, voucher specimens, and photographs.
- Evaluate recommended conservation actions for PGCN (species and occurrences) through targeted site visits and existing database information.
- Periodically update Important Plant Areas for all PGCN to guide conservation actions, and assess status of IPAs in terms of climate change. Conduct field visits of existing and potential additional IPAs as identified by the CNHP.
- Secure funding to help update and maintain CNHP's database to enhance the ability to keep the Colorado Rare Plant Conservation Strategy and any rare plant component of Colorado's SWAP current.
- Acquire fine-scale data necessary for high-precision modeling of the rarest PGCN and conduct modeling to inform targeted surveys.

# Part 5: PRIORITIES, THREATS, AND CONSERVATION ACTIONS FOR PGCN AND THEIR HABITATS

The following tables contain detailed conservation priorities, threats, and conservation actions for species (Table 3) and habitats (Table 4). Part 1 of this document describes the process used for generating these tables. These data are housed within an Access database within the Colorado Natural Heritage Program (<a href="https://www.cnhp.colostate.edu">www.cnhp.colostate.edu</a>).

Table 3. Plants of Greatest Conservation Need – Priorities, Threats, and Conservation Actions. Sorted by Scientific Name.

| Aletes humilis              | Population                | Status   | Population  | n Trend | Distribution                         | Type        | Habitat   | Primary  |
|-----------------------------|---------------------------|----------|---|---------|--------------------------------------|-------------|---|----------|
|                             | High                      | D        | Stable  | D       | Southern Rocky Mountains             | P           | Cliff and Canyon  | <b>✓</b> |
| Larimer aletes              |                           |          |   |         |                                      |             | Ponderosa Pine  | Ш        |
| Tier 2 Plants               |                           |          |   |         |                                      |             |   |          |
| General Threat              | Specific Th               | reat     |   |         | General Conservation Action          | Spe         | ecific Conservation Action  | Priority |
| Climate                     | poor dispers              | sal capa |   |         | Ex-situ Conservation                 |             | ed banking (incl. protocols,<br>llection, and cultivation)  | Н        |
| Climate                     | Habitat shif climate char | _        | alteration du                                     | ie to   | Planning and Zoning                  | res<br>and  | odel potential habitat/range shifts in<br>sponse to projected climate changes<br>d prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |                           | self and | nse to climate<br>/or inter-dep                   |         | Research and Monitoring              | and<br>clin | induct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Climate                     |                           | f normal | (intensification weather patterns)                |         | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive unning and conservation programs   | M        |
| Natural Factors             | Habitat is li             |          |   |         | Research and Monitoring              |             | search critical life history/habitat<br>mponents  | M        |
| Natural Factors             | Habitat is li             | mited    |   |         | Research and Monitoring              |             | onitor populations for early detection potential threats  | M        |
| Non-consumptive Disturbance | Recreation                |          |   |         | Education and Communication          | edı         | blish educational material/sponsor<br>ucational programs to raise public<br>areness   | L        |
| Aletes latilobus            | Population                | Status   | Population  | n Trend | Distribution                         | Туре        | Habitat   | Primary  |
|                             | Medium                    | D        | Unknown   |         | Colorado Plateau                     | P           | Cliff and Canyon  | <b>V</b> |
| Canyonlands aletes          |                           |          |   |         |                                      |             | Desert Shrub  |          |
| Tier 1 Plants               |                           |          |   |         |                                      |             |   |          |
| General Threat              | Specific Th               | reat     |   |         | General Conservation Action          | Spo         | ecific Conservation Action  | Priority |
| Climate                     | poor disper               | sal capa | o movement le<br>city, and/or<br>abitat feature   |         | Ex-situ Conservation                 |             | ed banking (incl. protocols,<br>llection, and cultivation)  | Н        |
| Climate                     | Habitat shif climate char | _        | alteration du                                     | ie to   | Planning and Zoning                  | res<br>and  | odel potential habitat/range shifts in<br>sponse to projected climate changes<br>d prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |                           | self and | nse to climate<br>/or inter-dep                   |         | Research and Monitoring              | and<br>clin | induct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Climate                     |                           | f normal | (intensification<br>weather patted<br>ados, etc.) |         | Capacity Building and<br>Cooperation | En          | gage in collaborative, proactive<br>unning and conservation programs  | M        |
| Natural Factors             | Limited hab               |          |   |         | Protected Area Management            |             | onitor populations for early detection potential threats  | M        |
|                             |                           |          |   |         |                                      |             |   |          |

| Aletes macdougalii   | Population Status   | Population Trend  | Distribution  | Type  | Habitat  | Primary     |
|--|---|---|---|---|--|-------------|
| ssp. breviradiatus   | Low D   | Unknown   | Colorado Plateau  | P   | Pinyon-Juniper   |             |
| Mesa Verde aletes  |   |   |   |   | Sandy Areas  |             |
| Tier 2 Plants  |   |   |   |   |  |             |
| General Threat   | Specific Threat   |   | General Conservation Action   | Spe   | cific Conservation Action  | Priorit     |
| Climate  | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal   | ity, and/or   | Ex-situ Conservation  |   | d banking (incl. protocols,<br>ection, and cultivation)  | Н           |
| Climate  | Habitat shifting and climate change   | alteration due to   | Planning and Zoning   | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н           |
| Climate  | Phenological respon<br>of species itself and/<br>species unknown  |   | Research and Monitoring   | and<br>clin   | duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)   | Н           |
| Lack of knowledge  | Complete distributio<br>unknown   | n in Colorado   | Research and Monitoring   |   | duct field inventory to refine known ribution  | Н           |
| Climate  | Climate variability (<br>alteration of normal<br>e.g., droughts, tornad   | weather patterns,   | Capacity Building and<br>Cooperation  |   | age in collaborative, proactive<br>nning and conservation programs   | M           |
| Lack of knowledge  | Population status un  | known   | Research and Monitoring   | Moi   | nitor population status  | M           |
| Non-consumptive Disturbance  | Non-motorized recre   | eation  | Education and Communication   | Publish educational material/sponsor<br>educational programs to raise public<br>awareness                                       |  | М           |
| Aliciella sedifolia  | Population Status   | Population Trend  | Distribution  | Туре  | Habitat  | Primary     |
| Auciena searjona   | Low D   | Unknown   | Southern Rocky Mountains  | P   | Exposed Rock (alpine)  | <b>✓</b>    |
| Stonecrop gilia Tier 1 Plants  | a 10 m  |   |   |   |  | <b>D</b>    |
| General Threat   | Specific Threat   |   | General Conservation Action   |   | cific Conservation Action  | Priorit     |
| Climate  | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal   | ity, and/or   | Ex-situ Conservation  |   | d banking (incl. protocols, ection, and cultivation)   | Н           |
| Climate  | resurrement to rure nu  | bitat features  |   |   |  |             |
|  | Habitat shifting and climate change   |   | Planning and Zoning   | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н           |
| Climate  | Habitat shifting and climate change   | alteration due to   | Planning and Zoning  Research and Monitoring  | resp<br>and<br>situ<br>Con<br>and<br>clim   | onse to projected climate changes prepare adaptation plan to define in   | Н           |
| Indirect Consumptive Use   | Habitat shifting and climate change  Phenological respon of species itself and/   | alteration due to<br>se to climate change<br>or inter-dependent   |   | resp<br>and<br>situ<br>Con<br>and<br>clim<br>(dis   | onse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs<br>duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors  |             |
| Indirect Consumptive Use<br>(Mortality)  | Habitat shifting and<br>climate change  Phenological respon<br>of species itself and/<br>species unknown  | alteration due to se to climate change for inter-dependent  | Research and Monitoring   | resp<br>and<br>situ<br>Con<br>and<br>clim<br>(dis<br>Imp<br>man   | conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs<br>duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)<br>lement compatible grazing  | Н           |
| Indirect Consumptive Use<br>(Mortality)<br>Lack of knowledge<br>Natural Factors                              | Habitat shifting and climate change  Phenological respon of species itself and/species unknown  Grazing by domestic  Response to manage   | se to climate change for inter-dependent e sheep  | Research and Monitoring  Compatible Resource Use  | resp<br>and<br>situ<br>Con<br>and<br>clim<br>(dis<br>Imp<br>mar<br>Res  | conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element compatible grazing nagement earch species/habitat response to  | Н           |
| Indirect Consumptive Use<br>(Mortality)<br>Lack of knowledge<br>Natural Factors                              | Phenological respon<br>of species itself and/<br>species unknown  Grazing by domestic  Response to manage<br>poorly understood  | se to climate change or inter-dependent e sheep ment/disturbance  | Research and Monitoring  Compatible Resource Use  Research and Monitoring   | resp<br>and<br>situ<br>Con<br>and<br>clim<br>(dis<br>Imp<br>mar<br>Res<br>mar<br>Mon  | conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element compatible grazing nagement earch species/habitat response to nagement or disturbance  | H<br>H      |
| Climate  Indirect Consumptive Use (Mortality) Lack of knowledge  Natural Factors Non-consumptive Disturbance | Habitat shifting and climate change  Phenological respon of species itself and/species unknown  Grazing by domestic  Response to manage poorly understood  Small population siz | se to climate change for inter-dependent e sheep ment/disturbance e eation  | Research and Monitoring  Compatible Resource Use  Research and Monitoring  Research and Monitoring                              | resp<br>and<br>situ<br>Con<br>and<br>clim<br>(dis<br>Imp<br>mar<br>Res<br>mar<br>Moi<br>Pub<br>educ<br>awa                      | conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element compatible grazing nagement earch species/habitat response to nagement or disturbance nitor population status lish educational material/sponsor cational programs to raise public                                | H<br>H<br>H |
| Indirect Consumptive Use (Mortality) Lack of knowledge  Natural Factors Non-consumptive Disturbance          | Phenological respon of species itself and/species unknown  Grazing by domestic  Response to manage poorly understood  Small population siz  Non-motorized recre                 | alteration due to  se to climate change for inter-dependent  e sheep ment/disturbance e eation intensification or weather patterns, | Research and Monitoring  Compatible Resource Use  Research and Monitoring  Research and Monitoring  Education and Communication | resp<br>and<br>situ<br>Con<br>and<br>clim<br>(dis<br>Imp<br>mar<br>Res<br>mar<br>Moi<br>Pub<br>educ<br>awa<br>Wri<br>mar<br>Eng | conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element compatible grazing nagement earch species/habitat response to nagement or disturbance nitor population status lish educational material/sponsor cational programs to raise public reness te and implement travel | H<br>H<br>H |

X = Best professional judgement, D = Science-based decision, P = Primary area of distribution, O = Other areas where species occurs.

| Anticlea    | a vaginatus        | Population S                                     | Status   | Population Trend                                      | Distribution   | Type             | Habitat   | Primary  |
|-------------|--------------------|--|----------|---|--|------------------|---|----------|
|             | o .                | Medium   | D        | Unknown   | Utah-Wyoming Rocky<br>Mountains                                    | P                | Cliff and Canyon  | <b>✓</b> |
| Alcove dea  | ath camas          |  |          |   |  |                  |   |          |
| Tier 2      | Plants             |  |          |   |  |                  |   |          |
| General Th  | nreat              | Specific Thre                                    | eat      |   | General Conservation Action  | Spe              | ecific Conservation Action  | Priority |
| Climate     |                    | Vulnerability<br>poor dispersa<br>restriction to | ıl capac | •   | Ex-situ Conservation   |                  | ed banking (incl. protocols,<br>election, and cultivation)  | Н        |
| Climate     |                    | Habitat shifti<br>climate chanş                  | _        | alteration due to                                     | Planning and Zoning  | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs   | Н        |
| Climate     |                    |  | elf and/ | se to climate change<br>or inter-dependent            | Research and Monitoring  | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)      | Н        |
| Lack of kn  | owledge            | Complete dis<br>unknown                          | tributio | on in Colorado  | Research and Monitoring  |                  | nduct field inventory to refine knowr<br>tribution  | h H      |
| Climate     |                    |  | normal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                               |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of kn  | owledge            | Population st                                    | atus un  | known   | Research and Monitoring  | Mo               | nitor population status   | M        |
| Habitat De  | gradation          | Altered hydro<br>aquifer)                        | ologica  | l regime (surface or                                  | Maintain or Restore Natural<br>Processes                           | Res              | store natural hydrologic regime   | L        |
| Aquileg     | ia chrysantha      | Population S                                     | Status   | Population Trend                                      | Distribution   | Type             | Habitat   | Primary  |
| var. ryd    | bergii             | Low  | D        | Declining D   | Southern Rocky Mountains   | P                | Mountain Streams  | <b>✓</b> |
| Golden col  | lumbine            |  |          |   |  |                  | Seeps and Springs<br>Douglas Fir  |          |
| Tier 2      | Plants             |  |          |   |  |                  |   |          |
| General Th  | nreat              | Specific Thre                                    |          |   | General Conservation Action  | -                | ecific Conservation Action  | Priority |
| Climate     |                    | Vulnerability<br>poor dispersa<br>restriction to | ıl capac |   | Ex-situ Conservation   |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate     |                    | Habitat shifti<br>climate chang                  | -        | alteration due to                                     | Planning and Zoning  | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate     |                    |  | elf and/ | se to climate change<br>for inter-dependent           | Research and Monitoring  | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)      | Н        |
| Lack of kn  | owledge            | Taxonomic s                                      |          |   | Research and Monitoring  | Tax              | konomic work is needed  | H        |
| Natural Fac |                    |  | are sma  | ll and declining                                      | Research and Monitoring  |                  | nitor population status   | H        |
|             | mptive Disturbance | Recreation                                       |          |   | Voluntary Standards  | for              | plement Best Management Practices recreation management   | Н        |
| Climate     |                    |  | normal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                               |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Habitat Co  | nversion           | Housing, urb<br>development                      |          | ex-urban  | Land Protection (Public, Private<br>Easements, and Resource Rights |                  | quire conservation easement for<br>oitat protection   | M        |
| Habitat De  | gradation          | Fragmentatio                                     | n        |   | Land Protection (Public, Private<br>Easements, and Resource Rights | s hab            | ablish legal designation to protect<br>bitat (e.g., wilderness, Research<br>tural Area, Special Interest Area)  | M        |
| Invasive or | Exotic Species     | Invasive plan<br>varieties that                  |          | eds and garden<br>nybridize)                          | Invasive Species Control and Prevention                            | Con              | ntrol non-natives   | M        |
|             |                    |  |          |   |  |                  |   |          |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Asclepias ı                    | uncialis ssp.   | Population S                                       | Status   | Population     | Trend    | Distribution   | Type        | Habitat  | Primary  |
|--------------------------------|-----------------|--|----------|----------------|----------|--|-------------|--|----------|
| uncialis                       | -               | Medium   | D        | Declining      | D        | Central Shortgrass Prairie   | P           | Shortgrass Prairie   | <b>✓</b> |
| Dwarf milkwee                  | ed              |  |          |                |          | Southern Rocky Mountains   | О           | Pinyon-Juniper   |          |
| Tier 2 P                       | Plants          |  |          |                |          |  |             |  |          |
| General Threat                 | t               | Specific Three                                     | eat      |                |          | General Conservation Action  | Spe         | ecific Conservation Action   | Priority |
| Climate                        |                 | Vulnerability<br>poor dispersa<br>restriction to   | ıl capac | city, and/or   | arriers, | Ex-situ Conservation   |             | ed banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate                        |                 | Habitat shifti<br>climate chang                    |          | alteration due | e to     | Planning and Zoning  | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>d prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                        |                 | Phenological<br>of species its<br>species unknown  | elf and  |                |          | Research and Monitoring  | and<br>clin | nduct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Habitat Conver                 | rsion           | Conversion to                                      | o cropl  | and            |          | Land Protection (Public, Private<br>Easements, and Resource Rights | / /         | quire conservation easement for pitat protection   | Н        |
| Natural Factors                | s               | Population libiological red                        |          | •              |          | Research and Monitoring  |             | search critical life history/habitat<br>mponents   | Н        |
| Climate                        |                 | Climate varia<br>alteration of t<br>e.g., droughts | normal   | weather patte  |          | Capacity Building and<br>Cooperation                               |             | gage in collaborative, proactive<br>inning and conservation programs   | M        |
| Indirect Consum<br>(Mortality) | mptive Use      | Incompatible                                       | Grazir   | ng             |          | Voluntary Standards  |             | plement Best Management Practices<br>livestock grazing   | M        |
| Non-consumpti                  | ive Disturbance | Off-road veh                                       | icular t | ravel          |          | Compatible Resource Use  |             | nage use to be compatible with diversity   | M        |
| Habitat Conver                 | rsion           | Energy Deve  | lopmer   | nt             |          | Voluntary Standards  |             | plement Best Management Practices<br>energy development and mining   | L        |
| Invasive or Exc                | otic Species    | Invasive plan                                      | nts      |                |          | Invasive Species Control and Prevention                            |             | plement integrated weed/pest<br>nagement plan  | L        |

| Astragalus anisus                       | Population Sta  | atus    | Population '   | Trend   | Distribution                            | Type                    | Habitat   | Primary  |
|---|---|---------|----------------|---------|---|-------------------------|---|----------|
|   | Medium  | D       | Stable         | D       | Southern Rocky Mountains                | P                       | Sagebrush   | ✓        |
| Gunnison milkvetch                      |   |         |                |         |   |                         |   |          |
| Tier 2 Plants                           |   |         |                |         |   |                         |   |          |
| General Threat                          | Specific Threat   | t       |                |         | General Conservation Action             | Spe                     | ecific Conservation Action  | Priority |
| Climate                                 | Vulnerability d<br>poor dispersal or<br>restriction to ra | capacit | ty, and/or     | rriers, | Ex-situ Conservation                    |                         | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                                 | Habitat shifting climate change                           | -       | lteration due  | to      | Planning and Zoning                     | res <sub>I</sub><br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                                 | Phenological re<br>of species itself<br>species unknow    | f and/o |                |         | Research and Monitoring                 | and<br>clin             | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Degradation                     | Roads   |         |                |         | Voluntary Standards                     |                         | plement Best Management Practices transportation projects   | Н        |
| Non-consumptive Disturbance             | Motor-powered   | d recre | ation          |         | Voluntary Standards                     | for                     | plement Best Management Practices recreation management   | Н        |
| Climate                                 | Climate variabi<br>alteration of no<br>e.g., droughts, t  | rmal v  | veather patter |         | Capacity Building and<br>Cooperation    |                         | gage in collaborative, proactive nning and conservation programs  | M        |
| Lack of knowledge                       | Response to fir<br>unknown                                | e and o | other disturb  | ances   | Research and Monitoring                 |                         | search species/habitat response to nagement or disturbance  | M        |
| Lack of knowledge                       | Basic life cycle  | unkno   | own            |         | Research and Monitoring                 |                         | search critical life history/habitat inponents  | M        |
| Habitat Degradation                     | Altered fire reg<br>increased fire e                      |         |                | rass)   | Invasive Species Control and Prevention | _                       | olement integrated weed/pest<br>nagement plan   | L        |
| Indirect Consumptive Use<br>(Mortality) | Grazing   |         |                |         | Voluntary Standards                     |                         | olement Best Management Practices livestock grazing   | L        |
| Invasive or Exotic Species              | Invasive plants   | (espec  | cially cheatgr | rass)   | Invasive Species Control and Prevention |                         | olement integrated weed/pest<br>nagement plan   | L        |
| A 4                                     | Population Sta  | atue    | Population '   | Trand   | Distribution                            | Type                    | Habitat   | Primary  |
| Astragalus cronquistii                  | Low   | D       | Unknown        | D       | Colorado Plateau                        | Type<br>P               | Desert Shrub  | ✓ ✓      |
| Cronquist milkvetch                     |   |         |                |         |   |                         |   |          |
| Tier 2 Plants                           |   |         |                |         |   |                         |   |          |
| General Threat                          | Specific Threat   |         |                |         | General Conservation Action             |                         | ecific Conservation Action  | Priority |
| Climate                                 | poor dispersal c<br>restriction to ra                     | capacit | ty, and/or     | rriers, | Ex-situ Conservation                    |                         | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                                 | Habitat shifting climate change                           | _       | lteration due  | to      | Planning and Zoning                     | res <sub>l</sub><br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                                 | Phenological re<br>of species itself<br>species unknow    | f and/o |                |         | Research and Monitoring                 | and<br>clin             | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge                       | Complete distri<br>unknown                                | ibution | in Colorado    |         | Research and Monitoring                 |                         | nduct field inventory to refine known<br>tribution  | h H      |
| Climate                                 | Climate variabi<br>alteration of no                       | rmal v  | veather patter |         | Capacity Building and<br>Cooperation    |                         | gage in collaborative, proactive<br>nning and conservation programs   | M        |
|   | e.g., droughts, t   | tomad   | 03, Cic.)      |         |   |                         |   |          |
| Habitat Degradation                     | e.g., droughts, t<br>Roads                                | tornadi | 03, Ctc.)      |         | Voluntary Standards                     |                         | plement Best Management Practices transportation projects   | M        |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Astragalus debequaeus | Population S                                       | tatus   | Population    | n Trend | Distribution                         | Type        | Habitat  | Primary  |
|-----------------------|--|---------|---------------|---------|--------------------------------------|-------------|--|----------|
|                       | Medium   | D       | Stable        | D       | Southern Rocky Mountains             | P           | Barrens  | <b>V</b> |
| D-D                   |  |         |               |         | Utah High Plateau                    | P           | Pinyon-Juniper   | <b>✓</b> |
| DeBeque milkvetch     |  |         |               |         | Colorado Plateau                     | O           | Desert Shrub   |          |
| Tier 2 Plants         |  |         |               |         |                                      |             | Sagebrush  |          |
| General Threat        | Specific Thre                                      | at      |               |         | General Conservation Action          | Spe         | ecific Conservation Action   | Priority |
| Climate               | Vulnerability<br>poor dispersa<br>restriction to   | l capac | ity, and/or   | •       | Ex-situ Conservation                 |             | ed banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate               | Habitat shiftii<br>climate chang                   | _       | alteration du | ie to   | Planning and Zoning                  | res<br>and  | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate               | Phenological<br>of species itse<br>species unkno   | lf and/ |               | _       | Research and Monitoring              | and<br>clin | nduct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Resource Extraction   | Oil and gas di                                     | rilling |               |         | Voluntary Standards                  |             | plement Best Management Practices energy development and mining  | Н        |
| Climate               | Climate varia<br>alteration of r<br>e.g., droughts | ormal   | weather patt  |         | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Habitat Degradation   | Roads  |         |               |         | Voluntary Standards                  |             | plement Best Management Practices transportation projects  | M        |
| Lack of knowledge     | Complete dist<br>unknown                           | ributio | on in Colorac | lo      | Research and Monitoring              |             | nduct field inventory to refine known tribution  | М        |
| Lack of knowledge     | Biology and e                                      | cology  | y poorly kno  | wn      | Research and Monitoring              |             | search critical life history/habitat<br>mponents   | M        |

# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Astragalus deterior         | Population Sta   | atus F     | Population Trend                     | Distribution                         | Type        | Habitat  | Primary  |
|-----------------------------|--|------------|--------------------------------------|--------------------------------------|-------------|--|----------|
| 0                           | Low  | D U        | Jnknown                              | Colorado Plateau                     | P           | Cliff and Canyon   | ✓        |
| Cliff-palace milkvetch      | All known occ  | currence   | s are historical.                    |                                      |             |  |          |
| Tier 1 Plants               |  |            |                                      |                                      |             |  |          |
| General Threat              | Specific Threat  | t          |                                      | General Conservation Action          | Spe         | ecific Conservation Action   | Priority |
|                             |  |            |                                      | Protected Area Management            |             | nage public use to be compatible h biodiversity  | Н        |
| Climate                     | Vulnerability do<br>poor dispersal c<br>restriction to ran | capacity,  |                                      | Ex-situ Conservation                 |             | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                     | Habitat shifting climate change                            | -          | eration due to                       | Planning and Zoning                  | resp        | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |  | f and/or   | to climate change<br>inter-dependent | Research and Monitoring              | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Lack of knowledge           | Population statu   | us unkno   | own                                  | Research and Monitoring              | Mo          | onitor population status   | Н        |
| Lack of knowledge           | Complete distri<br>unknown                                 | ibution i  | n Colorado                           | Research and Monitoring              |             | nduct field inventory to refine known tribution  | Н        |
|                             |  |            |                                      | Education and Communication          | edu         | blish educational material/sponsor<br>acational programs to raise public<br>areness  | M        |
| Climate                     | Climate variabilial alteration of nor e.g., droughts, t    | rmal we    | ather patterns,                      | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Lack of knowledge           | Response to dis  | sturbance  | e unknown                            | Research and Monitoring              |             | search species/habitat response to nagement or disturbance   | M        |
| Non-consumptive Disturbance | Non-motorized  | l recreati | on                                   | Voluntary Standards                  |             | plement Best Management Practices recreation management  | L        |

| Astragalus equisolensis     | Population S                                     | Status   | Population Trend                                      | Distribution  | Type        | Habitat   | Primary  |
|-----------------------------|--|----------|---|---|-------------|---|----------|
|                             | Low  | D        | Unknown   | Colorado Plateau  | P           | Pinyon-Juniper  | <b>✓</b> |
| Horseshoe milkvetch         |  |          |   |   |             |   |          |
| Tier 2 Plants               |  |          |   |   |             |   |          |
| General Threat              | Specific Thre                                    | eat      |   | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
|                             |  |          |   | Education and Communication   | edu         | plish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |
| Climate                     | Vulnerability<br>poor dispersa<br>restriction to | ıl capac | eity, and/or  | Ex-situ Conservation  |             | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                     | Habitat shifti<br>climate chang                  |          | alteration due to                                     | Planning and Zoning   | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |  | elf and  | se to climate change<br>for inter-dependent           | Research and Monitoring   | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Habitat Degradation         |  |          |   | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | pand existing Palisade ACEC   | Н        |
| Non-consumptive Disturbance | Recreation                                       |          |   | Voluntary Standards   |             | plement Best Management Practices recreation management   | Н        |
| Climate                     |  | normal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge           | Population st                                    | atus un  | known   | Research and Monitoring   | Mo          | onitor population status  | M        |
| A                           | Population S                                     | Status   | Population Trend                                      | Distribution  | Tuna        | Habitat   | Primary  |
| Astragalus humillimus       | Low  | D        | Unknown   | Colorado Plateau  | Type<br>P   | Cliff and Canyon  | ✓        |
| Mancos milkvetch            |  |          |   |   |             |   |          |
| Tier 1 Plants               |  |          |   |   |             |   |          |
| General Threat              | Specific Thre                                    | eat      |   | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability<br>poor dispersa<br>restriction to | ıl capac |   | Ex-situ Conservation  |             | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                     | Habitat shifti<br>climate chang                  |          | alteration due to                                     | Planning and Zoning   | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |  | elf and  | ise to climate change<br>for inter-dependent          | Research and Monitoring   | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge           | Population st                                    | atus un  | known   | Research and Monitoring   |             | onitor population status  | Н        |
| Lack of knowledge           | Complete dis<br>unknown                          | tributio | on in Colorado  | Research and Monitoring   |             | nduct field inventory to refine knowr<br>tribution  | Н        |
| Lack of knowledge           | Threats are p                                    | oorly u  | nderstood   | Research and Monitoring   | Mo          | onitor population status  | Н        |
| Climate                     | Climate varia                                    | bility ( | intensification or                                    | Capacity Building and   | Eng         | gage in collaborative, proactive  | M        |

| Astragalı    | us iodopetalus    | Population                    | Status    | Population Trend                                      | Distribution                         | Type             | Habitat   | Primary  |
|--------------|-------------------|-------------------------------|-----------|---|--------------------------------------|------------------|---|----------|
|              |                   | Medium                        | D         | Unknown   | Colorado Plateau                     | P                | Sagebrush   | <b>✓</b> |
| Violet milkv | etch              |                               |           |   | Southern Rocky Mountains             | P                | Mixed Forest  |          |
| Tier 2       | Plants            |                               |           |   |                                      |                  |   |          |
| General Thre |                   | Specific Thr                  | eat       |   | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |
| Climate      |                   | poor dispers                  | al capac  | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation                 |                  | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate      |                   | Habitat shift<br>climate chan | _         | alteration due to                                     | Planning and Zoning                  | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate      |                   |                               | elf and   | nse to climate change<br>/or inter-dependent          | Research and Monitoring              | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knov | wledge            | Complete dis<br>unknown       | stributio | on in Colorado  | Research and Monitoring              |                  | nduct field inventory to refine known<br>tribution  | n H      |
|              |                   |                               |           |   | Education and Communication          | edu              | plish educational material/sponsor<br>acational programs to raise public<br>areness   | M        |
| Climate      |                   |                               | normal    | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of know | wledge            | Population s                  | tatus un  | ıknown  | Research and Monitoring              | Mo               | nitor population status   | M        |
| Non-consum   | ptive Disturbance | Non-motoriz                   | ed recr   | eation  | Voluntary Standards                  |                  | plement Best Management Practices recreation management   | M        |
| Astragalı    | us                | Population                    | Status    | Population Trend                                      | Distribution                         | Type             | Habitat   | Primary  |
| lonchoca     |                   | Low                           | D         | Unknown   | Utah-Wyoming Rocky                   | P                | Pinyon-Juniper  | <b>✓</b> |
| var. ham     | =                 |                               |           |   | Mountains                            |                  | Desert Shrub  |          |
| Hamilton mi  | lkvetch           |                               |           |   |                                      |                  |   |          |
| Tier 1       | Plants            |                               |           |   |                                      |                  |   |          |
| General Thre | eat               | Specific Thr                  | eat       |   | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |
| Climate      |                   | poor dispers                  | al capac  | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation                 |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate      |                   |                               | ing and   | alteration due to                                     | Planning and Zoning                  | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate      |                   |                               | elf and   | nse to climate change<br>/or inter-dependent          | Research and Monitoring              | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of know | wledge            | unknown                       |           | on in Colorado  | Research and Monitoring              | dist             | nduct field inventory to refine knowr<br>tribution  |          |
| Lack of knov | wledge            | Population s                  |           |   | Research and Monitoring              |                  | nitor population status   | Н        |
| Climate      |                   |                               | normal    | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Non-consum   | ptive Disturbance | Non-motoriz                   | ed recr   | eation  | Voluntary Standards                  |                  | plement Best Management Practices recreation management   | M        |
|              |                   |                               |           |   |                                      |                  |   |          |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Astragalus  | Population Status Population  | Trend           | Distribution T  | ype  | Habitat  | Primary       |
|---|---|-----------------|---|--|--|---------------|
| microcymbus   | Medium D Declining  | D               | Southern Rocky Mountains  | P  | Sagebrush<br>Pinyon-Juniper  |               |
| Skiff milkvetch   |   |                 |   |  | , <sub>I</sub> .   |               |
| Tier 1 Plants   |   |                 |   |  |  |               |
| General Threat  | Specific Threat   |                 | General Conservation Action   | Spe  | cific Conservation Action  | Priority      |
|   |   |                 | Land Protection (Public, Private),<br>Easements, and Resource Rights  | hab  | ablish legal designation to protect<br>itat (e.g., Area of Critical<br>vironmental Concern)  | Н             |
|   |   |                 | Research and Monitoring   | Mo   | nitor population status  | Н             |
| Climate   | Vulnerability due to movement be<br>poor dispersal capacity, and/or<br>restriction to rare habitat features   | arriers,        | Ex-situ Conservation  |  | d banking (incl. protocols,<br>lection, and cultivation)   | Н             |
| Climate   | Habitat shifting and alteration due climate change  | e to            | Planning and Zoning   | resp<br>and  | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н             |
| Climate   | Phenological response to climate<br>of species itself and/or inter-deper<br>species unknown   | _               | Research and Monitoring   | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)   | Н             |
| Natural Factors   | Herbivory (e.g.,rabbits)  |                 | Research and Monitoring   |  | earch species/habitat response to nagement or disturbance  | Н             |
| Climate   | Climate variability (intensification alteration of normal weather patte e.g., droughts, tornados, etc.)   |                 | Capacity Building and<br>Cooperation  |  | gage in collaborative, proactive nning and conservation programs   | M             |
| Non-consumptive Disturbance   | Motor-powered recreation  |                 | Education and Communication   | edu  | olish educational material/sponsor<br>cational programs to raise public<br>areness   | M             |
| Non-consumptive Disturbance   | Motor-powered recreation  |                 | Voluntary Standards   |  | plement Best Management Practices recreation management  | M             |
| Astragalus  | Population Status Population  | Trend           | Distribution T  | Гуре   | Habitat  | Primary       |
| _   |   |                 |   | P  | Deciduous Oak  | <b>✓</b>      |
| missouriensis   | Medium D Unknown  |                 | Southern Rocky Mountains  |  | Ponderosa Pine   |               |
|   | Medium D Unknown  |                 | Southern Rocky Mountains  |  | FORGEROSA FIRE   | <b>✓</b>      |
| var. humistratus  | Medium D Unknown  |                 | Southern Rocky Mountains  |  | Foothill/Mountain Grassland  |               |
| var. humistratus<br>Missouri milkvetch  | Medium D Unknown  |                 | Southern Rocky Mountains  |  |  |               |
| var. humistratus<br>Missouri milkvetch<br>Tier 2 Plants   |   |                 | ·   | C  | Foothill/Mountain Grassland  |               |
| var. humistratus Missouri milkvetch Tier 2 Plants General Threat  | Specific Threat   | ·               | General Conservation Action   |  | Foothill/Mountain Grassland  | Priority      |
| var. humistratus Missouri milkvetch Tier 2 Plants General Threat  |   | arriers,        | ·   | See  | Foothill/Mountain Grassland  |               |
| war. humistratus Missouri milkvetch Tier 2 Plants General Threat Climate  | Specific Threat  Vulnerability due to movement be poor dispersal capacity, and/or   |                 | General Conservation Action   | See coll Mo resp and                                 | Foothill/Mountain Grassland cific Conservation Action d banking (incl. protocols,  | Priority      |
| war. humistratus Missouri milkvetch Tier 2 Plants General Threat Climate Climate                                    | Specific Threat  Vulnerability due to movement be poor dispersal capacity, and/or restriction to rare habitat features  Habitat shifting and alteration due   | e to<br>change  | General Conservation Action  Ex-situ Conservation  Planning and Zoning  | Mo<br>resp<br>and<br>situ                            | Foothill/Mountain Grassland  cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Priority<br>H |
| missouriensis var. humistratus Missouri milkvetch Tier 2 Plants General Threat Climate  Climate  Habitat Conversion | Specific Threat  Vulnerability due to movement be poor dispersal capacity, and/or restriction to rare habitat features  Habitat shifting and alteration due climate change  Phenological response to climate of species itself and/or inter-dependent.            | e to<br>change  | General Conservation Action  Ex-situ Conservation  Planning and Zoning  | See coll  Mo resp and situ  Con and clir (dis        | Foothill/Mountain Grassland  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors   | Priority<br>H |
| war. humistratus Missouri milkvetch Tier 2 Plants General Threat Climate Climate Climate                            | Specific Threat  Vulnerability due to movement bar poor dispersal capacity, and/or restriction to rare habitat features. Habitat shifting and alteration due climate change.  Phenological response to climate of species itself and/or inter-dependence unknown. | change<br>ndent | General Conservation Action  Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Land Protection (Public, Private), | See coll  Mo resp and situ Con and clir (dis Acc hab | roothill/Mountain Grassland  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) quire conservation easement for | Priority H H  |

**Table 3. - Continued.** 

| Astragalus naturitensis          | Population S                     | tatus   | Population Trend                                      | Distribution                               | Type        | Habitat   | Primary  |
|----------------------------------|----------------------------------|---------|---|--|-------------|---|----------|
| o .                              | Low                              | D       | Unknown   | Colorado Plateau                           | P           | Cliff and Canyon  | <b>V</b> |
| Naturita milkvetch Tier 2 Plants |                                  |         |   | Southern Rocky Mountains Utah High Plateau | P<br>O      | Pinyon-Juniper<br>Sagebrush   |          |
| General Threat                   | Specific Threa                   | at      |   | General Conservation Action                | Sne         | ecific Conservation Action  | Priority |
| Climate                          | 1                                | due to  |   | Ex-situ Conservation                       | See         | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                          | Habitat shiftin<br>climate chang | _       | alteration due to                                     | Planning and Zoning                        | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                          | _                                | lf and/ | se to climate change<br>or inter-dependent            | Research and Monitoring                    | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Resource Extraction              | Oil and gas dr<br>pipelines, dus | _       | (including roads,                                     | Voluntary Standards                        |             | plement Best Management Practices<br>energy development and mining  | Н        |
| Climate                          |                                  | ormal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation       |             | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge                | Population sta                   | tus un  | known   | Research and Monitoring                    | Mo          | onitor population status  | M        |
| Non-consumptive Disturbance      | Motor-powere                     | ed recr | eation  | Voluntary Standards                        |             | plement Best Management Practices recreation management   | M        |

| Astragalus osterhout       | Population                  | Status    | Population Trend                                       | Distribution  | Type             | Habitat   | Primary  |
|----------------------------|-----------------------------|-----------|--|---|------------------|---|----------|
| Ü                          | Low                         | D         | Unknown  | Southern Rocky Mountains  | P                | Sagebrush   | <b>✓</b> |
| Kremmling milkvetch        |                             |           |  |   |                  |   |          |
| Tier 1 Plants              |                             |           |  |   |                  |   |          |
| General Threat             | Specific Th                 | reat      |  | General Conservation Action   | Spe              | ecific Conservation Action  | Priority |
|                            |                             |           |  | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab<br>Nat       | ablish legal designation to protect<br>vitat (e.g., wilderness, Research<br>tural Area, Acrea of Critical<br>vironmental Concern))                    | Н        |
|                            |                             |           |  | Planning and Zoning   | issu             | mote consideration of biodiversity<br>nes in transportation and land use<br>nning processes   | Н        |
| Climate                    | poor dispers                | sal capa  |  | Ex-situ Conservation  |                  | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate                    | Habitat shif<br>climate cha | _         | alteration due to                                      | Planning and Zoning   | res <sub>l</sub> | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                    |                             | tself and | nse to climate change<br>/or inter-dependent           | Research and Monitoring   | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Conversion         | Housing, ur<br>developmer   |           | l ex-urban   | Land Protection (Public, Private)<br>Easements, and Resource Rights |                  | quire conservation easement for itat protection   | Н        |
| Habitat Degradation        | Roads                       |           |  | Voluntary Standards   |                  | plement Best Management Practices transportation projects   | Н        |
| Lack of knowledge          | Population                  | status ur | ıknown   | Research and Monitoring   | Mo               | nitor population status   | Н        |
| Non-consumptive Disturbanc | e Motor-powe                | ered reci | reation  | Education and Communication   | edu              | olish educational material/sponsor<br>cational programs to raise public<br>areness  | Н        |
| Non-consumptive Disturbanc | e Motor-powe                | ered reci | reation  | Voluntary Standards   |                  | plement Best Management Practices recreation management   | Н        |
| Resource Extraction        | Oil and gas                 | drilling  |  | Voluntary Standards   |                  | plement Best Management Practices energy development and mining   | Н        |
| Climate                    |                             | f normal  | (intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |

| Astragalus piscator                                      | Population S   | Status  | Population Trend  |  | Туре  | Habitat   | Primary       |
|--|--|---|---|--|---|---|---------------|
|  | Medium   | D   | Unknown   | Colorado Plateau   | P   | Sandy Areas   |               |
| Fisher Towers milkvetch                                  |  |   |   |  |   | Desert Shrub  |               |
| Tier 2 Plants  |  |   |   |  |   | Pinyon-Juniper  |               |
| General Threat   | Specific Thre  | eat   |   | General Conservation Action  | Spe   | ecific Conservation Action  | Priority      |
| Climate  | Vulnerability<br>poor dispersa<br>restriction to   | ıl capac  | •   | Ex-situ Conservation   |   | d banking (incl. protocols, ection, and cultivation)  | Н             |
| Climate  | Habitat shifti<br>climate chan   | _   | alteration due to   | Planning and Zoning  | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs   | Н             |
| Climate  |  | elf and   | se to climate change<br>or inter-dependent  | Research and Monitoring  | and<br>clin   | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н             |
| Habitat Conversion                                       | Housing, urb   |   | ex-urban  | Land Protection (Public, Private),<br>Easements, and Resource Rights   | , Acc   | quire conservation easement for itat protection   | Н             |
| Habitat Degradation                                      |  |   |   | Land Protection (Public, Private),<br>Easements, and Resource Rights   | , Exp   | pand existing Palisade ACEC   | Н             |
| Habitat Degradation                                      | Roads or Rai   | lroads  |   | Voluntary Standards  |   | plement Best Management Practices<br>transportation projects  | Н             |
| Climate  |  | normal  | intensification or<br>weather patterns,<br>dos, etc.)   | Capacity Building and<br>Cooperation   |   | gage in collaborative, proactive aning and conservation programs  | M             |
| Lack of knowledge  | Population st  |   |   | Research and Monitoring  | Mo  | nitor population status   | M             |
| Astragalus rafaelensis                                   | Population S   | Status  | Population Trend  | Distribution   | Туре  | Habitat   | Primary       |
|  | Low  | D   | Unknown   | Colorado Plateau   | P   | Pinyon-Juniper  | <b>✓</b>      |
| San Rafael milkvetch                                     |  |   |   |  |   |   |               |
|  |  |   |   |  |   |   |               |
| Tier 2 Plants  |  |   |   |  |   |   |               |
| Tier 2 Plants General Threat                             | Specific Thre  | eat   |   | General Conservation Action  | Spe   | ecific Conservation Action  | Priority      |
|  |  | due to  | movement barriers,<br>ity, and/or<br>bitat features   | General Conservation Action<br>Ex-situ Conservation  | See   | cific Conservation Action d banking (incl. protocols, ection, and cultivation)  | Priority<br>H |
| General Threat<br>Climate                                | Vulnerability<br>poor dispersa<br>restriction to   | due to<br>al capac<br>rare ha<br>ng and   | ity, and/or   |  | See coll  Mooresp                                     | d banking (incl. protocols,   | •             |
| General Threat Climate Climate                           | Vulnerability<br>poor dispersa<br>restriction to<br>Habitat shifti<br>climate chan   | due to<br>dl capac<br>rare ha<br>ng and<br>ge<br>respor                         | ity, and/or<br>bitat features<br>alteration due to  | Ex-situ Conservation   | Moorespand situ  Cor and clim                         | d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in   | Н             |
| General Threat Climate Climate Climate                   | Vulnerability<br>poor dispersa<br>restriction to<br>Habitat shifti<br>climate chan;<br>Phenological<br>of species its  | rare hang and ge  | ity, and/or bitat features alteration due to use to climate change or inter-dependent   | Ex-situ Conservation  Planning and Zoning  | Moorespand situ Corand clin (dis                      | d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors  | Н             |
| General Threat Climate Climate Climate                   | Vulnerability poor dispersa restriction to Habitat shifti climate chan;  Phenological of species its species unkn  No threats de Climate varia               | r due to<br>al capac<br>rare ha<br>ng and<br>ge respor<br>elf and<br>own ocumen | ity, and/or bitat features alteration due to  se to climate change /or inter-dependent  ted intensification or weather patterns,            | Ex-situ Conservation  Planning and Zoning  Research and Monitoring   | See coll  Moorespand situ  Corrand clin (dis  Det Eng | d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors opersal mechanisms, mutualisms)  | н             |
| General Threat Climate Climate Climate Lack of knowledge | Vulnerability poor dispersa restriction to Habitat shifti climate chan;  Phenological of species its species unkn  No threats de Climate varia alteration of | resporelf and ocumen ability (normal s, torna                                   | ity, and/or bitat features alteration due to  se to climate change /or inter-dependent  ted intensification or weather patterns, dos, etc.) | Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Research and Monitoring  Capacity Building and | Moorespand situ Corrand clim (dis Det Eng plan        | d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) ermine threat status gage in collaborative, proactive | Н Н           |

# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Astragalus schmolliae                | Population Status Population Tren  | nd Distribution                         | Type Habitat  | Primary  |
|--------------------------------------|--|---|---|----------|
| o .                                  | Medium D Declining D   | Colorado Plateau                        | P Pinyon-Juniper  | ✓        |
| Schmoll milkvetch                    | Rapidly declining  |   |   |          |
| Tier 1 Plants                        |  |   |   |          |
| General Threat                       | Specific Threat  | General Conservation Action             | Specific Conservation Action  | Priority |
| Climate                              | Vulnerability due to movement barrier<br>poor dispersal capacity, and/or<br>restriction to rare habitat features     | rs, Ex-situ Conservation                | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate                              | Habitat shifting and alteration due to climate change  | Planning and Zoning                     | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | H        |
| Climate                              | Phenological response to climate chan<br>of species itself and/or inter-dependen<br>species unknown                  |   | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Invasive or Exotic Species           | Invasive plants  | Invasive Species Control and Prevention | Map weed infestations and sensitive no spray/no mow zones   | Н        |
| Invasive or Exotic Species           | Invasive plants  | Research and Monitoring                 | Examine impact of post-fire management strategies   | Н        |
| Lack of knowledge                    | Population status in areas outside<br>National Park is poorly understood   | Research and Monitoring                 | Monitor population status   | Н        |
| Climate                              | Climate variability (intensification or<br>alteration of normal weather patterns,<br>e.g., droughts, tornados, etc.) | Capacity Building and Cooperation       | Engage in collaborative, proactive planning and conservation programs   | M        |
| Invasive or Exotic Species           | Invasive plants - especially musk thist and cheatgrass moving into burned are  |   | Implement integrated weed/pest management plan  | M        |
| Lack of knowledge                    | Current threats are poorly understood lands outside of the National Park   | on Research and Monitoring              | Research species/habitat response to management or disturbance  | M        |
| Habitat Degradation                  | Roads  | Voluntary Standards                     | Implement Best Management Practices for transportation projects   | L        |
| Indirect Consumptive Use (Mortality) | Grazing  | Compatible Resource Use                 | Implement compatible grazing management   | L        |

# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Astragalu    | is tortipes       | Population S                                       | tatus    | Populatio    | on Trend | Distribution  | Type             | Habitat   | Primary  |
|--------------|-------------------|--|----------|--------------|----------|---|------------------|---|----------|
| J            | •                 | Medium   | D        | Stable       | D        | Colorado Plateau  | P                | Desert Shrub  |          |
| Sleeping Ute | milkvetch         |  |          |              |          |   |                  |   |          |
| Tier 1       | Plants            |  |          |              |          |   |                  |   |          |
| General Thre | at                | Specific Thre                                      | at       |              |          | General Conservation Action   | Spe              | ecific Conservation Action  | Priority |
|              |                   |  |          |              |          | Research and Monitoring   | Mo               | nitor population status   | Н        |
| Climate      |                   | Vulnerability<br>poor dispersa<br>restriction to   | l capac  | ity, and/or  | ŕ        | Ex-situ Conservation  |                  | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate      |                   | Habitat shifti<br>climate chang                    | _        | alteration d | lue to   | Planning and Zoning   | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate      |                   | Phenological<br>of species itse<br>species unknown | elf and  |              |          | Research and Monitoring   | and<br>clir      | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of know | vledge            | Complete dis<br>unknown                            | tributio | on in Colora | ıdo      | Research and Monitoring   |                  | nduct field inventory to refine known tribution   | n H      |
| Non-consump  | ptive Disturbance | Motor-power  | ed recr  | eation       |          | Education and Communication   | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |
| Non-consum   | ptive Disturbance | Motor-power  | ed recr  | eation       |          | Voluntary Standards   |                  | plement Best Management Practices recreation management   | Н        |
| Climate      |                   | Climate varia<br>alteration of r<br>e.g., droughts | normal   | weather par  |          | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Habitat Conv | version           | Conversion to                                      | cropl    | and?         |          | Land Protection (Public, Private)<br>Easements, and Resource Rights |                  | quire conservation easement for<br>pitat protection   | M        |
| Lack of know | vledge            | Response to o                                      | listurb  | ance         |          | Research and Monitoring   |                  | search species/habitat response to nagement or disturbance  | M        |

| Boechera crandallii                  | Population Status  | Population Trend   | Distribution  | Type        | Habitat   | Primary  |
|--------------------------------------|--|--------------------|---|-------------|---|----------|
|                                      | Unknown  | Unknown            | Southern Rocky Mountains  | P           | Sagebrush   | <b>V</b> |
| Crandall's rock-cress                |  |                    |   |             | Sandy Areas   |          |
| Tier 2 Plants                        |  |                    |   |             |   |          |
| General Threat                       | Specific Threat  |                    | General Conservation Action   | Spe         | cific Conservation Action   | Priority |
| Climate                              | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal  | ity, and/or        | Ex-situ Conservation  |             | d banking (incl. protocols, ection, and cultivation)  | Н        |
| Climate                              | Habitat shifting and climate change                                      | alteration due to  | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                              | Phenological respon<br>of species itself and/<br>species unknown         |                    | Research and Monitoring   | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)   | Н        |
| Habitat Degradation                  | Roads  |                    | Voluntary Standards   |             | plement Best Management Practices<br>transportation projects  | Н        |
| Lack of knowledge                    | Population status un   | known              | Research and Monitoring   |             | nitor population status   | Н        |
| Lack of knowledge                    | Complete distributio unknown   | n in Colorado      | Research and Monitoring   |             | nduct field inventory to refine known ribution  | Н        |
|                                      |  |                    | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | ablish legal designation to protect itat (e.g., Special Interestl Area)   | M        |
| Climate                              | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns,  | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive nning and conservation programs  | M        |
| Boechera glareosa                    | Population Status  | Population Trend   |   |             | Habitat   | Primary  |
| 3 ·                                  | Unknown  | Unknown            |   |             | Barrens   | ✓        |
| NA                                   |  |                    |   |             |   |          |
| Tier 1 Plants                        |  |                    |   |             |   |          |
| General Threat                       | Specific Threat  |                    | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
| Climate                              | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal  | ity, and/or        | Ex-situ Conservation  |             | d banking (incl. protocols,<br>ection, and cultivation)   | Н        |
| Climate                              | Habitat shifting and climate change                                      |                    | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                              | Phenological respon<br>of species itself and/<br>species unknown         |                    | Research and Monitoring   | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge                    | Threats and response poorly understood                                   | e to change are    | Research and Monitoring   |             | earch species/habitat response to nagement or disturbance   | Н        |
|                                      | Biology, ecology, an   | d detailed habitat | Research and Monitoring   |             | earch critical life history/habitat   | Н        |
| Lack of knowledge                    | are poorly known   |                    |   |             |   |          |
| Lack of knowledge  Lack of knowledge | are poorly known  Complete distributio unknown                           | n in Colorado      | Research and Monitoring   |             | nduct field inventory to refine known ribution  | Н        |
|                                      | Complete distributio   |                    | Research and Monitoring  Research and Monitoring                    | dist        | •   | Н        |

| Botrychium lineare  | Population   | Status   | Population '   | Trend                 | Distribution   | Type  | Habitat  | Primary        |
|---|--|--|--|-----------------------|--|---|--|----------------|
|   | Low  | D  | Declining  | D                     | Southern Rocky Mountains   | P   | Aspen Forest<br>Foothill/Mountain Grassland  | <b>✓</b>       |
| Narrowleaf grape fern   |  |  |  |                       |  |   | Mixed Conifer  |                |
| Tier 2 Plants   | a .a   |  |  |                       |  | ~   |  | 5              |
| General Threat  | Specific Thi   |  |  |                       | General Conservation Action  | •   | cific Conservation Action  | Priority       |
| Climate   | poor dispers   | al capac   |  | rriers,               | Ex-situ Conservation   |   | d banking (incl. protocols, ection, and cultivation)   | Н              |
| Climate   | Habitat shift<br>climate char  | _  | alteration due   | to                    | Planning and Zoning  | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н              |
| Climate   |  | self and/  | se to climate of or inter-dependent  |                       | Research and Monitoring  | and<br>clin   | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)  | Н              |
| Lack of knowledge   | Complete di<br>unknown   | stributio  | n in Colorado  |                       | Research and Monitoring  |   | nduct field inventory to refine known ribution   | Н              |
|   |  |  |  |                       | Research and Monitoring  | Mo  | nitor population status  | M              |
| Climate   |  | normal   | intensification<br>weather patter<br>dos, etc.)  |                       | Capacity Building and Cooperation  |   | gage in collaborative, proactive nning and conservation programs   | M              |
| Habitat Degradation   | Roads or Ra  | ilroads  |  |                       | Voluntary Standards  |   | element Best Management Practices transportation projects  | M              |
| Lack of knowledge   | Details of ha  | abitat un  | known  |                       | Research and Monitoring  | Det   | ermine habitat requirements  | M              |
|   |  |  |  |                       |  |   |  |                |
| Rotrychium tay nov  | Population   | Status   | Population '   | Trend                 | Distribution   | Type  | Habitat  | Primary        |
| Botrychium tax. nov. "furgatum"   | Population   |  | Population '   | Trend                 |  | Type  | Habitat Meadow Tundra  | Primary        |
| Botrychium tax. nov.<br>"furcatum"  | Population<br>Low  | Status<br>X  | Population Unknown   | Trend                 | Distribution Southern Rocky Mountains  | Type<br>P   | Meadow Tundra  | Primary        |
| •   | •  |  | •  | Trend                 |  | • •   |  |                |
| "furcatum"  | •  |  | •  | Γrend                 |  | • •   | Meadow Tundra  |                |
| "furcatum"  Fork-leaved moonwort  | •  | X  | •  | Γrend                 |  | P   | Meadow Tundra<br>Spruce-Fir  |                |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants   | Low  Specific Thr  Vulnerabilit poor dispers   | X reat y due to sal capac  | Unknown movement ba  |                       | Southern Rocky Mountains   | P Spe   | Meadow Tundra  |                |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat   | Low  Specific Thr  Vulnerabilit poor dispers restriction to  | X  reat  y due to sal capac orare halting and  | Unknown  movement ba ity, and/or   | rriers,               | Southern Rocky Mountains  General Conservation Action  | P Spe See coll Mo resp and  | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols,  | Priority       |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat  Climate  | Low  Specific Thr  Vulnerabilit poor dispers restriction to  Habitat shift climate char  | x y due to sal capaco rare halting and age   | Unknown  movement ba ity, and/or bitat features alteration due                                 | to                    | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  | P Spe See coll Mo resp and situ Cor and clin  | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Priority H     |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat  Climate  Climate   | Low  Specific Thr  Vulnerabilit poor dispers restriction to  Habitat shift climate char  Phenologica of species it   | x y due to sal capaco rare halting and age   | Unknown  movement ba ity, and/or bitat features alteration due                                 | to                    | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  Planning and Zoning   | P Spe See coll Mo resp and situ Cor and clin (dis Imp                                   | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors   | Priority H     |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat  Climate  Climate  Climate  Habitat Degradation                                       | Low  Specific Thr  Vulnerabilit poor dispers restriction to  Habitat shift climate char  Phenologica of species it species unkn  Roads   | xy due to sal capaco rare halting and age  | Unknown  movement ba ity, and/or bitat features alteration due                                 | to to change dent     | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring   | P Spe See coll Mo resp and situ Cor and clin (dis Imp for Res                           | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element Best Management Practices  | Priority H H   |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat  Climate  Climate  Climate  Habitat Degradation  Lack of knowledge                    | Low  Specific Thr  Vulnerabilit poor dispers restriction to  Habitat shift climate char  Phenologica of species it species unkn  Roads  Biology, ecc are poorly k  | y due to sal capace o rare hal ting and tinge di respon self and/ nown                           | Unknown  movement ba ity, and/or bitat features alteration due se to climate of                | to change dent        | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Voluntary Standards  | P Spe See coll Mo resp and situ Cor and clin (dis Imp for Ress com Cor                  | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element Best Management Practices transportation projects earch critical life history/habitat  | Priority H H H |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat  Climate  Climate   | Low  Specific Thr  Vulnerabilit poor dispers restriction to  Habitat shift climate char  Phenologica of species it species unkr  Roads  Biology, ecc are poorly k  Complete di unknown  Climate vari                           | y due to sal capace o rare hal ting and ting and nown blogy, ar nown stributio tability (frormal | Unknown  movement ba ity, and/or bitat features alteration due se to climate of or inter-deper | to change dent or     | General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Voluntary Standards  Research and Monitoring   | P Spe See coll Mo resp and situ Cor and clin (dis Imp for Res con Cor dist Eng          | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element Best Management Practices transportation projects earch critical life history/habitat aponents duct field inventory to refine known  | Priority H H H |
| "furcatum"  Fork-leaved moonwort  Tier 1 Plants  General Threat  Climate  Climate  Climate  Habitat Degradation  Lack of knowledge  Lack of knowledge | Low  Specific Thr  Vulnerabilit poor dispers restriction to  Habitat shift climate char  Phenologica of species it species unkn  Roads  Biology, ecc are poorly k  Complete di unknown  Climate varialteration of e.g., drough | y due to sal capace or rare halting and responself and/nown                                      | Unknown  movement ba ity, and/or bitat features alteration due se to climate of or inter-deper | to change dent or ns, | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Voluntary Standards  Research and Monitoring  Research and Monitoring  Capacity Building and | P Spe See coll Mo resp and situ Cor and clin (dis Imp for Res con Cor dist Eng plan Res | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) element Best Management Practices transportation projects earch critical life history/habitat aponents aduct field inventory to refine known ribution gage in collaborative, proactive | Priority H H H |

| Caesalpinia repe                    | ns Population Sta                    | tus Population Trend  |                                      | Habitat   | Primary  |
|-------------------------------------|--------------------------------------|---|--------------------------------------|---|----------|
| 1 1                                 | Unknown                              | Unknown   |                                      | Sandy Areas   | <b>✓</b> |
| Creeping rush-pea                   |                                      |   |                                      | Desert Shrub  |          |
| Tier 2 Plants                       |                                      |   |                                      |   |          |
| General Threat                      | Specific Threat                      |   | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate                             | poor dispersal c                     | ue to movement barriers,<br>capacity, and/or<br>re habitat features | Ex-situ Conservation                 | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate                             | Habitat shifting climate change      | and alteration due to   | Planning and Zoning                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н        |
| Climate                             |                                      | and/or inter-dependent  | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge                   | Complete distri                      | bution in Colorado  | Research and Monitoring              | Conduct field inventory to refine known distribution  | Н        |
| Climate                             |                                      | lity (intensification or rmal weather patterns, ornados, etc.)      | Capacity Building and Cooperation    | Engage in collaborative, proactive planning and conservation programs   | M        |
| Camissonia                          | Population Sta                       | tus Population Trend  | Distribution                         | Type Habitat  | Primary  |
| eastwoodiae                         | Low                                  | Unknown   | Colorado Plateau                     | P Saltbrush Fans and Flats  | <b>✓</b> |
| Eastwood evening prim Tier 2 Plants | rose                                 |   |                                      | Pinyon-Juniper  |          |
| General Threat                      | Specific Threat                      |   | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate                             | Vulnerability du<br>poor dispersal c | ue to movement barriers,<br>apacity, and/or<br>re habitat features  | Ex-situ Conservation                 | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate                             | Habitat shifting climate change      | and alteration due to   | Planning and Zoning                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н        |
| Climate                             |                                      | and/or inter-dependent  | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge                   | Complete distri<br>unknown           | bution in Colorado  | Research and Monitoring              | Conduct field inventory to refine known distribution  | Н        |
| Climate                             |                                      | lity (intensification or rmal weather patterns, ornados, etc.)      | Capacity Building and<br>Cooperation | Engage in collaborative, proactive planning and conservation programs   | M        |
| Habitat Degradation                 | Roads                                |   | Voluntary Standards                  | Implement Best Management Practices for transportation projects   | M        |
| Lack of knowledge                   | Population statu                     | ıs unknown  | Research and Monitoring              | Monitor population status   | M        |
| Non-consumptive Distu               | rbance Motor-powered                 | recreation  | Education and Communication          | Publish educational material/sponsor<br>educational programs to raise public<br>awareness   | M        |
|                                     |                                      |   |                                      | a areness   |          |

| Carex stenoptila                 | Population Status  | Population Trend  | Distribution                         | Type             | Habitat   | Primary                    |
|----------------------------------|--|-------------------|--------------------------------------|------------------|---|----------------------------|
| Small-winged sedge Tier 2 Plants | Medium D   | Unknown           | Southern Rocky Mountains             | P                | Mountain Streams Shrub-dominated Wetlands Spruce-Fir Aspen Forest Exposed Rock Rocky Mtn Bristlecone Pine   | <b>y y y y y y y y y y</b> |
| General Threat                   | Specific Threat  |                   | General Conservation Action          | Spe              | ecific Conservation Action  | Priority                   |
| Lack of knowledge                | Threats unknown  |                   | Research and Monitoring              |                  | search species/habitat response to nagement or disturbance  | Н                          |
| Lack of knowledge                | Complete distributio unknown   | n in Colorado     | Research and Monitoring              |                  | nduct field inventory to refine known tribution   | Н                          |
| Climate                          | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns, | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M                          |
| Climate                          | Vulnerability due to<br>poor dispersal capaci<br>restriction to rare hal | ity, and/or       | Ex-situ Conservation                 |                  | ed banking (incl. protocols, lection, and cultivation)  | M                          |
| Climate                          | Habitat shifting and climate change                                      | alteration due to | Planning and Zoning                  | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | M                          |
| Climate                          | Phenological respons<br>of species itself and/<br>species unknown        |                   | Research and Monitoring              | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | M                          |
| Lack of knowledge                | Population status unl  | known             | Research and Monitoring              | Mo               | nitor population status   | M                          |
| Non-consumptive Disturbance      | Recreation?  |                   | Voluntary Standards                  |                  | plement Best Management Practices recreation management   | M                          |

# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Castilleja puberula         | Population Status   | Population Trend                               | Distribution                         | Type             | Habitat   | Primary  |
|-----------------------------|---|--|--------------------------------------|------------------|---|----------|
| <b>V</b> 1                  | Medium D  | Unknown  | Southern Rocky Mountains             | P                | Shrub Tundra  | ✓        |
| Downy Indian-paintbrush     |   |  |                                      |                  |   |          |
| Tier 2 Plants               |   |  |                                      |                  |   |          |
| General Threat              | Specific Threat   |  | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |
|                             |   |  | Species Management                   |                  | intain/update comprehensive species abase   | Н        |
| Climate                     | Vulnerability due t<br>poor dispersal capa<br>restriction to rare h | acity, and/or                                  | Ex-situ Conservation                 |                  | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                     | Habitat shifting and climate change                                 | d alteration due to                            | Planning and Zoning                  | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                     |   | onse to climate change<br>d/or inter-dependent | Research and Monitoring              | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge           | Complete distributi<br>unknown                                      | ion in Colorado                                | Research and Monitoring              |                  | nduct field inventory to refine known tribution   | Н        |
| Climate                     | Climate variability<br>alteration of norma<br>e.g., droughts, torn  | l weather patterns,                            | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge           | Population status u   | nknown   | Research and Monitoring              | Mo               | nitor population status   | M        |
| Non-consumptive Disturbance | Recreation  |  | Education and Communication          | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | L        |
| Non-consumptive Disturbance | Recreation  |  | Voluntary Standards                  |                  | plement Best Management Practices recreation management   | L        |

| Cirsium p                    | perplexans     | Population                                  | Status      | Populatio     | on Trend | Distribution                            | Type             | Habitat   | Primary  |
|------------------------------|----------------|---|-------------|---------------|----------|---|------------------|---|----------|
| •                            | •              | Low   | D           | Stable        | D        | Colorado Plateau                        | P                | Sagebrush   | ✓        |
| Adobe thistle                |                |   |             |               |          | Southern Rocky Mountains                | P                | Saltbrush Fans and Flats  |          |
|                              |                |   |             |               |          | Utah High Plateau                       | P                |   |          |
| Tier 2                       | Plants         | C .C TI                                     |             |               |          | 0 10 " 1"                               | C                | · · · · · · · · · · · · · · · · · · ·   | D: '     |
| General Thre                 | eat            | Specific Th                                 |             | 1, , 1        |          | General Conservation Action             |                  | ecific Conservation Action  | Priority |
| Climate                      |                | Habitat shit<br>climate cha                 |             | alteration d  | lue to   | Planning and Zoning                     | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | H<br>n   |
| Climate                      |                | Phenologic<br>of species i<br>species unk   | tself and   |               |          | Research and Monitoring                 | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    |          |
| Lack of know                 | vledge         | Most occur<br>very few in<br>unknown        |             |               |          | Research and Monitoring                 |                  | search species/habitat response to nagement or disturbance  | Н        |
|                              |                |   |             |               |          | Education and Communication             | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | M        |
|                              |                |   |             |               |          | Education and Communication             | tho              | ucate land owners, managers, and<br>se engaged in weed control about<br>piding impacts to native thistles   | M        |
| Climate                      |                | Climate var<br>alteration o<br>e.g., drough | f normal    | weather pat   |          | Capacity Building and<br>Cooperation    |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Invasive or E                | Exotic Species | Bio-control<br>species                      | of non-1    | native Cirsiu | ım       | Invasive Species Control and Prevention | nat<br>mit       | sign weed control activites to avoid<br>ive thistles and develop methods for<br>igating impacts from bio-control<br>ints such as introduced weevils     | M        |
| Lack of know                 | vledge         | Complete d                                  | listributio | on in Colora  | ıdo      | Research and Monitoring                 |                  | nduct field inventory to refine know tribution of natural occurrences   | n M      |
| Lack of knov                 | vledge         | Biology and                                 | d ecolog    | y are poorly  | known    | Research and Monitoring                 |                  | search critical life history/habitat nponents   | M        |
| Habitat Degr                 | radation       | Roads                                       |             |               |          | Voluntary Standards                     |                  | olement Best Management Practices transportation projects   | L        |
| Indirect Con:<br>(Mortality) | sumptive Use   | Grazing                                     |             |               |          | Compatible Resource Use                 |                  | olement compatible grazing<br>nagement  | L        |
| Resource Ex                  | traction       | Oil and gas                                 | drilling    |               |          | Voluntary Standards                     |                  | plement Best Management Practices<br>energy development and mining  | L        |

| Cirsium scapanolepis               | Population Status P  | Population Trend   |  | Habitat  |  | Primary     |
|------------------------------------|--|--|--|--|--|-------------|
|                                    | Unknown U  | Jnknown  |  | Mixed C  | onifer   | <b>✓</b>    |
| Mountain-slope thistle             |  |  |  | Foothill/  | Mountain Grassland   |             |
| -                                  |  |  |  | Mixed Fo   | prest  |             |
| Tier 1 Plants General Threat       | Specific Threat  |  | General Conservation Action  | Specific Cons  | servation Action   | Priority    |
| Climate                            | Habitat shifting and alte climate change   | eration due to   | Planning and Zoning  | Model potenti<br>response to pr<br>and prepare a   | ial habitat/range shifts in<br>rojected climate changes<br>daptation plan to define in<br>u conservation needs   | Н           |
| Climate                            | Phenological response to of species itself and/or is species unknown   |  | Research and Monitoring  | and pollinator<br>climate, and c   | ary research on rare plant<br>responses to changing<br>other vulnerability factors<br>chanisms, mutualisms)  | Н           |
| Invasive or Exotic Species         | Bio-control of non-nativ<br>species  | ve Cirsium   | Invasive Species Control and Prevention  | those engaged  | owners, managers, and<br>I in weed control about<br>acts to native thistles  | Н           |
| Invasive or Exotic Species         | Bio-control of non-nativ<br>species  | ve Cirsium   | Invasive Species Control and Prevention  | native thistles<br>mitigating im   | control activites to avoid<br>and develop methods for<br>pacts from bio-control<br>s introduced weevils  | Н           |
| Lack of knowledge                  | Taxonomy   |  | Research and Monitoring  | Taxonomic w  |  | Н           |
| Lack of knowledge                  | Complete distribution in<br>unknown  | n Colorado   | Research and Monitoring  | Conduct field distribution   | inventory to refine known  | Н           |
| Climate                            | Climate variability (inte<br>alteration of normal wea<br>e.g., droughts, tornados  | ather patterns,  | Capacity Building and<br>Cooperation   |  | laborative, proactive conservation programs  | M           |
| Invasive or Exotic Species         | Bio-control of non-nativ<br>species  | ve Cirsium   | Invasive Species Control and Prevention  | Map weed inf<br>spray/no mow   | estations and sensitive no zones   | M           |
| Cleome multicaulis                 | Population Status P  | Opulation Trend  | Distribution T   | ype Habitat  |  | Primary     |
|                                    | Medium D D   | Declining D  | Southern Rocky Mountains   | P Grass/Fo<br>Playas   | rb Dominated Wetlands  |             |
| Slender spiderflower Tier 2 Plants |  |  |  |  |  |             |
| General Threat                     | Specific Threat  |  | General Conservation Action  | Specific Cons  | servation Action   | Priority    |
|                                    |  |  | Land Protection (Public, Private),   | 1  | l designation to protect   | Н           |
|                                    |  |  | Easements, and Resource Rights   |  | Area of Critical   |             |
|                                    |  |  |  | habitat (e.g., A<br>Environmenta   | Area of Critical al Concern) ervation easement for   | Н           |
| Climate                            | Vulnerability due to mo<br>poor dispersal capacity,<br>restriction to rare habita  | and/or   | Easements, and Resource Rights  Land Protection (Public, Private), Easements, and Resource Rights  | habitat (e.g., A<br>Environmenta<br>Acquire conse<br>habitat protec  | Area of Critical al Concern) ervation easement for tion (incl. protocols,  | Н           |
| Climate                            | poor dispersal capacity,   | and/or<br>at features  | Easements, and Resource Rights  Land Protection (Public, Private), Easements, and Resource Rights  | habitat (e.g., A<br>Environmenta<br>Acquire conschabitat protectors<br>Seed banking<br>collection, and<br>Model potenti<br>response to prand prepare a   | Area of Critical al Concern) ervation easement for tion (incl. protocols,  |             |
|                                    | poor dispersal capacity,<br>restriction to rare habita<br>Habitat shifting and alte<br>climate change  | and/or at features eration due to colimate change  | Easements, and Resource Rights  Land Protection (Public, Private), Easements, and Resource Rights Ex-situ Conservation   | habitat (e.g., 4<br>Environmenta<br>Acquire conschabitat protectors Seed banking<br>collection, and Model potentiresponse to propare as situ and ex situ and ex situ and ex situ and pollinator climate, and collimate, and collimate, and collimate and collimate.  | Area of Critical al Concern) ervation easement for tion (incl. protocols, d cultivation) ial habitat/range shifts in rojected climate changes daptation plan to define in  | Н           |
| Climate                            | poor dispersal capacity, restriction to rare habita Habitat shifting and alte climate change  Phenological response to f species itself and/or i   | and/or at features eration due to colimate change  | Easements, and Resource Rights  Land Protection (Public, Private), Easements, and Resource Rights  Ex-situ Conservation  Planning and Zoning   | habitat (e.g., 4<br>Environmenta<br>Acquire conschabitat protectors Seed banking<br>collection, and Model potentiresponse to propare as situ and ex situ and ex situ and ex situ and pollinator climate, and collimate, and collimate, and collimate and collimate.  | Area of Critical al Concern) ervation easement for tion (incl. protocols, d cultivation)  ial habitat/range shifts in rojected climate changes daptation plan to define in a conservation needs ary research on rare plant responses to changing other vulnerability factors chanisms, mutualisms)                                     | Н           |
| Climate                            | poor dispersal capacity, restriction to rare habita Habitat shifting and alte climate change  Phenological response to f species itself and/or i   | and/or at features eration due to colimate change inter-dependent ensification or ather patterns,        | Easements, and Resource Rights  Land Protection (Public, Private), Easements, and Resource Rights  Ex-situ Conservation  Planning and Zoning  Research and Monitoring                        | habitat (e.g., A<br>Environmental<br>Acquire consolidation protection, and<br>Seed banking<br>collection, and<br>Model potential<br>response to prand prepare as<br>situ and ex situand ex situand pollinator<br>climate, and condition dispersal med<br>Monitor popule  | Area of Critical al Concern) ervation easement for tion (incl. protocols, d cultivation)  ial habitat/range shifts in rojected climate changes daptation plan to define in a conservation needs ary research on rare plant responses to changing other vulnerability factors chanisms, mutualisms)                                     | Н           |
| Climate                            | poor dispersal capacity, restriction to rare habitat Habitat shifting and alter climate change  Phenological response to of species itself and/or is species unknown  Climate variability (inter alteration of normal wear | and/or at features eration due to climate change inter-dependent ensification or ather patterns, , etc.) | Easements, and Resource Rights  Land Protection (Public, Private), Easements, and Resource Rights  Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Capacity Building and | habitat (e.g., and Environmental Acquire consoleration, and Collection, and Model potential response to propose and prepare as situ and existic Conduct primand pollinator climate, and conduction (dispersal media) Monitor popular Engage in collination and | Area of Critical al Concern) ervation easement for tion (incl. protocols, d cultivation)  ial habitat/range shifts in rojected climate changes daptation plan to define in u conservation needs ary research on rare plant responses to changing other vulnerability factors chanisms, mutualisms) lation status laborative, proactive | H<br>H<br>H |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Corispermum navicula        | Population St                                     | tatus    | Population Trend                                    | Distribution                         | Type        | Habitat   | Primary  |
|-----------------------------|---|----------|---|--------------------------------------|-------------|---|----------|
| •                           | Medium  | D        | Unknown   | Southern Rocky Mountains             | P           | Barrens<br>Sandy Areas  |          |
| Boat-shaped bugseed         |   |          |   |                                      |             |   |          |
| Tier 1 Plants               |   |          |   |                                      |             |   |          |
| General Threat              | Specific Threa                                    | ıt       |   | General Conservation Action          | Spe         | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability of poor dispersal restriction to ra | capaci   | ty, and/or  | Ex-situ Conservation                 |             | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                     | Habitat shifting climate change                   | _        | alteration due to                                   | Planning and Zoning                  | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     | _   | lf and/o | e to climate change<br>or inter-dependent           | Research and Monitoring              | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge           | Taxonomic wo                                      | ork is n | eeded   | Research and Monitoring              | Tax         | konomy  | Н        |
| Lack of knowledge           | Complete distr<br>unknown                         | ributior | n in Colorado                                       | Research and Monitoring              |             | nduct field inventory to refine known<br>tribution  | n H      |
| Non-consumptive Disturbance | Motor-powere                                      | d recre  | ation   | Education and Communication          | edu         | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |
| Non-consumptive Disturbance | Motor-powere                                      | d recre  | ation   | Voluntary Standards                  |             | plement Best Management Practices recreation management   | Н        |
| Climate                     |   | ormal v  | ntensification or<br>weather patterns,<br>os, etc.) | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge           | Population stat                                   | tus unk  | nown  | Research and Monitoring              | Mo          | nitor population status   | M        |

| Cryptantha  | gypsophila                      | Population S   | tatus   | Population Trend   | Distribution  | Type  | Habitat   | Primary               |
|---|---------------------------------|--|---|--|---|---|---|-----------------------|
|   | -                               | Medium   | D   | Unknown  | Colorado Plateau  | P   | Barrens   | <b>✓</b>              |
| Gypsum Valley   | cat's- eve                      |  |   |  | Southern Rocky Mountains  | О   | Pinyon-Juniper  | <b>✓</b>              |
| •   | lants                           |  |   |  |   |   |   |                       |
| General Threat  |                                 | Specific Thre  | at  |  | General Conservation Action   | Spe   | cific Conservation Action   | Priorit               |
|   |                                 | •  |   |  | Land Protection (Public, Private)<br>Easements, and Resource Rights   | , Esta  | ablish legal designation to protect<br>itat (e.g., Area of Critical<br>rironmental Concern)   | Н                     |
| Climate   |                                 | Vulnerability<br>poor dispersal<br>restriction to  | l capac   | ity, and/or  | Ex-situ Conservation  |   | d banking (incl. protocols, ection, and cultivation)  | Н                     |
| Climate   |                                 | Habitat shiftii<br>climate chang   | -   | alteration due to  | Planning and Zoning   | resp<br>and   | del potential habitat/range shifts in<br>sonse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs   | Н                     |
| Climate   |                                 |  | elf and/  | se to climate change<br>or inter-dependent   | Research and Monitoring   | and<br>clin   | duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)  | Н                     |
| Habitat Degrada   | ation                           | Oil and gas pi   | ipelines  | s, roads, dust, etc.   | Voluntary Standards   |   | lement Best Management Practices energy development and mining  | Н                     |
| Non-consumptiv  | ve Disturbance                  | Motor-power  | ed recre  | eation   | Compatible Resource Use   |   | port off-road travel restrictions on<br>lic land  | Н                     |
| Resource Extrac   | ction                           | Oil and gas di   | rilling a   | and uranium mining   | Voluntary Standards   |   | lement Best Management Practices energy development and mining  | Н                     |
| Climate   |                                 |  |   | intensification or   | Capacity Building and   | _   | age in collaborative, proactive   | M                     |
|   |                                 |  |   | weather patterns,<br>dos, etc.)  | Cooperation   | piai  | nning and conservation programs   |                       |
| Lack of knowled   | dge                             | alteration of r<br>e.g., droughts<br>Population sta  | , torna   | los, etc.)   | Research and Monitoring   |   | nitor population status   | M                     |
|   |                                 | e.g., droughts   | , tornac<br>atus un   | los, etc.)   | Research and Monitoring   |   |   |                       |
| Delphiniun  | n ramosum                       | e.g., droughts Population sta  | , tornac<br>atus un   | los, etc.)<br>known  | Research and Monitoring   | Mo  | nitor population status   |                       |
| Delphinium<br>var. alpestr  | n ramosum<br>e                  | e.g., droughts Population sta  | atus un   | known  Population Trend  | Research and Monitoring  Distribution   | Mor   | nitor population status  Habitat  | Primar                |
| <b>Delphinium</b><br>var. alpestro<br>Colorado larksp   | n ramosum<br>e                  | e.g., droughts Population sta  | atus un   | known  Population Trend  | Research and Monitoring  Distribution   | Mor   | nitor population status  Habitat  | Primar                |
| <b>Delphinium</b><br>var. alpestro<br>Colorado larksp<br>Tier 2 Pl                                  | n ramosum<br>e                  | e.g., droughts Population sta  | s, tornadatus un<br>status<br>D   | known  Population Trend  | Research and Monitoring  Distribution   | Mor<br>Type<br>P  | nitor population status  Habitat  | Primary               |
| <b>Delphinium</b><br>var. alpestro<br>Colorado larksp   | n ramosum<br>e                  | e.g., droughts Population sta  Population S Medium  Specific Thre  | tatus un bata due to l capac  | Population Trend Unknown  movement barriers, ity, and/or   | Research and Monitoring  Distribution  Southern Rocky Mountains   | Type P  | Habitat Meadow Tundra   | Primary               |
| Delphinium<br>var. alpestra<br>Colorado larksp<br>Tier 2 Pl<br>General Threat<br>Climate            | n ramosum<br>e                  | Population sta  Population S  Medium  Specific Thre  Vulnerability poor dispersa restriction to a  | atus uni<br>status D<br>at due to l capac<br>rare hal   | Population Trend Unknown  movement barriers, ity, and/or   | Research and Monitoring  Distribution Southern Rocky Mountains  General Conservation Action   | More P  Spe See coll  Moorespand  | Habitat Meadow Tundra  cific Conservation Action d banking (incl. protocols,  | Primary  Priorit      |
| Delphinium war. alpestra Colorado larksp Tier 2 Pl General Threat Climate                           | n ramosum<br>e                  | e.g., droughts Population sta  Population S  Medium  Specific Thre Vulnerability poor dispersa restriction to the state of | at due to I capac rare haling and ge  | Population Trend Unknown  movement barriers, ity, and/or bitat features alteration due to  | Research and Monitoring  Distribution Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  | Moorespand Spee coll Moorespand situ Corand clim                                    | Habitat Meadow Tundra  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Primar, Priorit H     |
| Delphinium var. alpestre Colorado larksp Tier 2 Pl General Threat Climate Climate                   | n ramosum<br>ce<br>our<br>lants | e.g., droughts Population sta  Population S  Medium  Specific Thre Vulnerability poor dispersa restriction to the state of the state of the species itses species unknown as the species itses species unknown as the species unknown | at due to I capac rare hal ng and ge responelf and/own  | Population Trend Unknown  movement barriers, ity, and/or bitat features alteration due to  | Research and Monitoring  Distribution Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning   | Moorespand situ Corrand clim (dis   | Habitat Meadow Tundra  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors   | Primary Priorit H H   |
| Delphinium var. alpestre Colorado larksp Tier 2 Pl General Threat Climate Climate  Climate          | n ramosum<br>ce<br>our<br>lants | e.g., droughts Population sta  Population S  Medium  Specific Thre Vulnerability poor dispersa restriction to to Habitat shiftin climate change  Phenological of species itse species unknown  Complete dist unknown  Climate varia  | at due to l capac respon elf and/own tributio bility (inormal                                 | Population Trend Unknown  movement barriers, ity, and/or bitat features alteration due to  se to climate change or inter-dependent  n in Colorado intensification or weather patterns, | Research and Monitoring  Distribution Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring                                    | Moorespand situ Corrand clin (dist Eng  | Habitat  Meadow Tundra  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) aduct field inventory to refine known   | Primar Priori H H     |
| Delphinium var. alpestre Colorado larksp Tier 2 Pl General Threat Climate  Climate  Lack of knowled | n ramosum<br>ce<br>pur<br>lants | e.g., droughts Population sta  Population S  Medium  Specific Thre Vulnerability poor dispersa restriction to to Habitat shiftin climate change  Phenological of species itse species unknown  Complete dist unknown  Climate varia alteration of r  | at due to l capacerare haling and ge responent finding tribution bility (inormal s, tornace). | movement barriers, ity, and/or bitat features alteration due to see to climate change or inter-dependent in in Colorado intensification or weather patterns, dos, etc.)                | Research and Monitoring  Distribution Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Capacity Building and             | Moor Type P Spe See coll Moor resp and situ Cor and clin (diss Cor dist Eng plan    | Habitat  Meadow Tundra  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) aduct field inventory to refine known ribution tage in collaborative, proactive                                 | Primary Priorit H H   |
| Delphinium<br>var. alpestro<br>Colorado larksp<br>Tier 2 Pl<br>General Threat                       | n ramosum<br>ce<br>pur<br>lants | e.g., droughts Population sta  Population S  Medium  Specific Thre Vulnerability poor dispersa restriction to to Habitat shiftin climate change  Phenological of species itse species unknown  Complete dist unknown  Climate varia alteration of r e.g., droughts   | at due to l capacerare haling and ge responent finding tribution bility (inormal s, tornace). | movement barriers, ity, and/or bitat features alteration due to see to climate change or inter-dependent in in Colorado intensification or weather patterns, dos, etc.)                | Research and Monitoring  Distribution Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Capacity Building and Cooperation | Moorage P Spee See coll Moorage and situ Corand clin (diss Cordist Eng plan Pub edu | Habitat  Meadow Tundra  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) aduct field inventory to refine known ribution (age in collaborative, proactive uning and conservation programs | Primar Priori H H H M |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Delphinium robustum  | Population Status  | Population Trend             |                                      | Habitat   | Primary  |
|--|--|------------------------------|--------------------------------------|---|----------|
| <i>I</i>   | Unknown  | Unknown                      |                                      | Cliff and Canyon  | <b>✓</b> |
| Wahatoya Creek larkspur  |  |                              |                                      | Aspen Forest  |          |
| Tier 2 Plants  |  |                              |                                      |   |          |
| General Threat   | Specific Threat  |                              | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate  | Vulnerability due to m<br>poor dispersal capacity<br>restriction to rare habit | , and/or                     | Ex-situ Conservation                 | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate  | Habitat shifting and al climate change   | teration due to              | Planning and Zoning                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н        |
| Climate  | Phenological response<br>of species itself and/or<br>species unknown           |                              | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge  | Complete distribution unknown  | in Colorado                  | Research and Monitoring              | Conduct field inventory to refine known distribution  | Н        |
| Climate  | Climate variability (in alteration of normal wee.g., droughts, tornado         | eather patterns,             | Capacity Building and<br>Cooperation | Engage in collaborative, proactive planning and conservation programs   | M        |
| Lack of knowledge  | Population status unkr   | nown                         | Research and Monitoring              | Monitor population status   | M        |
| Lack of knowledge  | Biology, ecology, and are poorly known   | detailed habitats            | Research and Monitoring              | Research critical life history/habitat components   | M        |
| Lack of knowledge  | Threats unknown  |                              | Research and Monitoring              | Research species/habitat response to management or disturbance  | M        |
| Descurainia kenheilii  | Population Status  | Population Trend             | Distribution                         | Type Habitat  | Primary  |
|  | Low X  | Unknown                      | Southern Rocky Mountains             | P Meadow Tundra   | <b>✓</b> |
| Heil's tansy mustard   |  |                              |                                      |   |          |
| Tier 1 Plants  |  |                              |                                      |   |          |
| General Threat   | Specific Threat  |                              | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate  | Vulnerability due to m<br>poor dispersal capacity<br>restriction to rare habit | , and/or                     | Ex-situ Conservation                 | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate  | Habitat shifting and al climate change   | teration due to              | Planning and Zoning                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н        |
| Climate  | Phenological response<br>of species itself and/or<br>species unknown           | _                            | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
|  |  |                              | Research and Monitoring              | Research species/habitat response to  | Н        |
| Lack of knowledge  | Threats and response t poorly understood                                       | o change are                 |                                      | management or disturbance   |          |
|  | •  |                              | Research and Monitoring              | management or disturbance Research critical life history/habitat components   | Н        |
| Lack of knowledge  | poorly understood<br>Biology, ecology, and                                     | detailed habitat             |                                      | Research critical life history/habitat  |          |
| Lack of knowledge  Lack of knowledge  Lack of knowledge  Lack of knowledge | poorly understood Biology, ecology, and are poorly known Complete distribution | detailed habitat in Colorado | Research and Monitoring              | Research critical life history/habitat components  Conduct field inventory to refine known  |          |

| Dicoria wetherillii                     | Population Status  | Population Trend                |                                      | Habitat   | Primary  |
|---|--|---------------------------------|--------------------------------------|---|----------|
|   | Unknown  | Unknown                         |                                      | Unknown   |          |
| Wetherill's dicoria                     |  |                                 |                                      |   |          |
| Tier 2 Plants                           |  |                                 |                                      |   |          |
| General Threat                          | Specific Threat  |                                 | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate                                 | Phenological responsible of species itself and species unknown         |                                 | e Research and Monitoring            | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge                       | Distribution, status,<br>biology/ecology, ta<br>are all unknown        | habitat,<br>xonomy, and threats | Research and Monitoring              | Basic research on all aspects of this species' conservation are needed  | Н        |
| Draba exunguiculata                     | Population Status  | Population Trend                | Distribution                         | Type Habitat  | Primary  |
| _ · · · · · · · · · · · · · · · · · · · | Low D  | Stable D                        | Southern Rocky Mountains             | P Exposed Rock (alpine) Meadow Tundra   |          |
| Clawless draba                          |  |                                 |                                      | 112443 11 2 41414   |          |
| Tier 2 Plants                           |  |                                 |                                      |   |          |
| General Threat                          | Specific Threat  |                                 | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate                                 | Vulnerability due to<br>poor dispersal capa-<br>restriction to rare ha |                                 | Ex-situ Conservation                 | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate                                 | Habitat shifting and climate change                                    |                                 | Planning and Zoning                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | H        |
| Climate                                 | Phenological responsible of species itself and species unknown         |                                 | e Research and Monitoring            | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge                       | Numbers and distrib<br>known   | oution are poorly               | Research and Monitoring              | Conduct field inventory to refine know distribution and abundance   | n H      |
| Climate                                 | Climate variability<br>alteration of normal<br>e.g., droughts, torna   | weather patterns,               | Capacity Building and<br>Cooperation | Engage in collaborative, proactive planning and conservation programs   | M        |
| Non-consumptive Disturbance             | Non-motorized recr   | eation                          | Education and Communication          | Publish educational material/sponsor<br>educational programs to raise public<br>awareness   | M        |
| Non-consumptive Disturbance             | Non-motorized recr   | eation                          | Voluntary Standards                  | Implement Best Management Practices for recreation management   | M        |
| Lack of knowledge                       | Biology, ecology, a<br>known   | nd habitat are poorly           | Research and Monitoring              | Research critical life history/habitat components   | L        |
| Natural Factors                         | Trampling by mour  | tain goats                      | Research and Monitoring              | Research species/habitat response to management or disturbance  | L        |

| Draba graminea              | Population S                                     | Status   | Population Trend                                      | Distribution                         | Type                       | Habitat   | Primary  |
|-----------------------------|--|----------|---|--------------------------------------|----------------------------|---|----------|
| Ü                           | Medium   | D        | Unknown   | Southern Rocky Mountains             | P                          | Exposed Rock (alpine) Shrub Tundra  |          |
| San Juan whitlow-grass      |  |          |   |                                      |                            |   |          |
| Tier 2 Plants               |  |          |   |                                      |                            |   |          |
| General Threat              | Specific Thre                                    | at       |   | General Conservation Action          | Spe                        | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability<br>poor dispersa<br>restriction to | l capac  | •   | Ex-situ Conservation                 |                            | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                     | Habitat shifti<br>climate chang                  |          | alteration due to                                     | Planning and Zoning                  | Mo<br>resp<br>and<br>situ  | Н   |          |
| Climate                     |  | elf and  | se to climate change<br>for inter-dependent           | Research and Monitoring              | Cor<br>and<br>clin<br>(dis | Н   |          |
| Climate                     |  | normal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation |                            | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge           | Complete dis<br>unknown                          | tributio | on in Colorado  | Research and Monitoring              |                            | nduct field inventory to refine known<br>ribution   | M        |
| Lack of knowledge           | Population st                                    | atus un  | known   | Research and Monitoring              | Мо                         | nitor population status   | L        |
| Draba grayana               | Population S                                     | Status   | Population Trend                                      | Distribution                         | Type                       | Habitat   | Primary  |
|                             | Unknown  |          | Unknown   | Southern Rocky Mountains             | P                          | Exposed Rock (alpine)   |          |
| Gray's Peak whitlow-grass   |  |          |   |                                      |                            |   |          |
| Tier 2 Plants               |  |          |   |                                      |                            |   |          |
| General Threat              | Specific Thre                                    | at       |   | General Conservation Action          | Spe                        | ecific Conservation Action  | Priority |
|                             |  |          |   | Species Management                   |                            | intain/update comprehensive species abase   | Н        |
| Climate                     | Vulnerability<br>poor dispersa<br>restriction to | l capac  | •   | Ex-situ Conservation                 |                            | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate                     | Habitat shifti<br>climate chang                  | -        | alteration due to                                     | Planning and Zoning                  | resp<br>and                | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                     |  | elf and  | se to climate change<br>for inter-dependent           | Research and Monitoring              | and<br>clin                | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge           | Numbers and known                                | distrib  | oution are poorly                                     | Research and Monitoring              |                            | nduct field inventory to refine known ribution and abundance  | Н        |
| Climate                     |  | normal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation |                            | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Non-consumptive Disturbance | Non-motorize                                     | ed recr  | eation  | Education and Communication          | edu                        | olish educational material/sponsor<br>cational programs to raise public<br>areness  | M        |
| Non-consumptive Disturbance | Non-motorize                                     | ed recr  | eation  | Voluntary Standards                  |                            | plement Best Management Practices recreation management   | M        |
| Lack of knowledge           | Biology, ecol<br>known                           | ogy, aı  | nd habitat are poorly                                 | Research and Monitoring              |                            | search critical life history/habitat<br>inponents   | L        |
| Natural Factors             | Trampling by                                     |          | toin goots  | Research and Monitoring              | Dag                        | search species/habitat response to  | L        |

| Draba malpighiacea | Population Status   | Population Trend    | Distribution                         | Type   | Habitat   | Primary  |
|--------------------|---|---------------------|--------------------------------------|--|---|----------|
| 1 0                | Unknown   | Unknown             | Southern Rocky Mountains             |  | Aspen Forest<br>Spruce-Fir  |          |
| Whitlow-grass      |   |                     |                                      |  | Spruce-1-11   |          |
| Tier 1 Plants      |   |                     |                                      |  |   |          |
| General Threat     | Specific Threat   |                     | General Conservation Action          | Spe  | ecific Conservation Action  | Priority |
| Climate            | vulnerability due to movement ba<br>poor dispersal capacity, and/or<br>restriction to rare habitat features |                     |                                      |  | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate            | Habitat shifting and climate change   | alteration due to   | Planning and Zoning                  | res <sub>l</sub>   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate            | Phenological respon<br>of species itself and<br>species unknown   |                     | Research and Monitoring              | Cor<br>and<br>clin<br>(dis                                     | Н   |          |
| Lack of knowledge  | Threats and response poorly understood  | e to change are     | Research and Monitoring              | Research species/habitat response to management or disturbance |   | Н        |
| Lack of knowledge  | Biology, ecology, ar<br>are poorly known  | nd detailed habitat | Research and Monitoring              |  | search critical life history/habitat  | Н        |
| Lack of knowledge  | Complete distribution   | on in Colorado      | Research and Monitoring              |  | nduct field inventory to refine known ribution  | Н        |
| Lack of knowledge  | Population status un  | known               | Research and Monitoring              | Mo   | nitor population status   | Н        |
| Lack of knowledge  | Taxonomic status is   | uncertain           | Research and Monitoring              | Tax  | conomic work is needed  | Н        |
| Climate            | Climate variability (<br>alteration of normal<br>e.g., droughts, torna                                      | weather patterns,   | Capacity Building and<br>Cooperation |  | gage in collaborative, proactive<br>nning and conservation programs   | M        |

| Draba si    | mithii  | Population Sta   | atus F   | Population Trend                     | Distribution                         | Type  | Habitat  | Primary  |
|-------------|---|--|--|--------------------------------------|--------------------------------------|---|--|----------|
| Smith white | ow-grass  | Medium   | D U  | Unknown                              | Southern Rocky Mountains             | P   | P Cliff and Canyon Aspen Forest Mixed Forest   |          |
| Tier 2      | Plants  |  |  |                                      |                                      |   | Upland Shrub   |          |
| General Thr | reat  | Specific Threat  | t  |                                      | General Conservation Action          | Spe   | ecific Conservation Action   | Priority |
| Climate     |   | poor dispersal o   | capacity.  |                                      | Ex-situ Conservation                 |   | ed banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate     | restriction to rare habitat features  Climate Habitat shifting and alteration due to Planning and Zoning climate change |  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define i<br>situ and ex situ conservation needs |                                      |                                      |   |  |          |
| Climate     |   | _  | f and/or   | to climate change<br>inter-dependent | Research and Monitoring              | and<br>clin   | nduct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms) | Н        |
| Non-consur  | nptive Disturbance  | Non-motorized  | l recreati   | on                                   | Voluntary Standards                  |   | plement Best Management Practices recreation management  | Н        |
|             |   |  |  |                                      | Education and Communication          | edı   | blish educational material/sponsor<br>acational programs to raise public<br>areness  | M        |
| Climate     |   | Climate variabi<br>alteration of no<br>e.g., droughts, t | ormal we   | ather patterns,                      | Capacity Building and<br>Cooperation |   | gage in collaborative, proactive nning and conservation programs   | M        |
| Habitat Deg | gradation   | Roads  |  |                                      | Voluntary Standards                  |   | plement Best Management Practices transportation projects  | M        |
| Lack of kno | owledge   | Numbers and d<br>known                                   | listributi   | on are poorly                        | Research and Monitoring              | Conduct field inventory to refine know distribution and abundance |  | M        |
| Lack of kno | owledge   | Biology, ecolog<br>known                                 | gy, and l  | nabitat are poorly                   | Research and Monitoring              |   | search critical life history/habitat mponents  | M        |

| Draba weberi  | Population   | 1 Status  | Population Trend   | Distribution  | Type   | Habitat  | Primary      |
|---|--|---|--|---|--|--|--------------|
|   | Low  | D   | Unknown  | Southern Rocky Mountains  | P  | Mountain Streams   | <b>✓</b>     |
| Weber's draba   |  |   |  |   |  |  |              |
| Tier 1 Plants   |  |   |  |   |  |  |              |
| General Threat  | Specific Th  | reat  |  | General Conservation Action   | Spe  | ecific Conservation Action   | Priority     |
| Climate   | poor disper  | sal capa  | o movement barriers,<br>city, and/or<br>abitat features  | Ex-situ Conservation  |  | d banking (incl. protocols, ection, and cultivation)   | Н            |
| Climate   | Habitat shi<br>climate cha   | _   | alteration due to  | Planning and Zoning   | Mo<br>resp<br>and<br>situ                            | Н  |              |
| Climate   |  | tself and   | nse to climate change<br>/or inter-dependent   | Research and Monitoring   | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>persal mechanisms, mutualisms)  | Н            |
| Lack of knowledge   | Population   | status ur   | ıknown   | Research and Monitoring   | Mo   | nitor population status  | Н            |
| Lack of knowledge   | Complete d   | listributio   | on in Colorado   | Research and Monitoring   |  | nduct field inventory to refine known ribution   | Н            |
| Climate   |  | f normal  | (intensification or<br>weather patterns,<br>idos, etc.)  | Capacity Building and<br>Cooperation  | Eng<br>plai  | M  |              |
| Habitat Degradation   | Natural sys<br>(hydrologic   |   | lification<br>n construction   | Education and Communication   |  | cate dam operator about avoiding /or mitigating impacts  | M            |
| Lack of knowledge   | Biology, ec<br>known   | cology, a   | nd habitat are poorly  | Research and Monitoring   |  | rearch critical life history/habitat   | M            |
| Non-consumptive Disturbance                                 | Non-motor  | ized recr   | eation   | Education and Communication   |  | rk with land manager to post No<br>spassing signage  | M            |
|   |  |   |  |   |  |  |              |
| Erigeron kachinensis  | Population   | Status  | Population Trend   | Distribution  | Type   | Habitat  | Primary      |
| Erigeron kachinensis  | Population<br>High   | n Status<br>D   | Population Trend<br>Unknown  | Distribution Colorado Plateau   | Type<br>P  | Habitat<br>Cliff and Canyon  | Primary 🗸    |
| Erigeron kachinensis  Kachina daisy                         | *  |   |  |   | * *  |  |              |
| Kachina daisy   | *  |   |  |   | * *  |  |              |
| _   | *  | D   |  |   | P  | Cliff and Canyon   | <b>V</b>     |
| Kachina daisy Tier 2 Plants                                 | High  Specific The Vulnerability poor dispersion of the volume of the vo | D<br>areat<br>ity due to  | Unknown  | Colorado Plateau  | P Spe  |  |              |
| Kachina daisy Tier 2 Plants General Threat                  | High  Specific Th  Vulnerabili poor disper   | D<br>areat<br>ity due to<br>rsal capac<br>so rare ha<br>fting and   | Unknown  o movement barriers, city, and/or   | Colorado Plateau  General Conservation Action   | Spee See coll Mo resp                                | Cliff and Canyon  cific Conservation Action d banking (incl. protocols,  | Priority     |
| Kachina daisy Tier 2 Plants General Threat Climate          | High  Specific The Vulnerability poor disper restriction to Habitat shing climate characteristics. Phenological properties are the properties of the propert | D  areat  ty due to sal capacato rare hat fiting and ange  al respontself and   | Unknown  o movement barriers, city, and/or abitat features alteration due to   | Colorado Plateau  General Conservation Action  Ex-situ Conservation   | P Spe See coll Mo resp and situ Con and clin         | Cliff and Canyon  ccific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in   | Priority H   |
| Kachina daisy Tier 2 Plants General Threat Climate Climate  | High  Specific The Vulnerability poor disper restriction to the Habitat shing climate characteristic of species in species unknown to the species of species of species of species of species unknown to the species of speci | D  areat  ty due to sal capacio rare ha fiting and inge  al respontiself and cnown  | Unknown  o movement barriers, city, and/or abitat features alteration due to   | Colorado Plateau  General Conservation Action  Ex-situ Conservation  Planning and Zoning  | P Spe See coll Mo resp and situ Con and clin (dis    | Cliff and Canyon  ccific Conservation Action d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors                                 | Priority H   |
| Kachina daisy Tier 2 Plants General Threat Climate  Climate | High  Specific The Vulnerability poor disper restriction to the Habitat shing climate characteristic characteristic climate characteristic climate characteristic climate characteristic characteristic climate characteristic climate characteristic characteristic climate characteristic characteristic climate characteristic characteristic characteristic characteristic characteristic characte | D  areat  ty due to sal capacio rare hater the sal capacio rare hater the sal capacio rare hater the sal capacio rate hater the sal capacio rater the sal | Unknown  o movement barriers, city, and/or abitat features alteration due to  use to climate change for inter-dependent  al regime (surface or (intensification or weather patterns, | Colorado Plateau  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Maintain or Restore Natural | P Spe See coll Mo resp and situ Con and clin (dis Ma | Cliff and Canyon  ccific Conservation Action d banking (incl. protocols, dection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms) | Priority H H |

| Erigero   | n wilkenii   | Population   | Status   | Population Trend   | Distribution   | Type  | Habitat  | Primary             |  |
|---|--|--|--|--|--|---|--|---------------------|--|
| Wilken flea   |  | Low  | D  | Unknown  | Utah-Wyoming Rocky<br>Mountains  | P   | Cliff and Canyon<br>Pinyon-Juniper   |                     |  |
| Tier 1  | Plants   |  |  |  |  |   |  |                     |  |
| General Th  |  | Specific Th  | reat   |  | General Conservation Action  | Spe   | cific Conservation Action  | Priority            |  |
| Climate   |  | Vulnerabili<br>poor disper   | ty due to<br>sal capac   | movement barriers,<br>ity, and/or<br>bitat features  | Ex-situ Conservation   | See   | d banking (incl. protocols, ection, and cultivation)   | Н                   |  |
| Climate   |  | Habitat shif<br>climate cha  | _  | alteration due to  | Planning and Zoning  | Moresp<br>and<br>situ   | Н  |                     |  |
| Climate   |  |  | tself and/   | se to climate change<br>or inter-dependent   | Research and Monitoring  | and<br>clin   | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)   |                     |  |
| Lack of kn  | owledge  | Population   | status un  | known  | Research and Monitoring  | Mo  | nitor population status  | Н                   |  |
| Lack of kn  | owledge  | Complete d<br>unknown  | listributio  | on in Colorado   | Research and Monitoring  |   | nduct field inventory to refine known ribution   | Н                   |  |
| Lack of kn  | owledge  | Threats poo  | orly know  | /n   | Research and Monitoring  |   | earch species/habitat response to nagement or disturbance  | Н                   |  |
| Climate   |  | f normal   | intensification or weather patterns,   | Capacity Building and<br>Cooperation   | _  | age in collaborative, proactive nning and conservation programs     | M  |                     |  |
|   |  |  |  |  |  |   |  |                     |  |
|   |  | e.g., arougi   | ns, torna  | dos, etc.)   |  |   |  |                     |  |
| Friogon   | num hrandegeei   |  |  | Population Trend   | Distribution   | Туре  | Habitat  | Primary             |  |
| Eriogon   | um brandegeei  | Population   | 1 Status   | Population Trend   |  | Type<br>P   | Habitat<br>Barrens   |                     |  |
| Eriogon   | num brandegeei   |  |  |  | Distribution Southern Rocky Mountains  | * *   | Barrens  | Primary  ✓          |  |
|   | uum brandegeei   | Population   | 1 Status   | Population Trend   |  | * *   |  | ~ ~                 |  |
| Brandegee   | , and the second | Population   | 1 Status   | Population Trend   |  | * *   | Barrens  | Primary  V          |  |
|   | wild buckwheat Plants  | Population   | n Status<br>D  | Population Trend   |  | P   | Barrens  |                     |  |
| Brandegee<br>Tier 1   | wild buckwheat Plants  | Population Low  Specific Th Vulnerabili poor disper  | D areat ty due to sal capac  | Population Trend Stable D movement barriers,   | Southern Rocky Mountains   | P<br>Spe<br>See   | Barrens<br>Sagebrush   |                     |  |
| Brandegee<br>Tier 1<br>General Th                             | wild buckwheat Plants  | Population Low  Specific Th Vulnerabili poor disper restriction t  | D areat  ty due to sal capaco o rare halfting and  | Population Trend Stable D  movement barriers, ity, and/or  | Southern Rocky Mountains  General Conservation Action  | P Spe See coll Mo resp and  | Barrens Sagebrush  cific Conservation Action d banking (incl. protocols,   | Priority            |  |
| Brandegee<br>Tier 1<br>General Th<br>Climate                  | wild buckwheat Plants  | Population Low  Specific Th Vulnerabili poor disper restriction t Habitat shift climate cha  | n Status  D  Treat  ty due to sal capac o rare halfting and nge  al respontself and/   | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to   | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  | P Spee See coll Mo resp and situ Cor and clin                       | Barrens Sagebrush  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in   | Priority H          |  |
| Brandegee Tier 1 General Th Climate Climate                   | wild buckwheat Plants  | Specific Th Vulnerabili poor disper restriction t Habitat shift climate cha  | n Status  D  Treat  ty due to sal capac o rare halfting and nge  al respontself and/mown   | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change for inter-dependent   | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  Planning and Zoning   | P Spee See coll Mo resp and situ Cor and clin (dis                  | Barrens Sagebrush  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors   | Priority H          |  |
| Brandegee Tier 1 General Th Climate Climate Climate           | wild buckwheat Plants  areat   | Specific Th Vulnerabili poor disper restriction t Habitat shif climate cha Phenologic of species in species unk                                      | n Status  D  Treat  ty due to sal capac or rare halfting and nge  al respontself and/mown  | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change for inter-dependent eation  | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring   | P Spee See coll Mo resp and situ Cor and clin (dis Mar              | Barrens Sagebrush  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms)  | Priority H H        |  |
| Brandegee Tier 1 General Th Climate Climate Climate Non-consu | wild buckwheat Plants  rreat  mptive Disturbance   | Specific Th Vulnerabili poor disper restriction t Habitat shif climate cha  Phenologic of species ir species unk  Motor-pow Climate var              | n Status  D  areat  ty due to sal capace or rare halfting and nge  al respontself and/mown  ered recreted recre | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change for inter-dependent eation eation intensification or weather patterns,            | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Compliance and Enforcement                         | P Spee See coll Mo resp and situ Cor and clin (dis Mai              | Barrens Sagebrush  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nage off-road travel  | Priorit; H H        |  |
| Brandegee Tier 1 General Th Climate Climate Climate           | wild buckwheat Plants  reat  mptive Disturbance mptive Disturbance   | Specific Th Vulnerabili poor disper restriction t Habitat shif climate cha  Phenologic of species in species unk  Motor-pow Climate var alteration o | n Status  D  areat  ty due to sal capace or rare halfting and nge  al respontself and/mown  ered recreted recre | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change for inter-dependent eation eation intensification or weather patterns, dos, etc.) | General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Compliance and Enforcement Education and Communication Capacity Building and | P Spe See coll Mo resp and situ Cor and clin (dis Mai Infe Eng plai | Barrens Sagebrush  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) mage off-road travel orm BLM travel management plan. tage in collaborative, proactive | Priority H  H  H  H |  |

| Eriogonum clavellatun | Population                 | n Status    | Population Trend                                     | Distribution                         | Type             | Habitat   | Primary  |
|-----------------------|----------------------------|-------------|--|--------------------------------------|------------------|---|----------|
| 3                     | Low                        | D           | Unknown  | Colorado Plateau                     | P                | Desert Shrub Saltbrush Fans and Flats   |          |
| Comb Wash buckwheat   |                            |             |  |                                      |                  |   |          |
| Tier 2 Plants         |                            |             |  |                                      |                  |   |          |
| General Threat        | Specific Th                | nreat       |  | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |
| Climate               | poor disper                | rsal capaci | movement barriers,<br>ity, and/or<br>pitat features  | Ex-situ Conservation                 |                  | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate               | Habitat shi<br>climate cha |             | alteration due to                                    | Planning and Zoning                  | res <sub>l</sub> | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate               | -                          | itself and/ | se to climate change<br>or inter-dependent           | Research and Monitoring              | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge     | Complete o                 | distributio | n in Colorado  | Research and Monitoring              |                  | nduct field inventory to refine known ribution  | Н        |
| Lack of knowledge     | Population                 | status unl  | known  | Research and Monitoring              | Mo               | nitor population status   | Н        |
| Resource Extraction   | Oil and gas                | drilling    |  | Voluntary Standards                  |                  | plement Best Management Practices energy development and mining   | Н        |
| Climate               |                            | of normal   | ntensification or<br>weather patterns,<br>los, etc.) | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |

# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Eriogonum                            | Population Status  | Population Trend                               | Distribution                         | Type             | Habitat   | Primary    |
|--------------------------------------|--|--|--------------------------------------|------------------|---|------------|
| coloradense Colorado wild buckwheat  | Medium D   | Unknown  | Southern Rocky Mountains             | P                | Foothill/Mountain Grassland<br>Shrub Tundra<br>Meadow Tundra  | <b>V V</b> |
| Tier 2 Plants                        |  |  |                                      |                  |   |            |
| General Threat                       | Specific Threat  |  | General Conservation Action          | Spe              | ecific Conservation Action  | Priority   |
|                                      |  |  | Education and Communication          | edu              | blish educational material/sponsor<br>acational programs to raise public<br>areness   | Н          |
| Climate                              | Vulnerability due to<br>poor dispersal capa<br>restriction to rare h | acity, and/or                                  | Ex-situ Conservation                 |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | Н          |
| Climate                              | Habitat shifting an climate change                                   | d alteration due to                            | Planning and Zoning                  | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н          |
| Climate                              |  | onse to climate change<br>d/or inter-dependent | Research and Monitoring              | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н          |
| Lack of knowledge                    | Biology and ecological   | gy are poorly known                            | Research and Monitoring              |                  | search critical life history/habitat<br>nponents  | Н          |
| Lack of knowledge                    | Complete distribut unknown   | ion in Colorado                                | Research and Monitoring              |                  | nduct field inventory to refine known<br>tribution  | Н          |
| Lack of knowledge                    | Population status u  | ınknown  | Research and Monitoring              | Mo               | nitor population status   | Н          |
| Non-consumptive Disturbance          | Non-motorized rec  | reation  | Voluntary Standards                  |                  | plement Best Management Practices recreation management   | Н          |
| Climate                              | Climate variability<br>alteration of norma<br>e.g., droughts, torn   | al weather patterns,                           | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M          |
| Habitat Degradation                  | Roads  |  | Voluntary Standards                  |                  | plement Best Management Practices<br>transportation projects  | M          |
| Indirect Consumptive Use (Mortality) | Incompatible grazi   | ng?  | Compatible Resource Use              |                  | plement compatible grazing nagement   | M          |

# Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Eriogonum                                 | Population Status  | Population '   | Trend   | Distribution  | Гуре        | Habitat   | Primary  |
|---|--|----------------|---------|---|-------------|---|----------|
| pelinophilum                              | Low D Rapidly declining  | Declining      | D       | Colorado Plateau  | P           | Desert Shrub  | <b>✓</b> |
| Clay-loving wild buckwheat  Tier 1 Plants |  |                |         |   |             |   |          |
| General Threat                            | Specific Threat  |                |         | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
|   |  |                |         | Land Protection (Public, Private)<br>Easements, and Resource Rights | *           | ablish legal designation to protect vitat (extend existing ACEC)  | Н        |
| Climate                                   | Vulnerability due to<br>poor dispersal capaci<br>restriction to rare hab | ty, and/or     | rriers, | Ex-situ Conservation  |             | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate                                   | Habitat shifting and climate change                                      | alteration due | to      | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                                   | Phenological respons<br>of species itself and/<br>species unknown        |                |         | Research and Monitoring   | and<br>clir | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Conversion                        | Conversion to cropla   | nd             |         | Land Protection (Public, Private)<br>Easements, and Resource Rights | ,           | quire conservation easement for<br>pitat protection   | Н        |
| Habitat Conversion                        | Housing, urban, and development  | ex-urban       |         | Land Protection (Public, Private)<br>Easements, and Resource Rights | ,           | quire conservation easement for<br>pitat protection   | Н        |
| Habitat Degradation                       | Roads  |                |         | Planning and Zoning   | issu        | mote consideration of biodiversity<br>ues in transportation and land use<br>nning processes   | Н        |
| Climate                                   | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patter |         | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge                         | Biology and ecology  | poorly know    | n       | Research and Monitoring   | req<br>bet  | termine minimum viable population<br>uirements; transition probabilities<br>ween different plant stages; and<br>ble seed production                   | M        |
| Lack of knowledge                         | Complete distribution unknown  | n in Colorado  |         | Research and Monitoring   |             | nduct field inventory to refine known tribution   | L        |

| Eutrema edwardsii ssp.                          | Population                                      | Status   | Population      | on Trend  | Distribution  | Type        | Habitat   | Primary  |
|---|---|----------|-----------------|-----------|---|-------------|---|----------|
| penlandii                                       | Medium  | D        | Stable          | D         | Southern Rocky Mountains  | P           | Meadow Tundra   | ✓        |
| Penland alpine fen mustard                      |   |          |                 |           |   |             |   |          |
| Tier 1 Plants                                   |   |          |                 |           |   |             |   |          |
| General Threat                                  | Specific Th                                     | eat      |                 |           | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
|   |   |          |                 |           | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | ablish legal designation to protect<br>itat (e.g., state Natural Area)  | Н        |
|   |   |          |                 |           | Research and Monitoring   | Mo          | nitor population status   | Н        |
| Climate   | Vulnerabilit<br>poor dispers<br>restriction to  | al capa  | city, and/or    |           | Ex-situ Conservation  |             | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate   | Habitat shift<br>climate char                   | -        | l alteration o  | lue to    | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate   | Phenologica<br>of species it<br>species unkn    | self and |                 |           | Research and Monitoring   | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Climate   | Climate varial<br>alteration of<br>e.g., drough | norma    | l weather pa    |           | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Habitat Degradation                             | Altered hydaquifer)                             | rologica | al regime (sı   | ırface or | Maintain or Restore Natural<br>Processes                            | Res         | store natural hydrologic regime   | M        |
| Resource Extraction                             | Mining  |          |                 |           | Voluntary Standards   |             | plement Best Management Practices mining  | M        |
| Gaura neomexicana                               | Population                                      | Status   | Population      | on Trend  | Distribution  | Туре        | Habitat   | Primary  |
| ssp. coloradensis                               | Low   | D        | Declinin        | g D       | Central Shortgrass Prairie  | P           | Eastern Plains Streams  | <b>✓</b> |
| _   |   |          |                 | <i>-</i>  | Front Range   |             | Grass/Forb Dominated Wetlands   | <b>✓</b> |
| Colorado butterfly plant                        |   |          |                 |           |   |             | Seeps and Springs   |          |
| Tier 1 Plants                                   |   |          |                 |           |   |             | Shrub-dominated Wetlands  |          |
| General Threat                                  | Specific Thi                                    | eat      |                 |           | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
| Climate   | Vulnerabilit<br>poor dispers<br>restriction to  | al capa  | city, and/or    |           | Ex-situ Conservation  |             | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate   | Habitat shift<br>climate char                   | -        | d alteration of | lue to    | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate   | Phenologica<br>of species it<br>species unkn    | self and |                 |           | Research and Monitoring   | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
|   |   |          | al regime (si   | ırface or | Maintain or Restore Natural   | Res         | store natural hydrologic regime   | Н        |
| Habitat Degradation                             | Altered hydaquifer)                             | rologica | ar regime (se   |           | Processes   |             |   |          |
| Habitat Degradation  Invasive or Exotic Species | •   |          |                 |           | Processes Invasive Species Control and Prevention                   |             | olement integrated weed/pest<br>nagement plan   | Н        |

| Gutierrezia elegans        | Population S                                     | tatus    | Population Trend                                      | Distribution                         | Type                       | Habitat   | Primary  |
|----------------------------|--|----------|---|--------------------------------------|----------------------------|---|----------|
| _                          | Low  | D        | Unknown   | Colorado Plateau                     | P                          | Barrens   |          |
| Lone Mesa snakeweed        |  |          |   |                                      |                            | Sagebrush   |          |
| Tier 1 Plants              |  |          |   |                                      |                            |   |          |
| General Threat             | Specific Thre                                    | at       |   | General Conservation Action          | Spe                        | ecific Conservation Action  | Priority |
| Climate                    | Vulnerability<br>poor dispersa<br>restriction to | l capac  |   | Ex-situ Conservation                 | See                        | Н   |          |
| Climate                    | Habitat shifting climate change                  | _        | alteration due to                                     | Planning and Zoning                  | Mo<br>resp<br>and<br>situ  | Н   |          |
| Climate                    |  | elf and  | se to climate change<br>for inter-dependent           | Research and Monitoring              | Cor<br>and<br>clir<br>(dis | Н   |          |
| Lack of knowledge          | Complete dis                                     | tributio | on in Colorado  | Research and Monitoring              |                            | nduct field inventory to refine known tribution   | Н        |
| Non-consumptive Disturband | ce Infrastructure<br>visitor use                 | develo   | opment for Park                                       | Protected Area Management            |                            | sign public improvements to be npatible with biodiversity   | Н        |
| Resource Extraction        | Oil and gas d                                    | rilling  | and seismic testing                                   | Voluntary Standards                  |                            | plement Best Management Practices energy development and mining   | Н        |
| Climate                    |  | ormal    | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation | Eng<br>pla                 | M   |          |
| Habitat Conversion         | Water storage                                    | •        |   | Protected Area Management            |                            | nage public use to be compatible<br>h biodiversity  | M        |
| Lack of knowledge          | Population sta                                   | atus un  | known   | Research and Monitoring              | Mo                         | onitor population status  | M        |
| Non-consumptive Disturban  | ce Motor-power                                   | ed recr  | eation  | Compliance and Enforcement           | Ma                         | nage off-road travel  | L        |
| Hackelia besseyi           | Population S                                     | tatus    | Population Trend                                      | Distribution                         | Type                       | Habitat   | Primary  |
|                            | Unknown  |          | Unknown   | Southern Rocky Mountains             | P                          | Mixed Conifer   | <b>✓</b> |
| Bessey's stickseed         |  |          |   |                                      |                            |   |          |
| Tier 2 Plants              | G : C . TT                                       |          |   |                                      | ~                          |   | 5.       |
| General Threat             | Specific Thre                                    |          |   | General Conservation Action          |                            | ecific Conservation Action  | Priority |
| Climate                    | Vulnerability<br>poor dispersa<br>restriction to | l capac  | ity, and/or   | Ex-situ Conservation                 |                            | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                    | Habitat shifting climate chang                   |          | alteration due to                                     | Planning and Zoning                  | res <sub>j</sub>           | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                    |  | elf and  | se to climate change<br>for inter-dependent           | Research and Monitoring              | and<br>clir                | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge          | Biology, ecol<br>known                           | ogy, ar  | nd habitat poorly                                     | Research and Monitoring              | Res                        | search critical life history/habitat nponents   | Н        |
| Lack of knowledge          | Complete dis                                     | tributio | on in Colorado  | Research and Monitoring              |                            | nduct field inventory to refine known tribution   | Н        |
| Lack of knowledge          | Population sta                                   | atus un  | known   | Research and Monitoring              | Mo                         | onitor population status  | Н        |
| Climate                    | Climate varia                                    | hility ( | intensification or                                    | Capacity Building and                | Ens                        | gage in collaborative, proactive  | M        |

| Hackelia gracilenta   | Populatio  | n Status   | Populatio   | n Trend                   | Distribution  | Type  | Habitat  | Primary       |
|---|--|--|---|---------------------------|---|---|--|---------------|
| Ü   | Low  | D  | Stable  | D                         | Colorado Plateau  | P   | Pinyon-Juniper<br>Mixed Forest   |               |
| Mesa Verde stickseed  |  |  |   |                           |   |   |  |               |
| Tier 1 Plants   |  |  |   |                           |   |   |  |               |
| General Threat  | Specific T   |  |   |                           | General Conservation Action   |   | d banking (incl. protocols,  | Priorit       |
| Climate   | poor dispe   | rsal capac   | movement<br>city, and/or<br>bitat feature   |                           | Ex-situ Conservation  | coll  | Н  |               |
| Climate   | Habitat shi<br>climate cha   | _  | alteration d  | ue to                     | Planning and Zoning   | Moo<br>resp<br>and<br>situ  | Н  |               |
| Climate   |  | itself and   | se to climate<br>or inter-dep   |                           | Research and Monitoring   | and<br>clin   | duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)   | Н             |
| Lack of knowledge   | Complete unknown   | distributio  | on in Colora  | do                        | Research and Monitoring   |   | duct field inventory to refine known   | Н             |
| Climate   |  | of normal  | intensificati<br>weather pat<br>dos, etc.)  |                           | Capacity Building and<br>Cooperation  |   | age in collaborative, proactive<br>nning and conservation programs   | M             |
| Non-consumptive Disturbance   | Non-motor  | rized recre  | eation  |                           | Voluntary Standards   |   | lement Best Management Practices recreation management   | M             |
| Non-consumptive Disturbance   | Non-motor  | rized recre  | eation  |                           | Education and Communication   | edu   | lish educational material/sponsor<br>cational programs to raise public<br>reness   | L             |
| Herrickia horrida   | Populatio  | n Status   | Populatio   | n Trend                   | Distribution  | Type  | Habitat  | Primary       |
|   | Low  | D  | Unknown   | 1                         | Southern Rocky Mountains  | P   | Pinyon-Juniper   | <b>V</b>      |
| Considire Disconnection action  | 2011   |  |   |                           |   |   | Cliff and Canyon   |               |
| Canadian River spiny aster  | 2011   |  |   |                           |   |   | Cliff and Canyon   |               |
| Tier 2 Plants   |  | hwo o t  |   |                           | Cananal Concernation Action   |   | ·  | Daionita      |
| Tier 2 Plants General Threat  | Specific T   |  | movement  | harriers                  | General Conservation Action   | Spe   | cific Conservation Action  | -             |
| Tier 2 Plants General Threat  | Specific To Vulnerabil poor dispe  | ity due to   | movement city, and/or bitat feature   |                           | General Conservation Action Ex-situ Conservation  | Spe<br>See  | ·  | Priority<br>H |
| Tier 2 Plants General Threat Climate  | Specific Ti<br>Vulnerabil<br>poor dispe<br>restriction   | ity due to<br>rsal capac<br>to rare ha<br>fting and  | ity, and/or   | es                        |   | Spe<br>See<br>coll<br>Mooresp   | cific Conservation Action d banking (incl. protocols,  | -             |
| Tier 2 Plants  General Threat  Climate  Climate                             | Specific Ti<br>Vulnerabil<br>poor dispe<br>restriction<br>Habitat shi<br>climate cha   | ity due to<br>rsal capac<br>to rare ha<br>fting and<br>ange  | city, and/or<br>bitat feature<br>alteration d   | ue to e change            | Ex-situ Conservation  | Spe<br>See<br>coll<br>Moorespand<br>situ<br>Cor<br>and<br>clim                            | cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in   | Н             |
| Tier 2 Plants  General Threat  Climate  Climate                             | Specific Ti<br>Vulnerabil<br>poor dispe<br>restriction<br>Habitat shi<br>climate cha<br>Phenologic<br>of species<br>species un   | ity due to<br>rsal capac<br>to rare ha<br>fting and<br>ange<br>cal respon<br>itself and<br>known               | eity, and/or<br>bitat feature<br>alteration de<br>ase to climate                                | e change                  | Ex-situ Conservation  Planning and Zoning   | Spe<br>See<br>coll<br>Mooresp<br>and<br>situ<br>Cor<br>and<br>clin<br>(dis                | cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors   | Н             |
| Tier 2 Plants  General Threat  Climate  Climate  Climate  Lack of knowledge | Specific Ti<br>Vulnerabil<br>poor dispe<br>restriction<br>Habitat shi<br>climate chi<br>Phenologio<br>of species<br>species uni<br>Complete  | ity due to<br>rsal capactorare ha<br>fting and<br>ange<br>cal respon<br>itself and<br>known                    | eity, and/or<br>bitat feature<br>alteration d<br>use to climate<br>or inter-dep                 | e change                  | Ex-situ Conservation  Planning and Zoning  Research and Monitoring                          | Spe<br>See<br>coll<br>Mooresp<br>and<br>situ<br>Cor<br>and<br>clin<br>(dis<br>Cor<br>dist | cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) duct field inventory to refine known            | Н             |
| • •   | Specific Ti<br>Vulnerabil<br>poor dispe<br>restriction<br>Habitat shi<br>climate chi<br>Phenologic<br>of species<br>species uni<br>Complete<br>unknown<br>Population<br>Threats po | ity due to rsal capac to rare ha fting and ange  cal respon itself and known  distributio  status un orly know | city, and/or<br>bitat feature<br>alteration d<br>use to climate<br>or inter-dep<br>on in Colora | e change e change bendent | Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Research and Monitoring | Spee See coll  Moorespand situ  Corrand clin (dis Cordist  Moorespand situ                | cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in ionse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs iduct primary research on rare plant pollinator responses to changing hate, and other vulnerability factors persal mechanisms, mutualisms) iduct field inventory to refine known ribution | H<br>H        |

| Ipomops                     | sis aggregata      | Population St                                     | atus     | Population Trend                                     | Distribution  | Туре        | Habitat   | Primary  |  |
|-----------------------------|--------------------|---|----------|--|---|-------------|---|----------|--|
| ssp. web                    | eri                | Low   | D        | Unknown  | Southern Rocky Mountains  | P           | Mixed Conifer   | <b>✓</b> |  |
| Rabbit Ears                 | gilia              |   |          |  |   |             |   |          |  |
| Tier 2                      | Plants             |   |          |  |   |             |   |          |  |
| General Th                  |                    | Specific Threa                                    | ıt       |  | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |  |
| Lack of kno                 | owledge            | Genetics of iso<br>understood                     | olated p | populations poorly                                   | Research and Monitoring   | isol        | netic studies to determine the<br>lation and genetic diversity of<br>parate occurrences   | Н        |  |
| Non-consur                  | mptive Disturbance | Non-motorized                                     | d recre  | ation  | Education and Communication   | edu         | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |  |
| Non-consur                  | mptive Disturbance | Recreation  |          |  | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab         | ablish legal designation to protect<br>vitat (e.g., wilderness, Research<br>tural Area)   | Н        |  |
| Non-consur                  | nptive Disturbance | Motor-powere                                      | d recre  | ation  | Voluntary Standards   |             | plement Best Management Practices recreation management   | Н        |  |
| Indirect Co.<br>(Mortality) | nsumptive Use      | Grazing and tr<br>non-native ung                  |          | g by native and                                      | Compatible Resource Use   |             | olement compatible grazing nagement   | M        |  |
| Lack of kno                 | owledge            | Population sta                                    | tus unk  | known  | Research and Monitoring   | Mo          | Monitor population status   |          |  |
| Climate                     |                    |   | ormal v  | ntensification or<br>weather patterns,<br>los, etc.) | Capacity Building and<br>Cooperation                                |             | Engage in collaborative, proactive planning and conservation programs   |          |  |
| Climate                     |                    | Vulnerability of poor dispersal restriction to re | capaci   |  | Ex-situ Conservation  |             | ed banking (incl. protocols,<br>lection, and cultivation)   | L        |  |
| Climate                     |                    | Habitat shiftin<br>climate change                 | _        | alteration due to                                    | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | L        |  |
| Climate                     |                    |   | lf and/o | se to climate change<br>or inter-dependent           | Research and Monitoring   | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | L        |  |
| Invasive or                 | Exotic Species     | Invasive plant                                    | s        |  | Invasive Species Control and Prevention                             |             | plement integrated weed/pest<br>nagement plan   | L        |  |
| Lack of kno                 | owledge            | Reproductive unknown                              | and/or   | pollination biology                                  | Research and Monitoring   |             | search critical life history/habitat nponents   | L        |  |
| Lack of kno                 | owledge            | Complete distr<br>unknown                         | ributio  | n in Colorado  | Research and Monitoring   |             | nduct field inventory to refine known tribution   | L        |  |

| Ipomopsis globularis        | Population Status   | Population Trend   | Distribution                            | Type             | Habitat   | Primary  |
|-----------------------------|---|--------------------|---|------------------|---|----------|
| 1 1 3                       | Medium D  | Unknown            | Southern Rocky Mountains                | P                | Meadow Tundra Exposed Rock (alpine)   |          |
| Globe gilia                 |   |                    |   |                  | Exposed Rock (alpine)   |          |
| Tier 2 Plants               | C 'C' TTI '   |                    | C 1C " A "                              | C                | ······································  | D: '     |
| General Threat              | Specific Threat   |                    | General Conservation Action             |                  | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability due to n<br>poor dispersal capacity<br>restriction to rare habi | y, and/or          | Ex-situ Conservation                    |                  | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                     | Habitat shifting and al climate change  | Iteration due to   | Planning and Zoning                     | res <sub>l</sub> | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                     | Phenological response<br>of species itself and/or<br>species unknown          |                    | Research and Monitoring                 | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge           | Complete distribution unknown   | in Colorado        | Research and Monitoring                 |                  | nduct field inventory to refine known ribution  | n H      |
| Non-consumptive Disturbance | Non-motorized recrea  | tion               | Education and Communication             | edu              | olish educational material/sponsor<br>ecational programs to raise public<br>areness   | Н        |
| Non-consumptive Disturbance | Motor-powered recrea  | ntion              | Voluntary Standards                     |                  | plement Best Management Practices recreation management   | Н        |
| Climate                     | Climate variability (in alteration of normal we.g., droughts, tornado         | eather patterns,   | Capacity Building and<br>Cooperation    |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Invasive or Exotic Species  | Invasive plants   |                    | Invasive Species Control and Prevention |                  | nitor occurrences for weed invasion control promptly  | M        |
| Lack of knowledge           | Population status unki  | nown               | Research and Monitoring                 | Mo               | nitor population status   | M        |
| Lack of knowledge           | Response to change is   | poorly understood  | Research and Monitoring                 |                  | search species/habitat response to<br>nagement or disturbance   | M        |
| Lack of knowledge           | Biology, ecologyk, an are poorly known  | d specific habitat | Research and Monitoring                 |                  | search critical life history/habitat<br>inponents   | M        |
| Resource Extraction         | Mining  |                    |   |                  |   | M        |

| Ipomopsis polyantha                  | Population Status Po   | pulation Trend    | Distribution  | Туре        | Habitat   | Primary  |
|--------------------------------------|--|-------------------|---|-------------|---|----------|
|                                      | Medium D De  | eclining D        | Southern Rocky Mountains  | P           | Barrens<br>Ponderosa Pine   | <b>V</b> |
| Pagosa skyrocket                     | 1 7 0  |                   |   |             |   |          |
| Tier 1 Plants                        |  |                   |   | -           |   |          |
| General Threat                       | Specific Threat  |                   | General Conservation Action   |             | ecific Conservation Action  | Priority |
| Climate                              | Vulnerability due to mov<br>poor dispersal capacity, a<br>restriction to rare habitat  | and/or            | Ex-situ Conservation  |             | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                              | Habitat shifting and alter<br>climate change   | ation due to      | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                              | Phenological response to<br>of species itself and/or in<br>species unknown             |                   | Research and Monitoring   | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Conversion                   | Commerical and industria   | al development    | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | quire conservation easement for itat protection   | Н        |
| Habitat Conversion                   | Housing, urban, and ex-u development   | ırban             | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | quire conservation easement for itat protection   | Н        |
| Habitat Degradation                  | Roads and Utilities  |                   | Voluntary Standards   | for         | olement Best Management Practices<br>transportation and utility<br>struction and maintenance  | Н        |
| Invasive or Exotic Species           | Invasive plants  |                   | Invasive Species Control and<br>Prevention                          |             | p weed infestations and sensitive no ay/no mow zones  | Н        |
|                                      |  |                   | Education and Communication   |             | olement landowner<br>reach/education program  | M        |
|                                      |  |                   | Planning and Zoning   | issu        | mote consideration of biodiversity<br>les in transportation and land use<br>ming processes  | M        |
| Climate                              | Climate variability (inten<br>alteration of normal weat<br>e.g., droughts, tornados, o | her patterns,     | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive nning and conservation programs  | M        |
| Indirect Consumptive Use (Mortality) | Grazing  |                   | Compatible Resource Use   | _           | plement compatible grazing nagement   | M        |
| Lack of knowledge                    | Biology, ecology, and spoorly known  | ecific habitat is | Research and Monitoring   |             | earch critical life history/habitat   | M        |
| Lack of knowledge                    | Complete distribution in unknown   | Colorado          | Research and Monitoring   |             | nduct field inventory to refine known ribution  | M        |
| Lack of knowledge                    |  |                   | Species Management  | See         | d banking for future restoration work   | x M      |

| Lepidium crenatum                 | Population Sta  | atus    | Population Trend                                    | Distribution                         | Type        | Habitat  | Primary  |
|-----------------------------------|---|---------|---|--------------------------------------|-------------|--|----------|
| 1                                 | Medium  | D       | Unknown   | Colorado Plateau                     | P           | Desert Shrub   | <b>V</b> |
| A11 1'                            |   |         |   | Southern Rocky Mountains             | P           | Sagebrush  |          |
| Alkaline pepperwort Tier 2 Plants |   |         |   | Utah-Wyoming Rocky<br>Mountains      | P           |  |          |
| General Threat                    | Specific Threa  | t       |   | General Conservation Action          | Spe         | ecific Conservation Action   | Priority |
| Climate                           | Vulnerability of<br>poor dispersal<br>restriction to ra | capaci  |   | Ex-situ Conservation                 |             | ed banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate                           | Habitat shifting climate change                         | _       | lteration due to                                    | Planning and Zoning                  | resp        | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                           | 0   | f and/o | e to climate change<br>or inter-dependent           | Research and Monitoring              | and<br>clir | nduct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Lack of knowledge                 | Complete distr<br>unknown                               | ibution | in Colorado   | Research and Monitoring              |             | nduct field inventory to refine known tribution  | n H      |
| Lack of knowledge                 | Population stat   | us unk  | nown  | Research and Monitoring              | Mo          | onitor population status   | Н        |
| Lack of knowledge                 | Threats poorly  | knowi   | 1   | Research and Monitoring              |             | search species/habitat response to nagement or disturbance   | Н        |
| Climate                           |   | ormal v | ntensification or<br>veather patterns,<br>os, etc.) | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive<br>nning and conservation programs  | M        |

| Lesquere                    | lla calcicola     | Population S                    | Status   | Population Trend  | Distribution  | Type        | Habitat  | Primary  |
|-----------------------------|-------------------|---------------------------------|----------|---|---|-------------|--|----------|
| •                           |                   | Low                             | D        | Unknown   | Central Shortgrass Prairie<br>Southern Rocky Mountains              | P<br>O      | Barrens<br>Ponderosa Pine  |          |
| •                           | ntain bladderpod  |                                 |          |   | Doubles Really Mountains  | Ü           | 1 0.1401 0.04 1 1.10   |          |
| Tier 2 General Three        | Plants            | Specific Thre                   | not.     |   | General Conservation Action   | Sn          | ecific Conservation Action   | Priority |
| Climate                     | cat               | Vulnerability<br>poor dispersa  | due to   |   | Ex-situ Conservation  | Sec         | ed banking (incl. protocols,<br>llection, and cultivation)   | Н        |
| Climate                     |                   | Habitat shifti<br>climate chang | _        | alteration due to                                       | Planning and Zoning   | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>d prepare adaptation plan to define in<br>u and ex situ conservation needs | Н        |
| Climate                     |                   |                                 | elf and  | nse to climate change<br>/or inter-dependent            | Research and Monitoring   | and<br>clin | induct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Habitat Conv                | version           | Housing, urb<br>development     |          | l ex-urban  | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | quire conservation easement for bitat protection   | Н        |
| Non-consum                  | ptive Disturbance | Motor-power                     | red reci | reation   | Education and Communication   | edu         | blish educational material/sponsor<br>ucational programs to raise public<br>areness  | Н        |
| Resource Ex                 | traction          | Mining (coal                    | , sand/  | gravel, etc.)   | Education and Communication   | avo         | ucate development industries about biding and/or mitigating impacts to e or sensitive species  | Н        |
| Climate                     |                   |                                 | normal   | (intensification or<br>weather patterns,<br>idos, etc.) | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive<br>unning and conservation programs   | M        |
| Habitat Degr                | radation          | Overhead uti                    | lity lin | es and towers   | Voluntary Standards   |             | plement Best Management Practices urban development, landscaping, etc  | . M      |
| Habitat Degr                | radation          | Roads or Rai                    | lroads   |   | Voluntary Standards   |             | plement Best Management Practices transportation projects  | M        |
| Indirect Con<br>(Mortality) | sumptive Use      | Grazing                         |          |   | Compatible Resource Use   |             | plement compatible grazing inagement   | L        |
| Invasive or I               | Exotic Species    | Invasive plan                   | nts      |   | Invasive Species Control and Prevention                             |             | plement integrated weed/pest   | L        |

| Lesquerella congesta   | Population St  | tatus  | Population Trend  | Distribution  | Type   | Habitat  | Primary                 |
|--|--|--|---|---|--|--|-------------------------|
|  | Medium   | D  | Unknown   | Utah High Plateau   | P  | Barrens  | ✓                       |
| Dudley Bluffs bladderpod   |  |  |   |   |  |  |                         |
| Tier 1 Plants  |  |  |   |   |  |  |                         |
| General Threat   | Specific Threa   | at   |   | General Conservation Action   | Spe  | ecific Conservation Action   | Priority                |
| Climate  | Vulnerability<br>poor dispersal<br>restriction to r  | capac  | movement barriers,<br>ity, and/or<br>bitat features   | Ex-situ Conservation  | See<br>coll  | Н  |                         |
| Climate  | Habitat shiftin<br>climate chang   | _  | alteration due to   | Planning and Zoning   | Mo<br>resp<br>and<br>situ  | Н  |                         |
| Climate  |  | lf and/  | se to climate change<br>for inter-dependent   | Research and Monitoring   | Cor<br>and<br>clin<br>(dis   | Н  |                         |
| Habitat Degradation  | Utility and pip  | peline   | construction  | Voluntary Standards   |  | plement Best Management Practices energy development and mining  | Н                       |
| Habitat Degradation  | Roads  |  |   | Voluntary Standards   |  | plement Best Management Practices transportation projects  | Н                       |
| Lack of knowledge  | Population sta   | itus un  | known   | Research and Monitoring   |  | nitor population status  | Н                       |
| Lack of knowledge  | Response to c  | hange  |   | Research and Monitoring   | of c   | estigate how plants respond to layers<br>lust deposited during resource<br>raction   | Н                       |
| Resource Extraction  | Oil and gas dr   | illing,  | and oil shale mining  | Voluntary Standards   | Imp  | Н  |                         |
| Resource EAttaction  | 5 <b>8</b>   | _  |   |   | Ior  | energy development and mining  |                         |
| Climate  | Climate varial   | ormal  | intensification or<br>weather patterns,<br>dos, etc.)   | Capacity Building and<br>Cooperation  | Eng  | gage in collaborative, proactive nning and conservation programs   | M                       |
| Climate  | Climate variat   | ormal<br>, torna   | weather patterns,   |   | Eng  | gage in collaborative, proactive   | M<br>Primary            |
|  | Climate variate alteration of n e.g., droughts,  | ormal<br>, torna   | weather patterns,<br>dos, etc.)   | Cooperation  Distribution  Utah High Plateau  | Eng<br>plai  | gage in collaborative, proactive aning and conservation programs  Habitat  Barrens   |                         |
| Climate  | Climate variate alteration of n e.g., droughts,  | ormal<br>, tornac<br>tatus   | weather patterns,<br>dos, etc.)  Population Trend   | Cooperation   | Eng<br>plai<br>Type  | gage in collaborative, proactive nning and conservation programs  Habitat  | Primary                 |
| Climate  Lesquerella parviflora  Piceance bladderpod   | Climate variate alteration of n e.g., droughts,  | ormal<br>, tornac<br>tatus   | weather patterns,<br>dos, etc.)  Population Trend   | Cooperation  Distribution  Utah High Plateau  | Eng<br>plan<br>Type<br>P   | gage in collaborative, proactive aning and conservation programs  Habitat  Barrens   | Primary                 |
| Climate  Lesquerella parviflora  Piceance bladderpod  Tier 2 Plants  | Climate variate alteration of n e.g., droughts,  | ormal<br>, tornac<br>tatus<br>D  | weather patterns,<br>dos, etc.)  Population Trend   | Cooperation  Distribution  Utah High Plateau  | Eng<br>plan<br>Type<br>P<br>O  | gage in collaborative, proactive aning and conservation programs  Habitat  Barrens   | Primary                 |
| Climate  Lesquerella parviflora  Piceance bladderpod  Tier 2 Plants  General Threat  | Climate variat alteration of n e.g., droughts,  Population St Medium   | tatus D at due to  | weather patterns, dos, etc.)  Population Trend Stable D  movement barriers, ity, and/or   | Distribution Utah High Plateau Southern Rocky Mountains   | Type P O Spe   | gage in collaborative, proactive aning and conservation programs  Habitat  Barrens  Cliff and Canyon   | Primary  ✓              |
| Climate  Lesquerella parviflora  Piceance bladderpod   | Climate variat alteration of n e.g., droughts,  Population St Medium  Specific Threat Vulnerability poor dispersal restriction to r  | tatus D at due to capac care ha  | weather patterns, dos, etc.)  Population Trend Stable D  movement barriers, ity, and/or   | Distribution Utah High Plateau Southern Rocky Mountains General Conservation Action   | Type P O Spe See coll  | Habitat Barrens Cliff and Canyon ccific Conservation Action d banking (incl. protocols,  | Primary  Priority       |
| Climate  Lesquerella parviflora  Piceance bladderpod Tier 2 Plants General Threat Climate  Climate                               | Climate variat alteration of n e.g., droughts, Population St Medium  Specific Threa Vulnerability poor dispersal restriction to r Habitat shiftin climate change   | ormal, tornac  | movement barriers, ity, and/or bitat features alteration due to   | Distribution Utah High Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation   | Type P O Spe See coll Mo resp and situ Cor and clin                                  | Habitat Barrens Cliff and Canyon  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Primary Priority H      |
| Climate  Lesquerella parviflora  Piceance bladderpod Tier 2 Plants General Threat Climate  Climate                               | Climate variat alteration of n e.g., droughts, Population St Medium  Specific Threa Vulnerability poor dispersal restriction to r Habitat shiftin climate change Phenological of species itse species unkno  | ormal, tornace tattus  D  attus  due to a capace are hang and e  | movement barriers, ity, and/or bitat features alteration due to see to climate change /or inter-dependent   | Cooperation  Distribution Utah High Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning   | Type P O Spe See coll Mo resp and situ Cor and clin (dis Imp                         | Habitat Barrens Cliff and Canyon  crific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors  | Primary  Priority  H    |
| Climate  Lesquerella parviflora  Piceance bladderpod  Tier 2 Plants  General Threat  Climate                                     | Climate variat alteration of n e.g., droughts, | ormal , tornac  tatus  D  at due to a capac care ha ag and e  respon lf and/wn  iilling,  cormal         | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent and oil shale mining intensification or weather patterns, | Distribution Utah High Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring   | Type P O Spe See coll Mo resp and situ Cor and clin (dis Imp for Eng                 | Habitat Barrens Cliff and Canyon  defining (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms)  blement Best Management Practices  | Primary Priority H H    |
| Climate  Lesquerella parviflora  Piceance bladderpod Tier 2 Plants General Threat Climate  Climate  Climate  Resource Extraction | Climate variatal teration of ne.g., droughts,  Population St Medium  Specific Three Vulnerability poor dispersal restriction to restrict the restriction to restrict the restriction to restrict the restriction to restriction to restrict the restriction that restriction th | ormal , tornac  tatus  D  at due to a capac are ha ag and e  respon lf and/ wn  tilling, tornac , tornac | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent and oil shale mining intensification or weather patterns, | Distribution Utah High Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Voluntary Standards  Capacity Building and | Eng plan  Type P O Spe See coll  Mo resp and situ Cor and clin (dis Imp for Eng plan | Habitat Barrens Cliff and Canyon  crific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors prepare adaptations, mutualisms) belement Best Management Practices energy development and mining gage in collaborative, proactive | Primary  Priority  H  H |

| Lesquerella pruinosa        | Population St                                     | atus     | Population Trend                                    | Distribution  | Type        | Habitat   | Primary  |
|-----------------------------|---|----------|---|---|-------------|---|----------|
|                             | Medium  | D        | Unknown   | Southern Rocky Mountains  | P           | Barrens Foothill/Mountain Grassland   |          |
| Pagosa bladderpod           |   |          |   |   |             | T OOMING FIGUREAU   |          |
| Tier 2 Plants               |   |          |   |   |             |   |          |
| General Threat              | Specific Threa                                    | ıt       |   | General Conservation Action   | Spe         | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability of poor dispersal restriction to ra | capaci   | ty, and/or  | Ex-situ Conservation  |             | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                     | Habitat shifting climate change                   |          | lteration due to                                    | Planning and Zoning   | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |   | lf and/c | e to climate change<br>or inter-dependent           | Research and Monitoring   | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Climate                     |   | ormal v  | ntensification or<br>weather patterns,<br>os, etc.) | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive nning and conservation programs  | M        |
| Habitat Conversion          | Housing, urbandevelopment                         | n, and o | ex-urban  | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | quire conservation easement for<br>oitat protection   | M        |
| Habitat Degradation         | Roads   |          |   | Voluntary Standards   |             | plement Best Management Practices<br>transportation projects  | M        |
| Invasive or Exotic Species  | Invasive plants                                   | S        |   | Invasive Species Control and Prevention                             |             | plement integrated weed/pest<br>nagement plan   | M        |
| Invasive or Exotic Species  | Invasive plants                                   | S        |   | Invasive Species Control and Prevention                             |             | p weed infestations and sensitive no ay/no mow zones  | M        |
| Lack of knowledge           | Complete distr<br>unknown                         | ributior | in Colorado   | Research and Monitoring   |             | nduct field inventory to refine known tribution   | M        |
| Lack of knowledge           | Population stat                                   | tus unk  | nown  | Research and Monitoring   | Mo          | onitor population status  | M        |
| Non-consumptive Disturbance | Motor-powere                                      | d recre  | ation   | Education and Communication   | edu         | olish educational material/sponsor<br>acational programs to raise public<br>areness   | M        |
| Resource Extraction         | Oil and gas dri                                   | illing   |   | Voluntary Standards   |             | plement Best Management Practices energy development and mining   | M        |

| Lesquerella vicina          | Population                    | Status               | Population Trend                                      | Distribution  | Type                      | Habitat   | Primary  |  |
|-----------------------------|-------------------------------|----------------------|---|---|---------------------------|---|----------|--|
| •                           | Low                           | D                    | Unknown   | Colorado Plateau  | P                         | Pinyon-Juniper  | <b>V</b> |  |
| Good-neighbor bladderpod    |                               |                      |   | Southern Rocky Mountains  | P                         | Desert Shrub  |          |  |
| Tier 2 Plants               |                               |                      |   |   |                           |   |          |  |
| General Threat              | Specific Thr                  | eat                  |   | General Conservation Action   | Spe                       | ecific Conservation Action  | Priority |  |
| Climate                     | Vulnerability<br>poor dispers | y due to<br>al capac | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation  | See                       | Seed banking (incl. protocols, collection, and cultivation)   |          |  |
| Climate                     | Habitat shift climate chan    | _                    | alteration due to                                     | Planning and Zoning   | res <sub>l</sub>          | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs |          |  |
| Climate                     |                               | self and             | se to climate change<br>for inter-dependent           | Research and Monitoring   | and<br>clir               | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    |          |  |
| Habitat Degradation         | Roads                         |                      |   | Voluntary Standards   |                           | plement Best Management Practices transportation projects   | Н        |  |
| Non-consumptive Disturbance | Recreation                    |                      |   | Education and Communication   | edu                       | plish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |  |
| Non-consumptive Disturbance | Recreation                    |                      |   | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab                       | ablish legal designation to protect<br>bitat (e.g., Area of Critical<br>vironmental Concern)  | Н        |  |
| Climate                     |                               | normal               | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                | -                         | Engage in collaborative, proactive planning and conservation programs   |          |  |
| Lack of knowledge           | Population s                  |                      |   | Research and Monitoring   | Monitor population status |   | M        |  |
| Lack of knowledge           | Complete di<br>unknown        | stributio            | on in Colorado  | Research and Monitoring   |                           | nduct field inventory to refine knowr tribution   | n M      |  |
|                             |                               | ~                    |   |   |                           |   |          |  |
| Limnorchis zothecina        | Population                    |                      | Population Trend                                      |   | Туре                      | Habitat   | Primary  |  |
|                             | Low                           | D                    | Unknown   | Utah-Wyoming Rocky<br>Mountains                                     | P                         | Cliff and Canyon<br>Seeps and Springs   |          |  |
| Alcove bog orchid           |                               |                      |   |   |                           | seeps and springs   |          |  |
| Tier 2 Plants               |                               |                      |   |   |                           |   |          |  |
| General Threat              | Specific Thr                  | eat                  |   | General Conservation Action   | Spe                       | ecific Conservation Action  | Priority |  |
| Climate                     | poor dispers                  | al capac             | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation  |                           | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |  |
| Climate                     | Habitat shift climate chan    |                      | alteration due to                                     | Planning and Zoning   | res <sub>l</sub>          | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs           | Н        |  |
| Climate                     |                               | self and             | se to climate change<br>or inter-dependent            | Research and Monitoring   | and<br>clir               | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)              | Н        |  |
| Lack of knowledge           | Complete di<br>unknown        | stributio            | on in Colorado  | Research and Monitoring   |                           | nduct field inventory to refine known tribution   | n H      |  |
| Lack of knowledge           | Population s                  | tatus un             | known   | Research and Monitoring   | Mo                        | onitor population status  | Н        |  |
| Climate                     |                               | normal               | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                | Eng<br>plai               | M   |          |  |
| Habitat Degradation         | Altered hydi                  | ologica              | l regime (surface or                                  | Maintain or Restore Natural   | Res                       | store natural hydrologic regime   | L        |  |

| Lomatium concinu  | num Po  | opulation Sta  | atus   | Population 7  | Trend               | Distribution  | Type   | Habitat  | Primary      |
|---|---|--|--|---|---------------------|---|--|--|--------------|
|   |   | ledium   | D  | Declining   | D                   | Colorado Plateau  | P  | Sagebrush  | <b>V</b>     |
| Colorado desert-parsley                                     |   |  |  |   |                     | Southern Rocky Mountains  | О  | Barrens  |              |
| Tier 2 Plants   |   |  |  |   |                     |   |  |  |              |
| General Threat  | Spe   | ecific Threa   | t  |   |                     | General Conservation Action   | Spe  | ecific Conservation Action   | Priority     |
| Climate   | poo   | or dispersal   | capaci   | movement bar<br>ity, and/or<br>oitat features   | riers,              | Ex-situ Conservation  |  | d banking (incl. protocols, ection, and cultivation)   | Н            |
| Climate   |   | bitat shifting<br>mate change  | _  | alteration due  | to                  | Planning and Zoning   | resp<br>and  | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н            |
| Climate   | of s  |  | f and/o  | se to climate c<br>or inter-depen   |                     | Research and Monitoring   | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)   | Н            |
| Non-consumptive Disturb                                     | bance Red   | creation   |  |   |                     | Voluntary Standards   |  | element Best Management Practices recreation management  | Н            |
| Climate   | alte  |  | ormal v  | ntensification<br>weather patter<br>los, etc.)  |                     | Capacity Building and<br>Cooperation  |  | gage in collaborative, proactive aning and conservation programs   | M            |
| Lack of knowledge   | Co  |  |  | n in Colorado   |                     | Research and Monitoring   |  | nduct field inventory to refine known ribution   | ı L          |
| Lupinus crassus   | De  | opulation Sta  | -4   |   |                     |   |  | TT-1:4-4   | D :          |
| <b>г</b> артия стаямя                                       | rc  | pulation Su  | atus   | Population 7  | rend                | Distribution  | Type   | Habitat  | Primary      |
| Payson lupine   |   | ow   | D  | Unknown   | rend                | Distribution  Colorado Plateau  Southern Rocky Mountains  | P P  | Pinyon-Juniper<br>Barrens  | Primary      |
| •   |   | •  |  | _ •   | rend                | Colorado Plateau  | P  | Pinyon-Juniper   |              |
| Payson lupine   | Lo  | •  | D  | _ •   | rend                | Colorado Plateau  | P<br>P   | Pinyon-Juniper   |              |
| Payson lupine Tier 2 Plants                                 | Spe<br>Vu<br>poo                                  | ecific Threa<br>lnerability d<br>or dispersal  | D  t  due to a   | Unknown<br>movement bar   |                     | Colorado Plateau<br>Southern Rocky Mountains<br>General Conservation Action   | P<br>P<br>Spe  | Pinyon-Juniper<br>Barrens  |              |
| Payson lupine Tier 2 Plants General Threat                  | Spe<br>Vu<br>poc<br>resi                          | ecific Threa<br>Ilnerability or<br>dispersal<br>triction to ra   | t tulue to a capacitare hab  | Unknown  movement bar tty, and/or   | riers,              | Colorado Plateau<br>Southern Rocky Mountains<br>General Conservation Action   | P P Spe See coll Mooresp and                                 | Pinyon-Juniper Barrens cific Conservation Action d banking (incl. protocols,   | Priority H   |
| Payson lupine Tier 2 Plants General Threat Climate          | Spe<br>Vu<br>poo<br>resi<br>Hai<br>clir           | ecific Threa<br>Inerability of<br>or dispersal<br>triction to ra<br>bitat shifting<br>mate change  | t due to capaci are hab g and a e espons f and/o                     | Unknown  movement bar tty, and/or bitat features alteration due   | riers,<br>to        | Colorado Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation   | P P Spe See coll Mo resp and situ Cor and clin               | Pinyon-Juniper Barrens  ceific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in   | Priority H   |
| Payson lupine Tier 2 Plants General Threat Climate  Climate | Spe<br>Vu<br>poo<br>resi<br>Hal<br>clir           | ecific Threa<br>Ilnerability of<br>or dispersal<br>triction to ra<br>bitat shifting<br>mate change<br>enological ra<br>species itsel   | t due to capaci are hab g and a espons f and/own                     | unknown  movement bar ity, and/or bitat features alteration due   | riers,<br>to        | Colorado Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring | P P P Spe See coll Mo resp and situ Cor and clin (dis        | Pinyon-Juniper Barrens  ceific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors                                 | Priority H   |
| Payson lupine Tier 2 Plants General Threat Climate  Climate | Spe Vu pooresi Hal clin Pho of s spe Pop Cli alte | ecific Threa<br>Ilnerability of<br>or dispersal<br>triction to ra<br>bitat shifting<br>mate change<br>enological ra<br>species itsel<br>ecies unknow<br>pulation stat<br>mate variab | t tulue to capaciare hab g and a espons f and/a win tus unk ility (i | unknown  movement bar ty, and/or bitat features alteration due  se to climate cor inter-depen  known  ntensification weather patter | tto  hange dent  or | Colorado Plateau Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring | P P P Spe See coll Mo resp and situ Cor and clin (dis Mo Eng | Pinyon-Juniper Barrens  ceific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) | Priority H H |

| Lygodesmia                   | Population                 | Status                 | Population Trend                                      | Distribution  | Type             | Habitat   | Primary  |
|------------------------------|----------------------------|------------------------|---|---|------------------|---|----------|
| doloresensis                 | Low                        | D                      | Unknown   | Colorado Plateau  | P                | Pinyon-Juniper  | <b>✓</b> |
| Dolores River skeletonplant  |                            |                        |   |   |                  | Desert Shrub  |          |
| Tier 1 Plants                |                            |                        |   |   |                  |   |          |
| General Threat               | Specific Th                | reat                   |   | General Conservation Action   | Spe              | ecific Conservation Action  | Priority |
|                              |                            |                        |   | Land Protection (Public, Private)<br>Easements, and Resource Rights |                  | pand existing Palisade ACEC   | Н        |
| Climate                      | poor disper                | sal capac              | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation  |                  | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                      | Habitat shif climate cha   | _                      | alteration due to                                     | Planning and Zoning   | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                      |                            | tself and              | se to climate change<br>/or inter-dependent           | Research and Monitoring   | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Degradation          | Roads                      |                        |   | Voluntary Standards   |                  | plement Best Management Practices<br>transportation projects  | Н        |
| Lack of knowledge            | Complete d<br>unknown      | istributio             | on in Colorado  | Research and Monitoring   |                  | nduct field inventory to refine known tribution   | Н        |
| Lack of knowledge            | Population                 | status un              | known   | Research and Monitoring   | Mo               | nitor population status   | Н        |
| Climate                      |                            | f normal               | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Machaeranthera               | Population                 | Status                 | Population Trend                                      | Distribution  | Туре             | Habitat   | Primary  |
| coloradoensis                | Medium                     | D                      | Unknown   | Southern Rocky Mountains  | P                | Foothill/Mountain Grassland   | <b>~</b> |
| Colorado tanev aetar         |                            |                        |   |   |                  | Exposed Rock  |          |
| Colorado tansy-aster         |                            |                        |   |   |                  | Meadow Tundra   |          |
| Tier 2 Plants General Threat | Specific Th                | root                   |   | General Conservation Action   | Sne              | ecific Conservation Action  | Priority |
| Climate                      | Vulnerabili<br>poor disper | ty due to<br>sal capac | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation  | See              | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                      | Habitat shif climate cha   | _                      | alteration due to                                     | Planning and Zoning   | resp<br>and      | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                      |                            | tself and              | se to climate change<br>/or inter-dependent           | Research and Monitoring   | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge            | Additional needed          | informat               | ion on habitat is                                     | Research and Monitoring   | Res              | search critical habitat components  | Н        |
| Lack of knowledge            | Population                 | status un              | known   | Research and Monitoring   | Mo               | nitor population status   | Н        |
| Climate                      |                            | f normal               | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of knowledge            | Threats and poorly unde    |                        | e to change are                                       | Research and Monitoring   |                  | search species/habitat response to nagement or disturbance  | M        |
| Lack of knowledge            | Complete d<br>unknown      | istributio             | on in Colorado  | Research and Monitoring   |                  | nduct field inventory to refine known tribution   | M        |
| Non-consumptive Disturbance  | Non-motori                 | zed recre              | eation  | Education and Communication   | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | M        |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Mentzelia rhizomata  | Population S  | Status                                 | Population Trend                                      | Distribution  | Type  | Habitat   | Primary  |  |
|--|---|--|---|---|---|---|----------|--|
|  | Medium  | D                                      | Unknown   | Southern Rocky Mountains  | P   | Barrens   | <b>✓</b> |  |
| Roan Cliffs blazing star   |   |  |   | Utah High Plateau   | P   |   |          |  |
| Tier 2 Plants  |   |  |   |   |   |   |          |  |
| General Threat   | Specific Three  | eat                                    |   | General Conservation Action   | Spe   | ecific Conservation Action  | Priority |  |
|  |   |  |   | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab<br>Env  | Establish legal designation to protect<br>habitat (e.g., Area of Critical<br>Environmental Concern, state Natural<br>Area)  |          |  |
| Climate  | poor dispersa   | ıl capac                               |   | Ex-situ Conservation  |   | Seed banking (incl. protocols, collection, and cultivation)   |          |  |
| Climate  | Habitat shifti<br>climate chan                                | -                                      | alteration due to                                     | Planning and Zoning   | resp<br>and                                       | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs |          |  |
| Climate  | _   | elf and                                | se to climate change<br>/or inter-dependent           | Research and Monitoring   | and<br>clin                                       | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)                | Н        |  |
| Resource Extraction  | Oil and gas d   | lrilling,                              | and oil shale mining                                  | Voluntary Standards   |   | plement Best Management Practices energy development and mining   | Н        |  |
| Climate  |   | normal                                 | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                |   | gage in collaborative, proactive<br>nning and conservation programs   | M        |  |
| Lack of knowledge  |   |  | on in Colorado  | Research and Monitoring   |   | nduct field inventory to refine known   | n M      |  |
| Lack of knowledge  | Population st   | atus un                                | known   | Research and Monitoring   | Mo  | nitor population status   | M        |  |
| Mertensia humilis  | Population S  | Status                                 | Population Trend                                      | Distribution  | Туре  | Habitat   | Primary  |  |
|  | Low   | D                                      | Unknown   | Southern Rocky Mountains  | P   | Sagebrush   | ✓        |  |
| Rocky Mountain bluebells   |   |  |   |   |   |   |          |  |
| Tier 2 Plants  |   |  |   |   |   |   |          |  |
| General Threat   | Specific Thre   | eat                                    |   | General Conservation Action   | Sne   | ecific Conservation Action  | Priority |  |
| Climate  | Vulnerability<br>poor dispersa                                | due to                                 |   |   | See   | d banking (incl. protocols, lection, and cultivation)   | Н        |  |
| Climate  | Habitat shifti<br>climate chan                                | -                                      | alteration due to                                     | Planning and Zoning   | resp<br>and                                       | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs               | Н        |  |
| Climate  |   | elf and                                | se to climate change<br>/or inter-dependent           | Research and Monitoring   | and<br>clin                                       | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)                | Н        |  |
|  |   |  | e to change are                                       | Research and Monitoring   |   | search species/habitat response to nagement or disturbance  | Н        |  |
| Lack of knowledge  | Threats and a   |  | e to change are                                       |   | Research critical life history/habitat components |   |          |  |
|  | poorly under  | stood<br>logy, ai                      | nd detailed habitat                                   | Research and Monitoring   |   | •   | Н        |  |
| Lack of knowledge  | poorly under<br>Biology, eco<br>are poorly kr                 | stood<br>logy, ar<br>rown              |   | Research and Monitoring Research and Monitoring                     | Con   | •   |          |  |
| Lack of knowledge  Lack of knowledge  Lack of knowledge  Lack of knowledge | poorly under<br>Biology, eco<br>are poorly kr<br>Complete dis | stood<br>logy, ar<br>nown<br>stributio | nd detailed habitat                                   |   | Con<br>dist<br>Mo                                 | nponents<br>nduct field inventory to refine known   |          |  |

| Mimulus gemmiparus           | Population Status   | Population Trend  | Distribution                         | Type        | Habitat   | Primary       |
|------------------------------|---|-------------------|--------------------------------------|-------------|---|---------------|
| Budding monkey flower        | Medium D  | Unknown           | Southern Rocky Mountains             | P           | Cliff and Canyon<br>Seeps and Springs<br>Grass/Forb Dominated Wetlands  | <b>✓</b>      |
| Tier 1 Plants General Threat | C::::- Tl   |                   | General Conservation Action          | C           | -:::::-   | D             |
| Climate                      | Specific Threat  Vulnerability due to poor dispersal capac restriction to rare ha | ity, and/or       | Ex-situ Conservation                 | See         | ecific Conservation Action<br>ed banking (incl. protocols,<br>election, and cultivation)  | Priority<br>H |
| Climate                      | Habitat shifting and climate change   | alteration due to | Planning and Zoning                  | resp        | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н             |
| Climate                      | Phenological respon<br>of species itself and<br>species unknown                   |                   | Research and Monitoring              | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н             |
| Lack of knowledge            | Population status un  | known             | Research and Monitoring              | Mo          | onitor population status  | Н             |
| Non-consumptive Disturbance  | Non-motorized recre   | eation            | Voluntary Standards                  |             | plement Best Management Practices recreation management   | Н             |
| Climate                      | Climate variability (<br>alteration of normal<br>e.g., droughts, tornal           | weather patterns, | Capacity Building and<br>Cooperation | ,           | gage in collaborative, proactive<br>nning and conservation programs   | M             |
| Lack of knowledge            | Complete distribution   | on in Colorado    | Research and Monitoring              |             | nduct field inventory to refine known tribution   | M             |
| Non-consumptive Disturbance  | Non-motorized recre   | eation            | Education and Communication          | edu         | plish educational material/sponsor<br>acational programs to raise public<br>areness   | M             |
| Lack of knowledge            | Restoration techniqu<br>understood  | ies are poorly    | Research and Monitoring              |             | storation techniques (e.g., storage of pagules and reintroduction of plants)  | L             |
| Lack of knowledge            | Threats and response known  | e to change are   | Research and Monitoring              |             | search species/habitat response to nagement or disturbance  | L             |

| Nuttallia                   | chrysantha         | Population                               | Status      | Population                                      | Trend   | Distribution   | Type        | Habitat  | Primary  |
|-----------------------------|--------------------|--|-------------|---|---------|--|-------------|--|----------|
|                             | ·                  | Low                                      | D           | Declining                                       | D       | Central Shortgrass Prairie   | P           | Barrens  | ✓        |
| Golden blaz                 | ing star           |  |             |   |         | Southern Rocky Mountains   | O           | Pinyon-Juniper   |          |
|                             |                    |  |             |   |         |  |             |  |          |
| Tier 2                      | Plants             | a .c. m                                  | ,           |   |         | 0 10 3 43  | C           | · · · · · · · · · · · · · · · · · · ·  | D: '     |
| General Thr                 | eat                | Specific Th                              |             |   |         | General Conservation Action  |             | ecific Conservation Action   | Priority |
| Climate                     |                    | poor dispers                             | sal capac   | movement ba<br>city, and/or<br>bitat features   | rriers, | Ex-situ Conservation   |             | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                     |                    | Habitat shif climate char                |             | alteration due                                  | to      | Planning and Zoning  | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |                    |  | self and    | nse to climate of<br>or inter-deper             |         | Research and Monitoring  | and<br>clir | nduct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Habitat Con                 | version            | Housing, urban, and ex-urban development |             |   |         | Land Protection (Public, Private<br>Easements, and Resource Rights |             | quire conservation easement for bitat protection   | Н        |
| Lack of kno                 | wledge             | Taxonomy                                 | is poorly   | understood                                      |         | Research and Monitoring  | Tax         | xonomic work   | Н        |
| Non-consun                  | nptive Disturbance | Motor-pow                                | ered recr   | eation  |         | Compliance and Enforcement   | Ma          | nage off-road travel   | Н        |
| Non-consun                  | nptive Disturbance | Motor-power                              | ered recr   | reation   |         | Education and Communication  | edu         | blish educational material/sponsor<br>acational programs to raise public<br>areness  | Н        |
| Resource Ex                 | traction           | Mining (coa                              | ıl, sand/ş  | gravel, etc.)                                   |         | Education and Communication  | avo         | ucate development industries about<br>piding and/or mitigating impacts to<br>e or sensitive species  | Н        |
| Climate                     |                    |  | fnormal     | intensification<br>weather patter<br>dos, etc.) |         | Capacity Building and<br>Cooperation                               |             | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Habitat Deg                 | radation           | Overhead u                               | tility line | es and towers                                   |         | Voluntary Standards  |             | plement Best Management Practices<br>urban development, landscaping, etc   | M        |
| Habitat Deg                 | radation           | Roads or Ra                              | ailroads    |   |         | Voluntary Standards  |             | plement Best Management Practices transportation projects  | M        |
| Indirect Con<br>(Mortality) | sumptive Use       | Grazing                                  |             |   |         | Compatible Resource Use  |             | plement compatible grazing nagement  | L        |
| Invasive or l               | Exotic Species     | Invasive pla                             | ints        |   |         | Invasive Species Control and<br>Prevention                         |             | plement integrated weed/pest<br>nagement plan  | L        |

| Nuttallia d   | densa            | Population                 | Status      | Population Trend                                      | Distribution  | Type        | Habitat  | Primary  |
|---------------|------------------|----------------------------|-------------|---|---|-------------|--|----------|
|               |                  | Low                        | D           | Unknown   | Southern Rocky Mountains  | P           | Pinyon-Juniper<br>Upland Shrub   |          |
| Arkansas Can  | yon stickleaf    |                            |             |   |   |             | opiana sinus   |          |
|               | Plants           |                            |             |   |   |             |  |          |
| General Threa | at               | Specific Th                | ireat       |   | General Conservation Action   |             | ecific Conservation Action   | Priority |
|               |                  |                            |             |   | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab         | ablish legal designation to protect<br>bitat (e.g., Area of Critical<br>vironmental Concern)   | Н        |
| Climate       |                  | poor disper                | sal capac   | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation  |             | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate       |                  | Habitat shi<br>climate cha | _           | alteration due to                                     | Planning and Zoning   | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate       |                  |                            | tself and   | se to climate change<br>for inter-dependent           | Research and Monitoring   | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Habitat Conve | ersion           | Housing, undevelopment     |             | ex-urban  | Land Protection (Public, Private)<br>Easements, and Resource Rights | *           | quire conservation easement for<br>pitat protection  | Н        |
| Lack of know  | ledge            | Population                 | status un   | known   | Research and Monitoring   | Mo          | onitor population status   | Н        |
| Non-consump   | tive Disturbance | Recreation                 |             |   | Voluntary Standards   |             | plement Best Management Practices recreation management  | Н        |
|               |                  |                            |             |   | Education and Communication   | edu         | blish educational material/sponsor<br>acational programs to raise public<br>areness  | M        |
| Climate       |                  |                            | f normal    | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive nning and conservation programs   | M        |
| Habitat Conve | ersion           | Housing, u                 |             | ex-urban  | Education and Communication   |             | plement landowner<br>reach/education program   | M        |
| Lack of know  | ledge            | Complete d                 | listributio | on in Colorado  | Research and Monitoring   |             | nduct field inventory to refine known tribution  | M        |
| Lack of know  | ledge            | Threats and                |             | e to change are                                       | Research and Monitoring   |             | search species/habitat response to nagement or disturbance   | M        |

| Oenothera acutissima                       | Population Status  | Population Trend   | Distribution                                     | Type        | Habitat   | Primary  |
|--|--|--------------------|--|-------------|---|----------|
| Narrow-leaf evening primrose Tier 2 Plants | Low D  | Unknown            | Utah-Wyoming Rocky<br>Mountains<br>Wyoming Basin | P<br>O      | Grass/Forb Dominated Wetlands<br>Sagebrush  |          |
| General Threat                             | Specific Threat  |                    | General Conservation Action                      | Sne         | ecific Conservation Action  | Priority |
| Climate                                    | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal  | ity, and/or        | Ex-situ Conservation                             | See         | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                                    | Habitat shifting and climate change                                      | alteration due to  | Planning and Zoning                              | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                                    | Phenological respon<br>of species itself and/<br>species unknown         |                    | Research and Monitoring                          | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Habitat Degradation                        | Altered hydrological aquifer)  | regime (surface or | Maintain or Restore Natural<br>Processes         |             | intain and restore natural hydrologic ime   | Н        |
| Lack of knowledge                          | Complete distributio unknown   | n in Colorado      | Research and Monitoring                          |             | nduct field inventory to refine known tribution   | Н        |
| Lack of knowledge                          | Population status un   | known              | Research and Monitoring                          | Mo          | onitor population status  | Н        |
| Climate                                    | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns,  | Capacity Building and<br>Cooperation             | ,           | gage in collaborative, proactive<br>nning and conservation programs   | M        |

| Oenothera harringtonii                         | Population S                    | tatus   | Population Trend                                       | Distribution   | Гуре        | Habitat   | Primary  |
|--|---------------------------------|---------|--|--|-------------|---|----------|
| Arkansas Valley evening primrose Tier 2 Plants | Medium                          | D       | Unknown  | Central Shortgrass Prairie   | P           | Barrens<br>Shortgrass Prairie   | <b>✓</b> |
| General Threat                                 | Specific Thre                   | at      |  | General Conservation Action  | Spe         | cific Conservation Action   | Priority |
| Climate  |                                 | due to  | city, and/or   | Ex-situ Conservation   | See         | d banking (incl. protocols, ection, and cultivation)  | Н        |
| Climate  | Habitat shifti<br>climate chang | 0       | alteration due to                                      | Planning and Zoning  | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate  |                                 | elf and | nse to climate change<br>/or inter-dependent           | Research and Monitoring  | and<br>clin | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)   | Н        |
| Habitat Conversion                             | Housing, urba                   | an, and | l ex-urban   | Land Protection (Public, Private),<br>Easements, and Resource Rights |             | quire conservation easement for itat protection   | Н        |
| Non-consumptive Disturbance                    | Motor-power                     | ed recr | reation  | Compliance and Enforcement   | Mai         | nage off-road travel  | Н        |
| Climate  |                                 | normal  | (intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                                 |             | gage in collaborative, proactive uning and conservation programs  | M        |
| Habitat Conversion                             | Housing, urba                   |         |  | Education and Communication  |             | olement landowner<br>reach/education program  | M        |
| Habitat Conversion                             | Housing, urba<br>development    | an, and | l ex-urban   | Education and Communication  | edu         | lish educational material/sponsor<br>cational programs to raise public<br>ureness   | M        |
| Habitat Degradation                            | Roads or Rail                   | roads   |  | Voluntary Standards  |             | element Best Management Practices<br>transportation projects  | M        |
| Indirect Consumptive Use<br>(Mortality)        | Grazing                         |         |  | Compatible Resource Use  |             | olement compatible grazing nagement   | M        |
| Non-consumptive Disturbance                    | Motor-power<br>road vehicula    |         | reation or other off-                                  | Land Protection (Public, Private),<br>Easements, and Resource Rights |             | quire conservation easement for itat protection   | M        |
| Resource Extraction                            | Mining (coal,                   | sand/g  | gravel, etc.)  | Voluntary Standards  |             | energy development and mining   | M        |
| Invasive or Exotic Species                     | Invasive plan                   | ts      |  | Invasive Species Control and<br>Prevention                           |             | olement integrated weed/pest  | L        |

| Oonopsis foliosa var.       | Population Status  | Population Trend  | Distribution                         | Type        | Habitat   | Primary  |
|-----------------------------|--|-------------------|--------------------------------------|-------------|---|----------|
| monocephala                 | Medium D   | Unknown           | Central Shortgrass Prairie           | P           | Shortgrass Prairie  | ✓        |
| Rayless goldenweed          |  |                   | Southern Rocky Mountains             | О           |   |          |
| Tier 2 Plants               |  |                   |                                      |             |   |          |
| General Threat              | Specific Threat  |                   | General Conservation Action          | Spe         | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability due to<br>poor dispersal capac<br>restriction to rare ha |                   | Ex-situ Conservation                 |             | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                     | Habitat shifting and climate change                                    | alteration due to | Planning and Zoning                  | res         | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     | Phenological respor<br>of species itself and<br>species unknown        |                   | Research and Monitoring              | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge           | Population status ur   | ıknown            | Research and Monitoring              | Mo          | onitor population status  | Н        |
| Lack of knowledge           | Complete distribution unknown  | on in Colorado    | Research and Monitoring              |             | nduct field inventory to refine known tribution   | Н        |
| Climate                     | Climate variability (<br>alteration of normal<br>e.g., droughts, torna | weather patterns, | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Habitat Degradation         | Roads  |                   | Voluntary Standards                  |             | plement Best Management Practices transportation projects   | M        |
| Non-consumptive Disturbance | Motor-powered recr<br>road vehicular trave                             |                   | Compliance and Enforcement           | Ma          | nage off-road travel  | M        |

| Oonopsis                    | puebloensis       | Population S                                     | Status   | Population                                      | Trend   | Distribution  | Type        | Habitat   | Primary  |  |
|-----------------------------|-------------------|--|----------|---|---------|---|-------------|---|----------|--|
| •                           | •                 | Medium   | D        | Declining                                       | D       | Central Shortgrass Prairie  | P           | Barrens   | <b>V</b> |  |
| Pueblo golde                | enweed            |  |          |   |         |   |             | Shortgrass Prairie  | ✓        |  |
| Tier 2                      | Plants            |  |          |   |         |   |             |   |          |  |
| General Thre                | eat               | Specific Thre                                    | eat      |   |         | General Conservation Action   | Spe         | cific Conservation Action   | Priority |  |
| Climate                     |                   | Vulnerability<br>poor dispersa<br>restriction to | ıl capac | •   | rriers, | Ex-situ Conservation  |             | Seed banking (incl. protocols, collection, and cultivation)   |          |  |
| Climate                     |                   | Habitat shifti<br>climate chan                   | _        | alteration due                                  | to      | Planning and Zoning   | resp<br>and | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |  |
| Climate                     |                   |  | elf and  | se to climate of<br>or inter-deper              |         | Research and Monitoring   | and<br>clin | duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)    | Н        |  |
| Habitat Con                 | version           | Housing, urb<br>development                      |          | l ex-urban                                      |         | Education and Communication   |             | lement landowner<br>each/education program  | Н        |  |
| Habitat Con                 | version           | Housing, urban, and ex-urban development         |          |   |         | Education and Communication   | edu         | lish educational material/sponsor cational programs to raise public reness  | Н        |  |
| Habitat Conv                | version           | Housing, urb<br>development                      |          | l ex-urban                                      |         | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | Acquire conservation easement for habitat protection  |          |  |
| Non-consum                  | ptive Disturbance | Motor-power                                      | red reci | eation  |         | Compliance and Enforcement  | Ma          | nage off-road travel  | Н        |  |
| Non-consum                  | ptive Disturbance | Motor-power<br>road vehicula                     |          | reation or othe<br>l                            | r off-  | Education and Communication   | edu         | lish educational material/sponsor<br>cational programs to raise public<br>reness  | Н        |  |
| Resource Ex                 | traction          | Mining (lime                                     | estone)  |   |         | Education and Communication   | avo         | cate development industries about iding and/or mitigating impacts to or sensitive species   | Н        |  |
| Climate                     |                   |  | normal   | intensification<br>weather patter<br>dos, etc.) |         | Capacity Building and<br>Cooperation                                | _           | age in collaborative, proactive<br>uning and conservation programs  | M        |  |
| Habitat Degi                | radation          | Overhead uti                                     | lity lin | es and towers                                   |         | Voluntary Standards   |             | lement Best Management Practices urban development, landscaping, etc.   | M        |  |
| Habitat Degi                | radation          | Roads or Rai                                     | lroads   |   |         | Voluntary Standards   |             | lement Best Management Practices transportation projects  | M        |  |
| Indirect Con<br>(Mortality) | sumptive Use      | Grazing  |          |   |         | Compatible Resource Use   |             | lement compatible grazing agement   | L        |  |
| Invasive or I               | Exotic Species    | Invasive plan                                    | nts      |   |         | Invasive Species Control and<br>Prevention                          |             | lement integrated weed/pest agement plan  | L        |  |

| Opuntia heacockiae  | Population Status  | Population Trend  |  |  | Habitat  | Primary      |
|---|--|---|--|--|--|--------------|
|   | Unknown  | Unknown   |  |  | Pinyon-Juniper   | <b>✓</b>     |
| Heacock's prickly-pear  |  |   |  |  |  |              |
| Tier 2 Plants   |  |   |  |  |  |              |
| General Threat  | Specific Threat  |   | General Conservation Action  | Spec   | cific Conservation Action  | Priority     |
| Climate   | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal  | ity, and/or   | Ex-situ Conservation   |  | banking (incl. protocols, ection, and cultivation)   | Н            |
| Climate   | Habitat shifting and climate change  | alteration due to   | Planning and Zoning  | respo  | lel potential habitat/range shifts in<br>onse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs   | Н            |
| Climate   | Phenological respon<br>of species itself and/<br>species unknown   |   | Research and Monitoring  | and j  | duct primary research on rare plant<br>pollinator responses to changing<br>ate, and other vulnerability factors<br>persal mechanisms, mutualisms)  | Н            |
| Lack of knowledge   | Taxonomy is poorly   | understood  | Research and Monitoring  | Taxo   | onomic work is needed  | Н            |
| Lack of knowledge   | Threats and response poorly understood   | e to change are   | Research and Monitoring  |  | earch species/habitat response to agement or disturbance   | Н            |
| Lack of knowledge   | Complete distributio<br>unknown  | n in Colorado   | Research and Monitoring  |  | duct field inventory to refine known ibution   | Н            |
| Lack of knowledge   | Population status un   | known   | Research and Monitoring  | Mon  | nitor population status  | Н            |
| Climate   | Climate variability (i<br>alteration of normal   | weather patterns,   | Capacity Building and<br>Cooperation   | _  | age in collaborative, proactive ning and conservation programs   | M            |
|   | e.g., droughts, tornac   | dos, etc.)  |  |  |  |              |
| Oreocarva osterhoutii   | e.g., droughts, tornac   | Population Trend  | Distribution   | Type   | Habitat  | Primary      |
| Oreocarya osterhoutii   |  | -   | Distribution Colorado Plateau  | P  | Barrens  | Primary  ✓   |
| Oreocarya osterhoutii Osterhout cat's-eye   | Population Status  | Population Trend  |  | P  |  |              |
| ·   | Population Status  | Population Trend  |  | P  | Barrens  |              |
| Osterhout cat's-eye   | Population Status  | Population Trend  |  | P  | Barrens  |              |
| Osterhout cat's-eye Tier 2 Plants   | Population Status Low D  | Population Trend Stable D  movement barriers, ity, and/or   | Colorado Plateau   | P Spec   | Barrens<br>Desert Shrub  |              |
| Osterhout cat's-eye Tier 2 Plants General Threat  | Population Status  Low D  Specific Threat  Vulnerability due to poor dispersal capac   | Population Trend Stable D  movement barriers, ity, and/or bitat features  | Colorado Plateau  General Conservation Action  | P Spec Seed colle Mod respe and  | Barrens Desert Shrub  cific Conservation Action I banking (incl. protocols,  | Priority     |
| Osterhout cat's-eye Tier 2 Plants General Threat Climate                                      | Population Status  Low D  Specific Threat  Vulnerability due to poor dispersal capac restriction to rare hal Habitat shifting and climate change   | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change  | Colorado Plateau  General Conservation Action  Ex-situ Conservation  | P Specc Seed colled Mod respect and situ a Concand clim  | Barrens Desert Shrub  cific Conservation Action I banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Priority     |
| Osterhout cat's-eye Tier 2 Plants General Threat Climate Climate Climate                      | Population Status Low D  Specific Threat  Vulnerability due to poor dispersal capac restriction to rare hal Habitat shifting and climate change  Phenological respon of species itself and/  | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  see to climate change for inter-dependent   | Colorado Plateau  General Conservation Action  Ex-situ Conservation  Planning and Zoning   | P Specc Seed colle Mod respend and situ a Cone and clim (disp  | Barrens Desert Shrub  Effic Conservation Action I banking (incl. protocols, ection, and cultivation)  I bell potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing ate, and other vulnerability factors persal mechanisms, mutualisms) duct field inventory to refine known ibution                              | Priority H H |
| Osterhout cat's-eye Tier 2 Plants General Threat Climate Climate                              | Population Status  Low D  Specific Threat  Vulnerability due to poor dispersal capac restriction to rare hal Habitat shifting and climate change  Phenological respon of species itself and/species unknown  Complete distribution   | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change for inter-dependent in Colorado intensification or weather patterns,               | Colorado Plateau  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring   | P Specc Seed colled Mod respread situ a Conc and clim (disp Conc distr Enga  | Barrens Desert Shrub  Effic Conservation Action I banking (incl. protocols, ection, and cultivation)  I bell potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing ate, and other vulnerability factors persal mechanisms, mutualisms)  duct field inventory to refine known                                     | Priority H H |
| Osterhout cat's-eye Tier 2 Plants General Threat Climate  Climate  Climate  Lack of knowledge | Population Status  Low D  Specific Threat  Vulnerability due to poor dispersal capac restriction to rare hal Habitat shifting and climate change  Phenological respon of species itself and/species unknown  Complete distributio unknown  Climate variability (i alteration of normal | Population Trend Stable D  movement barriers, ity, and/or bitat features alteration due to  se to climate change for inter-dependent on in Colorado intensification or weather patterns, dos, etc.) | Colorado Plateau  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Research and Monitoring  Capacity Building and | P Specc Seed colled responding and point of the colled situ and point of the colled situation of the colled si | Barrens Desert Shrub  Effic Conservation Action I banking (incl. protocols, ection, and cultivation)  Bel potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs duct primary research on rare plant pollinator responses to changing ate, and other vulnerability factors persal mechanisms, mutualisms) duct field inventory to refine known ibution age in collaborative, proactive | Priority H H |

| Oreoxis humilis                         | Population                                   | Status     | Populatio     | n Trend | Distribution                         | Type             | Habitat   | Primary  |  |
|---|--|------------|---------------|---------|--------------------------------------|------------------|---|----------|--|
|   | High   | D          | Stable        | D       | Southern Rocky Mountains             | P                | Exposed Rock (alpine) Meadow Tundra   |          |  |
| Pikes Peak spring parsley Tier 1 Plants |  |            |               |         |                                      |                  | Meddow Fundia   |          |  |
| General Threat                          | Specific Th                                  | reat       |               |         | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |  |
|   |  |            |               |         | Research and Monitoring              |                  | onitor population status  | Н        |  |
| Climate                                 | Vulnerabili<br>poor disper<br>restriction t  | sal capac  | city, and/or  |         | Ex-situ Conservation                 |                  | Seed banking (incl. protocols, collection, and cultivation)   |          |  |
| Climate                                 | Habitat shif climate cha                     | _          | alteration d  | ue to   | Planning and Zoning                  | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |  |
| Climate                                 | Phenologica<br>of species in<br>species unk  | tself and  |               |         | Research and Monitoring              | and<br>clin      | nduct primary research on rare plant<br>I pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |  |
| Habitat Degradation                     | Roads or R                                   | ailroads   |               |         | Voluntary Standards                  |                  | plement Best Management Practices transportation projects   | Н        |  |
| Lack of knowledge                       | Threats and poorly unde                      |            | e to change   | are     | Research and Monitoring              |                  | search species/habitat response to nagement or disturbance  | Н        |  |
|   |  |            |               |         | Education and Communication          | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | M        |  |
| Climate                                 | Climate var<br>alteration of<br>e.g., drough | f normal   | weather pat   |         | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |  |
| Lack of knowledge                       | Taxonomy                                     | is poorly  | understood    |         | Research and Monitoring              |                  | sess taxonomic status and<br>ationship to Oreoxis alpina  | M        |  |
| Lack of knowledge                       | Biology, ec<br>are poorly k                  | 05         | nd detailed l | nabitat | Research and Monitoring              |                  | search critical life history/habitat<br>nponents  | M        |  |
| Lack of knowledge                       | Complete d<br>unknown                        | istributio | on in Colora  | do      | Research and Monitoring              |                  | nduct field inventory to refine known tribution   | M        |  |
| Non-consumptive Disturbance             | Non-motori                                   | zed recr   | eation        |         | Voluntary Standards                  |                  | plement Best Management Practices recreation management   | M        |  |

| Oxybaphus                            | Population Status  | Population Tr     | end   | Distribution  | Туре             | Habitat   | Primary  |  |
|--------------------------------------|--|-------------------|-------|---|------------------|---|----------|--|
| rotundifolius                        | Medium D   | Declining         | D     | Central Shortgrass Prairie  | P                | Barrens   | ✓        |  |
| Round-leaf four o'clock              |  |                   |       |   |                  |   |          |  |
| Tier 2 Plants                        |  |                   |       |   |                  |   |          |  |
| General Threat                       | Specific Threat  |                   |       | General Conservation Action   | Spe              | ecific Conservation Action  | Priority |  |
| Climate                              | Vulnerability due to<br>poor dispersal capaci<br>restriction to rare hab | ity, and/or       | iers, | Ex-situ Conservation  |                  | Seed banking (incl. protocols, collection, and cultivation)   |          |  |
| Climate                              | Habitat shifting and a climate change                                    | alteration due to | )     | Planning and Zoning   | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |  |
| Climate                              | Phenological respons<br>of species itself and/s<br>species unknown       |                   |       | Research and Monitoring   | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |  |
| Habitat Conversion                   | Housing, urban, and development  | ex-urban          |       | Education and Communication   |                  | plement landowner<br>reach/education program  | Н        |  |
| Habitat Conversion                   | Housing, urban, and development  | ex-urban          |       | Education and Communication   | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |  |
| Habitat Conversion                   | Housing, urban, and development  | ex-urban          |       | Land Protection (Public, Private)<br>Easements, and Resource Rights |                  | quire conservation easement for<br>sitat protection   | Н        |  |
| Non-consumptive Disturbance          | Motor-powered recre  | eation            |       | Compliance and Enforcement  | Ma               | nage off-road travel  | Н        |  |
| Non-consumptive Disturbance          | Motor-powered recre<br>road vehicular travel                             |                   | off-  | Education and Communication   | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |  |
| Resource Extraction                  | Mining (limestone)   |                   |       | Education and Communication   | avo              | ucate development industries about biding and/or mitigating impacts to e or sensitive species   | Н        |  |
| Climate                              | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns  |       | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |  |
| Habitat Degradation                  | Overhead utility line  | s and towers      |       | Voluntary Standards   |                  | plement Best Management Practices<br>urban development, landscaping, etc  | . M      |  |
| Habitat Degradation                  | Roads or Railroads   |                   |       | Voluntary Standards   |                  | plement Best Management Practices transportation projects   | M        |  |
| Indirect Consumptive Use (Mortality) | Grazing  |                   |       | Compatible Resource Use   |                  | plement compatible grazing nagement   | L        |  |
| Invasive or Exotic Species           | Invasive plants  |                   |       | Invasive Species Control and<br>Prevention                          |                  | plement integrated weed/pest<br>nagement plan   | L        |  |

| Oxvtron  | is besseyi var.          | Population Sta   | atus P   | Population Trend   | Distribution   | Type  | Habitat   | Primary       |
|--|--------------------------|--|--|--|--|---|---|---------------|
| obnapifo   | •                        | Low  | D U  | Jnknown  | Wyoming Basin  | P   | Sagebrush   | <b>✓</b>      |
| Bessey loco  | oweed                    |  |  |  | Utah High Plateau  |   | Pinyon-Juniper  |               |
| Tier 2   | Plants                   |  |  |  |  |   |   |               |
| General Thi  | reat                     | Specific Threat  | t  |  | General Conservation Action  | Spe   | ecific Conservation Action  | Priority      |
| Climate  |                          | Vulnerability do<br>poor dispersal c<br>restriction to ran   | capacity,  |  | Ex-situ Conservation   |   | d banking (incl. protocols, ection, and cultivation)  | Н             |
| Climate  |                          | Habitat shifting climate change  | -  | eration due to   | Planning and Zoning  | Mo<br>resp<br>and<br>situ   | Н   |               |
| Climate  |                          |  | f and/or i   | to climate change<br>inter-dependent   | Research and Monitoring  | and<br>clin   | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н             |
| Lack of kno  | owledge                  | Population statu   | us unkno   | own  | Research and Monitoring  | Mo  | nitor population status   | Н             |
| Lack of kno  | owledge                  | Complete distri<br>unknown   | ibution ii   | n Colorado   | Research and Monitoring  |   | nduct field inventory to refine known ribution  | Н             |
| Climate  |                          | Climate variabilial alteration of nor e.g., droughts, t  | rmal we  | ather patterns,  | Capacity Building and<br>Cooperation   |   | gage in collaborative, proactive nning and conservation programs  | M             |
| Resource E   | xtraction                | Oil and gas dril   |  | ,,   | Voluntary Standards  |   | plement Best Management Practices energy development and mining   | M             |
| Pedioca  | ctus knowltonii          | Population Sta   | atus P   | Population Trend   | Distribution   | Type  | Habitat   | Primary       |
|  |                          |  | _  |  |  |   |   |               |
|  |                          | Unknown  | J  | Jnknown  | Colorado Plateau   | P   | Pinyon-Juniper  | <b>✓</b>      |
| Knowlton c   | eactus                   | Unknown  | Ţ  | Jnknown  | Colorado Plateau   | P   | Pinyon-Juniper  | <b>✓</b>      |
| Knowlton c   |                          | Unknown  | Ţ  | Jnknown  | Colorado Plateau   | P   | Pinyon-Juniper  | ✓             |
| Tier 1   | Plants                   |  |  | Jnknown  |  |   |   |               |
| Tier 1<br>General Thr                                  | Plants                   | Specific Threat  | t  |  | General Conservation Action  | Spe   | ecific Conservation Action  | Priority      |
| Tier 1   | Plants                   | Specific Threat  | t<br>lue to mo   | ovement barriers,  |  | Spe<br>See  |   |               |
| Tier 1<br>General Thi                                  | Plants                   | Specific Threat<br>Vulnerability di<br>poor dispersal c  | t<br>lue to mo<br>capacity,<br>are habita<br>g and alte  | ovement barriers,<br>, and/or<br>at features   | General Conservation Action  | Spe<br>See<br>coll<br>Mo<br>resp<br>and   | cific Conservation Action d banking (incl. protocols,   | Priority      |
| Tier 1 General Thr Climate                             | Plants                   | Specific Threat Vulnerability di poor dispersal c restriction to rai Habitat shifting climate change   | tue to mo<br>capacity,<br>re habita<br>g and alte<br>esponse t   | ovement barriers,<br>, and/or<br>at features<br>eration due to   | General Conservation Action Ex-situ Conservation   | Spe<br>See<br>coll<br>Mo<br>resp<br>and<br>situ<br>Cor<br>and<br>clin             | d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Priority<br>H |
| Tier 1 General Thi Climate Climate Climate             | Plants                   | Specific Threat Vulnerability di poor dispersal c restriction to rai Habitat shifting climate change  Phenological re of species itself                | tue to mo<br>capacity,<br>are habita<br>g and alte<br>esponse t<br>f and/or i  | ovement barriers,<br>, and/or<br>at features<br>eration due to<br>to climate change                    | General Conservation Action Ex-situ Conservation Planning and Zoning                           | Spe<br>See<br>coll<br>Mo<br>resp<br>and<br>situ<br>Cor<br>and<br>clin<br>(dis     | decific Conservation Action d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors                                 | Priority<br>H |
| Tier 1 General Thi Climate Climate Climate Direct Cons | Plants reat sumptive Use | Specific Threat Vulnerability di poor dispersal c restriction to rai Habitat shifting climate change  Phenological re of species itself species unknow | tulue to mocapacity, are habitated and alter the sesponse of and/or invite the sesponse of the | ovement barriers,<br>, and/or<br>at features<br>eration due to<br>to climate change<br>inter-dependent | General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring | Spe<br>See coll<br>Mo<br>resp<br>and<br>situ<br>Cor<br>and<br>clin<br>(dis<br>Enf | decific Conservation Action d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms) | Priority H H  |

| Penstem            | on crandallii | Population Status  | Population Trend                | Distribution                         | Type  |          |
|--------------------|---------------|--|---------------------------------|--------------------------------------|---|----------|
| ssp. prod          | cumbens       | Unknown  | Unknown                         | Southern Rocky Mountains             | P   |          |
| Crandall's l       | beardtongue   |  |                                 |                                      |   |          |
| Tier 2             | Plants        |  |                                 |                                      |   |          |
| General Th         |               | Specific Threat  |                                 | General Conservation Action          | Specific Conservation Action  | Priority |
| Climate            |               | Phenological respons<br>of species itself and/o<br>species unknown       |                                 | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
| Lack of kno        | owledge       | Taxonomy is poorly   | understood                      | Research and Monitoring              | Taxonomic work is needed  | Н        |
| Lack of kno        | owledge       | Threats and response poorly understood                                   | to change are                   | Research and Monitoring              | Research species/habitat response to management or disturbance  | Н        |
| Lack of kno        | owledge       | Biology, ecology, an are poorly known                                    | d detailed habitat              | Research and Monitoring              | Research critical life history/habitat components   | Н        |
| Lack of kno        | owledge       | Complete distribution unknown  | n in Colorado                   | Research and Monitoring              | Conduct field inventory to refine known distribution  | Н        |
| Lack of kno        | owledge       | Population status unl  |                                 | Research and Monitoring              | Monitor population status   | Н        |
| Climate            |               | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns,               | Capacity Building and<br>Cooperation | Engage in collaborative, proactive planning and conservation programs   | M        |
| Penstem            | on debilis    | Population Status  | Population Trend                | Distribution                         | Type Habitat  | Primary  |
| 1 011510111        |               | Medium D   | Declining D                     | Southern Rocky Mountains             | P Barrens   | <b>✓</b> |
| Parachute p        | penstemon     |  | C                               | Utah High Plateau                    | P   |          |
| Tier 1             | Plants        |  |                                 |                                      |   |          |
| General Th         | reat          | Specific Threat  |                                 | General Conservation Action          | Specific Conservation Action  | Priority |
|                    |               |  |                                 | Research and Monitoring              | Monitor population status   | Н        |
| Climate            |               | Vulnerability due to<br>poor dispersal capaci<br>restriction to rare hab | ty, and/or                      | Ex-situ Conservation                 | Seed banking (incl. protocols, collection, and cultivation)   | Н        |
| Climate            |               | Habitat shifting and a climate change                                    | alteration due to               | Planning and Zoning                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н        |
| Climate            |               | Phenological respons<br>of species itself and/<br>species unknown        |                                 | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н        |
|                    | extraction    | Oil and gas drilling   |                                 | Voluntary Standards                  | Implement Best Management Practices for energy development and mining   | Н        |
| Resource E         |               |  |                                 |                                      |   | M        |
| Resource E Climate |               | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns,               | Capacity Building and<br>Cooperation | Engage in collaborative, proactive planning and conservation programs   | IVI      |
|                    | owledge       | alteration of normal   | weather patterns,<br>los, etc.) | 1 2                                  |   |          |

| Penstemon degeneri          | Population Status   | Population Trend    | Distribution                            | Type             | Habitat   | Primary  |
|-----------------------------|---|---------------------|---|------------------|---|----------|
| o o                         | Medium D  | Unknown             | Southern Rocky Mountains                | P                | Pinyon-Juniper Foothill/Mountain Grassland  |          |
| Degener beardtongue         |   |                     |   |                  | T ooming Production Oraconand   |          |
| Tier 2 Plants               |   |                     |   |                  |   |          |
| General Threat              | Specific Threat   |                     | General Conservation Action             | Spe              | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability due to<br>poor dispersal capa<br>restriction to rare ha | city, and/or        | Ex-situ Conservation                    |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                     | Habitat shifting and climate change                                   | l alteration due to | Planning and Zoning                     | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                     | Phenological responder of species itself and species unknown          |                     | Research and Monitoring                 | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Non-consumptive Disturbance | Non-motorized recr  | reation             | Education and Communication             | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |
| Non-consumptive Disturbance | Motor-powered rec   | reation             | Voluntary Standards                     |                  | plement Best Management Practices recreation management   | Н        |
| Climate                     | Climate variability<br>alteration of normal<br>e.g., droughts, torna  | weather patterns,   | Capacity Building and<br>Cooperation    |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Invasive or Exotic Species  | Invasive plants   |                     | Invasive Species Control and Prevention |                  | p weed infestations and sensitive no ay/no mow zones  | M        |
| Invasive or Exotic Species  | Invasive plants   |                     | Invasive Species Control and Prevention |                  | plement integrated weed/pest<br>nagement plan   | M        |
| Lack of knowledge           | Complete distribution   | on in Colorado      | Research and Monitoring                 |                  | nduct field inventory to refine known   | n M      |
| Lack of knowledge           | Threats and respons   | se to change are    | Research and Monitoring                 |                  | search species/habitat response to nagement or disturbance  | M        |
| Lack of knowledge           | Biology, ecology, a are poorly known                                  | nd detailed habitat | Research and Monitoring                 | Res              | search critical life history/habitat  | M        |
| Lack of knowledge           | Population status un  | nknown              | Research and Monitoring                 |                  | nitor population status   | M        |

| Penstemon fremontii                    | Population                    | Status    | Population Trend                                      | Distribution                         | Type        | Habitat  | Primary  |
|--|-------------------------------|-----------|---|--------------------------------------|-------------|--|----------|
| var. glabrescens Fremont's beardtongue | Low D                         |           | Unknown   | Utah High Plateau<br>Wyoming Basin   | P<br>O      |  |          |
| Tier 2 Plants                          |                               |           |   |                                      |             |  |          |
| General Threat                         | Specific Thi                  | reat      |   | General Conservation Action          | Spe         | ecific Conservation Action   | Priority |
| Climate                                | poor dispers                  | al capac  | movement barriers, ity, and/or bitat features         | Ex-situ Conservation                 |             | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                                | Habitat shift<br>climate char | _         | alteration due to                                     | Planning and Zoning                  | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                                |                               | self and/ | se to climate change<br>or inter-dependent            | Research and Monitoring              | and<br>clin | nduct primary research on rare plant<br>d pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Lack of knowledge                      | Complete di<br>unknown        | stributio | n in Colorado   | Research and Monitoring              |             | nduct field inventory to refine known tribution  | n H      |
| Lack of knowledge                      | Population s                  | status un | known   | Research and Monitoring              | Mo          | onitor population status   | Н        |
| Resource Extraction                    | Oil and gas                   | drilling  |   | Voluntary Standards                  |             | plement Best Management Practices energy development and mining  | Н        |
| Climate                                |                               | normal    | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation |             | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Habitat Degradation                    | Roads                         |           |   | Voluntary Standards                  |             | plement Best Management Practices transportation projects  | M        |
| Non-consumptive Disturbance            | Motor-powe                    | ered recr | eation  | Voluntary Standards                  |             | plement Best Management Practices recreation management  | M        |

| Penstemon gibbensii         | Population S  | tatus   | Population Trend                                      | Distribution   | Type      | e Habitat   | Primary    |
|-----------------------------|---|---------|---|--|-----------|---|------------|
| <i>G</i>                    | Medium  | D       | Unknown   | Wyoming Basin  | P         | Barrens   | <b>V</b>   |
| Gibben's beardtongue        |   |         |   | Utah-Wyoming Rocky<br>Mountains                                  | О         | Pinyon-Juniper  |            |
| Tier 1 Plants               |   |         |   |  |           |   |            |
| General Threat              | Specific Threa                                      | at      |   | General Conservation Action                                      | Sp        | pecific Conservation Action   | Priority   |
|                             |   |         |   | Land Protection (Public, Privat<br>Easements, and Resource Right | ts ha     | stablish legal designation to protect<br>abitat (e.g., Area of Critical<br>nvironmental Concern)  | Н          |
| Climate                     | Vulnerability<br>poor dispersal<br>restriction to r | capac   |   | Ex-situ Conservation   |           | eed banking (incl. protocols,<br>ollection, and cultivation)  | Н          |
| Climate                     | Habitat shiftir<br>climate chang                    |         | alteration due to                                     | Planning and Zoning  | re<br>an  | Todel potential habitat/range shifts in<br>sponse to projected climate changes<br>and prepare adaptation plan to define in<br>tu and ex situ conservation needs | Н          |
| Climate                     |   | lf and  | se to climate change<br>/or inter-dependent           | Research and Monitoring  | an<br>cli | onduct primary research on rare plant<br>ad pollinator responses to changing<br>imate, and other vulnerability factors<br>lispersal mechanisms, mutualisms)     | Н          |
| Lack of knowledge           | Complete dist unknown                               | ributio | on in Colorado  | Research and Monitoring  |           | onduct field inventory to refine known stribution   | н          |
| Non-consumptive Disturbance | Motor-powere road vehicular                         |         |   | Voluntary Standards  |           | nplement Best Management Practices or travel management   | Н          |
|                             |   |         |   | Education and Communication                                      | ed        | ublish educational material/sponsor<br>ducational programs to raise public<br>wareness  | M          |
| Climate                     |   | ormal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation                             |           | ngage in collaborative, proactive<br>anning and conservation programs   | M          |
| Lack of knowledge           | Population sta                                      | ıtus un | known   | Research and Monitoring  | M         | Ionitor population status   | M          |
|                             | D 11 0  |         | 5 1   | D1 . H . J   | -         | ****  | <b>D</b> : |
| Penstemon grahamii          | Population S  |         | Population Trend                                      | Distribution   | Туре      |   | Primary    |
|                             | Low   | D       | Unknown   | Wyoming Basin  | P         | Barrens Pinyon-Juniper  |            |
| Graham beardtongue          |   |         |   |  |           | Finyon-Jumper   |            |
| Tier 2 Plants               |   |         |   |  |           |   |            |
| General Threat              | Specific Threa                                      | at      |   | General Conservation Action                                      | Sp        | pecific Conservation Action   | Priority   |
| Climate                     | Vulnerability<br>poor dispersal<br>restriction to r | capac   |   | Ex-situ Conservation   |           | eed banking (incl. protocols, ollection, and cultivation)   | Н          |
| Climate                     | Habitat shiftir<br>climate chang                    |         | alteration due to                                     | Planning and Zoning  | re<br>an  | Todel potential habitat/range shifts in<br>sponse to projected climate changes<br>and prepare adaptation plan to define in<br>tu and ex situ conservation needs | Н          |
| Climate                     |   | lf and/ | se to climate change<br>/or inter-dependent           | Research and Monitoring  | an<br>cli | onduct primary research on rare plant<br>and pollinator responses to changing<br>imate, and other vulnerability factors<br>lispersal mechanisms, mutualisms)    | Н          |
| Habitat Degradation         | Roads   |         |   | Voluntary Standards  |           | nplement Best Management Practices or transportation projects   | Н          |
| Lack of knowledge           | Complete dist<br>unknown                            | ributio | on in Colorado  | Research and Monitoring  | Co        | onduct field inventory to refine known stribution   | н Н        |
| Lack of knowledge           | Population sta                                      | itus un | known   | Research and Monitoring  | M         | Ionitor population status   | Н          |
| Resource Extraction         | Oil and gas dr<br>exploration                       | illing  | and seismic   | Voluntary Standards  |           | nplement Best Management Practices or energy development and mining   | Н          |
| Climate                     | Climate varial alteration of n                      |         | intensification or                                    | Capacity Building and<br>Cooperation                             | Eı        | ngage in collaborative, proactive anning and conservation programs  | M          |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Penstemo      | n penlandii       | Population S                                     | Status   | Populatio    | on Trend | Distribution  | Туре                 | Habitat   | Primary  |
|---------------|-------------------|--|----------|--------------|----------|---|----------------------|---|----------|
| Penland pensi | _                 | Medium   | D        | Stable       | D        | Southern Rocky Mountains  | P                    | Sagebrush<br>Upland Shrub   |          |
| General Threa |                   | Specific Thre                                    | eat      |              |          | General Conservation Action   | Spe                  | ecific Conservation Action  | Priority |
|               |                   | 2,70000  |          |              |          | Land Protection (Public, Private)<br>Easements, and Resource Rights | , Esta<br>hab<br>Nat | ablish legal designation to protect<br>vitat (e.g., wilderness, Research<br>tural Area, Acrea of Critical<br>vironmental Concern))                      | Н        |
|               |                   |  |          |              |          | Planning and Zoning   | issu                 | mote consideration of biodiversity<br>nes in transportation and land use<br>nning processes   | Н        |
|               |                   |  |          |              |          | Research and Monitoring   | Mo                   | nitor population status   | Н        |
| Climate       |                   | Vulnerability<br>poor dispersa<br>restriction to | al capac | city, and/or |          | Ex-situ Conservation  |                      | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate       |                   | Habitat shifti<br>climate chan                   |          | alteration d | lue to   | Planning and Zoning   | res <sub>l</sub>     | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate       |                   | Phenological<br>of species its<br>species unkn   | elf and  |              |          | Research and Monitoring   | and<br>clir          | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Habitat Conv  | ersion            | Housing, urb<br>development                      |          | l ex-urban   |          | Land Protection (Public, Private)<br>Easements, and Resource Rights |                      | quire conservation easement for<br>pitat protection   | Н        |
| Habitat Degra | adation           | Roads  |          |              |          | Voluntary Standards   |                      | plement Best Management Practices transportation projects   | Н        |
| Non-consump   | ptive Disturbance | Motor-power                                      | red recr | reation      |          | Education and Communication   | edu                  | olish educational material/sponsor<br>acational programs to raise public<br>areness   | Н        |
| Non-consump   | ptive Disturbance | Motor-power                                      | red recr | eation       |          | Voluntary Standards   |                      | plement Best Management Practices recreation management   | Н        |
| Climate       |                   | Climate varia<br>alteration of<br>e.g., drought  | normal   | weather par  |          | Capacity Building and<br>Cooperation                                |                      | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Resource Ext  | raction           | Oil and gas o                                    | drilling |              |          | Voluntary Standards   |                      | plement Best Management Practices energy development and mining   | M        |

| Penstemon scariosus          | Population Status  | s Population Trend   | Distribution                                     | Type   | Habitat   | Primary  |
|------------------------------|--|--|--|--|---|----------|
| var. albifluvis              | Low D  | Unknown  | Wyoming Basin                                    | P  | Barrens   |          |
| White River penstemon        |  |  | Utah High Plateau                                | О  | Desert Shrub  |          |
| Γier 1 Plants                |  |  |  |  |   |          |
| General Threat               | Specific Threat  |  | General Conservation Action                      | Spe  | cific Conservation Action   | Priorit  |
| Climate                      | Vulnerability due<br>poor dispersal cap<br>restriction to rare   | •  | Ex-situ Conservation                             |  | d banking (incl. protocols,<br>ection, and cultivation)   | Н        |
| Climate                      | Habitat shifting ar climate change   | nd alteration due to   | Planning and Zoning                              | resp<br>and  | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs   | Н        |
| Climate                      |  | onse to climate change<br>nd/or inter-dependent  | Research and Monitoring                          | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Degradation          | Roads  |  | Voluntary Standards                              |  | plement Best Management Practices transportation projects   | Н        |
| Lack of knowledge            | Population status  | unknown  | Research and Monitoring                          | Mo   | nitor population status   | Н        |
| Resource Extraction          | Oil and gas drillin  | g  | Voluntary Standards                              |  | energy development and mining   | Н        |
| Climate                      |  | y (intensification or<br>al weather patterns,<br>nados, etc.)  | Capacity Building and<br>Cooperation             |  | gage in collaborative, proactive nning and conservation programs  | M        |
| Penstemon scariosus          | Population Status  | S Population Trend   | Distribution                                     | Type   | Habitat   | Primary  |
| var. cyanomontanus           | Medium D   | Stable D   | Utah-Wyoming Rocky<br>Mountains                  | P  | Pinyon-Juniper<br>Desert Shrub  | <b>✓</b> |
| Plateau penstemon            |  |  |  |  |   |          |
| Tier 2 Plants General Threat | Specific Threat  |  | General Conservation Action                      | Sno  | ecific Conservation Action  | Priority |
| Climate                      | *  | to movement barriers,  |  | See  | d banking (incl. protocols, ection, and cultivation)  | Н        |
|                              | restriction to rare  | •  |  | COII   | ,   |          |
| Climate                      |  | •  | Planning and Zoning                              | Mo<br>resp   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs   | Н        |
| Climate                      | Habitat shifting ar climate change  Phenological resp  | habitat features<br>and alteration due to  | Planning and Zoning  Research and Monitoring     | Mo<br>resp<br>and<br>situ<br>Con<br>and<br>clin  | ponse to projected climate changes prepare adaptation plan to define in   | Н        |
| Climate                      | Habitat shifting ar climate change  Phenological resp of species itself ar   | habitat features and alteration due to onse to climate change ad/or inter-dependent  |  | Mo<br>resp<br>and<br>situ<br>Cor<br>and<br>clin<br>(dis  | propose to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors  | Н        |
|                              | Habitat shifting ar<br>climate change  Phenological resp<br>of species itself ar<br>species unknown  Complete distribu                     | habitat features and alteration due to onse to climate change ad/or inter-dependent  | Research and Monitoring                          | Mo<br>resp<br>and<br>situ<br>Cor<br>and<br>clin<br>(dis  | propose to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms) aduct field inventory to refine known            | Н        |
| Climate                      | Habitat shifting ar climate change  Phenological resp of species itself ar species unknown  Complete distribu unknown  Climate variability | habitat features and alteration due to onse to climate change ad/or inter-dependent tion in Colorado  y (intensification or al weather patterns, | Research and Monitoring  Research and Monitoring | Moorespand situ Corand clin (dist Corand dist Moorespand Corand dist Moorespand Corand | propose to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors appears a mechanisms, mutualisms) aduct field inventory to refine known ribution | Н        |

| Penstemon teucrioides | Population Status  | Population Trend   | Distribution                         | Type             | Habitat   | Primary  |
|-----------------------|--|--------------------|--------------------------------------|------------------|---|----------|
|                       | Unknown  | Unknown            | Southern Rocky Mountains             | P                | Sagebrush   | ✓        |
| Germander beardtongue |  |                    |                                      |                  |   |          |
| Tier 2 Plants         |  |                    |                                      |                  |   |          |
| General Threat        | Specific Threat  |                    | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |
| Climate               | Vulnerability due to<br>poor dispersal capac<br>restriction to rare hal  | ity, and/or        | Ex-situ Conservation                 |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate               | Habitat shifting and climate change                                      | alteration due to  | Planning and Zoning                  | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate               | Phenological respons<br>of species itself and/<br>species unknown        |                    | Research and Monitoring              | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge     | Taxonomy is poorly   | understood         | Research and Monitoring              | Tax              | konomic work is needed  | Н        |
| Lack of knowledge     | Threats and response poorly understood                                   | e to change are    | Research and Monitoring              |                  | search species/habitat response to nagement or disturbance  | Н        |
| Lack of knowledge     | Biology, ecology, an are poorly known                                    | d detailed habitat | Research and Monitoring              |                  | search critical life history/habitat<br>nponents  | Н        |
| Lack of knowledge     | Complete distributio unknown   | n in Colorado      | Research and Monitoring              |                  | nduct field inventory to refine known tribution   | Н        |
| Lack of knowledge     | Population status unl  | known              | Research and Monitoring              | Mo               | nitor population status   | Н        |
| Climate               | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornac | weather patterns,  | Capacity Building and<br>Cooperation | ,                | gage in collaborative, proactive<br>nning and conservation programs   | M        |

| Phacelia formosula                      | Population S                                     | Status   | Populatio    | n Trend | Distribution  | Туре        | Habitat  | Primary  |
|---|--|----------|--------------|---------|---|-------------|--|----------|
| v                                       | Medium   | D        | Stable       | D       | Southern Rocky Mountains  | P           | Barrens  | <b>✓</b> |
| North Park phacelia                     |  |          |              |         |   |             |  |          |
| Tier 1 Plants                           |  |          |              |         |   |             |  |          |
| General Threat                          | Specific Thre                                    | eat      |              |         | General Conservation Action   | Spe         | ecific Conservation Action   | Priority |
|   |  |          |              |         | Education and Communication   | edu         | blish educational material/sponsor<br>acational programs to raise public<br>areness  | Н        |
|   |  |          |              |         | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | pand existing ACECs and create new<br>ECC in Larimer County  | Н        |
|   |  |          |              |         | Research and Monitoring   | Mo          | onitor population status   | Н        |
| Climate                                 | Vulnerability<br>poor dispersa<br>restriction to | ıl capac | city, and/or |         | Ex-situ Conservation  |             | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                                 | Habitat shifti<br>climate chan                   | _        | alteration d | ue to   | Planning and Zoning   | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                                 | Phenological<br>of species its<br>species unkn   | elf and  |              |         | Research and Monitoring   | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Habitat Conversion                      | Housing, urb<br>development                      |          | l ex-urban   |         | Land Protection (Public, Private)<br>Easements, and Resource Rights |             | quire conservation easement for<br>bitat protection  | Н        |
| Lack of knowledge                       | Taxonomy of population is                        |          |              | l       | Research and Monitoring   |             | konomic work is needed for Larimer unty population   | Н        |
| Non-consumptive Disturbance             | Motor-power                                      | red recr | reation      |         | Voluntary Standards   |             | plement Best Management Practices recreation management  | Н        |
|   |  |          |              |         | Capacity Building and<br>Cooperation                                | alig        | ordinate with related agencies to<br>gn goals, policies, measures of<br>ecess, etc.  | M        |
| Climate                                 | Climate varia<br>alteration of<br>e.g., droughts | normal   | weather pat  |         | Capacity Building and<br>Cooperation                                |             | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Habitat Degradation                     | Roads and Po                                     | owerlin  | ies          |         | Voluntary Standards   | for         | plement Best Management Practices<br>transportation and powerline<br>ridors  | M        |
| Indirect Consumptive Use<br>(Mortality) | Incompatible                                     | grazin   | g?           |         | Research and Monitoring   |             | search species/habitat response to nagement or disturbance   | M        |
| Resource Extraction                     | Oil and gas d                                    | lrilling |              |         | Voluntary Standards   |             | plement Best Management Practices<br>energy development and mining   | M        |

| Phacelia submutica          | Population                      | Status               | Population Trend                                      | Distribution                                  | Type        | Habitat   | Primary  |
|-----------------------------|---------------------------------|----------------------|---|---|-------------|---|----------|
| DeBeque phacelia            | Low                             | D                    | Unknown   | Utah High Plateau<br>Southern Rocky Mountains | P<br>O      | Barrens   | <b>✓</b> |
| Tier 1 Plants               |                                 |                      |   |   |             |   |          |
| General Threat              | Specific Thr                    | eat                  |   | General Conservation Action                   | Spe         | ecific Conservation Action  | Priority |
| Climate                     | Vulnerabilit<br>poor dispers    | y due to<br>al capac | movement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation                          | See         | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                     | Habitat shift<br>climate char   |                      | alteration due to                                     | Planning and Zoning                           | resp        | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                     |                                 | self and/            | se to climate change<br>for inter-dependent           | Research and Monitoring                       | and<br>clir | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Degradation         | Roads                           |                      |   | Voluntary Standards                           |             | plement Best Management Practices<br>transportation projects  | Н        |
| Non-consumptive Disturbance | Motor-powe                      | red recr             | eation  | Voluntary Standards                           |             | plement Best Management Practices recreation management   | Н        |
| Resource Extraction         | Oil and gas                     | drilling             |   | Voluntary Standards                           |             | plement Best Management Practices energy development and mining   | Н        |
| Climate                     |                                 | normal               | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation          |             | gage in collaborative, proactive<br>nning and conservation programs   | М        |
| Lack of knowledge           | Complete di<br>unknown          | stributio            | on in Colorado  | Research and Monitoring                       |             | nduct field inventory to refine known tribution   | M        |
| Lack of knowledge           | Population s                    | tatus un             | known   | Research and Monitoring                       | Mo          | nitor population status   | M        |
| Lack of knowledge           | Population of<br>to disturbance | -                    | s and vulnerability<br>oorly known                    | Research and Monitoring                       |             | search species/habitat response to nagement or disturbance  | M        |
| Lack of knowledge           | Biology and                     | ecology              | y are poorly known                                    | Research and Monitoring                       |             | nduct studies on demography and roductive biology   | L        |

| Physaria  | alpina                                  | Population Status  | Population Trend   | Distribution   | Туре   | Habitat  | Primary                |
|---|---|--|--|--|--|--|------------------------|
|   |   | Unknown  | Unknown  | Southern Rocky Mountains   | P  | Exposed Rock (alpine)  |                        |
| Avery Peak  | twinpod                                 |  |  |  |  |  |                        |
| Tier 2  | Plants                                  |  |  |  |  |  |                        |
| General Thre  | eat                                     | Specific Threat  |  | General Conservation Action  | Spe  | ecific Conservation Action   | Priority               |
| Climate   |   | Vulnerability due to<br>poor dispersal capa<br>restriction to rare h   |  | Ex-situ Conservation   | See  | Н  |                        |
| Climate   |   | Habitat shifting and climate change  | d alteration due to  | Planning and Zoning  | resp<br>and  | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н                      |
| Climate   |   |  | nse to climate change<br>d/or inter-dependent  | Research and Monitoring  | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms) |  | Н                      |
| Lack of know  | wledge                                  | Threats and respon-  | se to change are   | Research and Monitoring  |  | search species/habitat response to nagement or disturbance   | Н                      |
| Lack of know  | wledge                                  | Biology, ecology, a<br>are poorly known  | and detailed habitat   | Research and Monitoring  |  | search critical life history/habitat<br>inponents  | Н                      |
| Lack of know  | wledge                                  | Complete distributi<br>unknown   | on in Colorado   | Research and Monitoring  |  | nduct field inventory to refine known cribution  | Н                      |
| Lack of know  | wledge                                  | Population status u  | nknown   | Research and Monitoring  | Mo   | nitor population status  | Н                      |
| Climate   |   | Climate variability alteration of norma  | l weather patterns,  | Capacity Building and<br>Cooperation   |  | gage in collaborative, proactive nning and conservation programs   | M                      |
|   |   | e.g., droughts, torna  | ados, etc.)  |  |  |  |                        |
| Non-consum  | nptive Disturbance                      | e.g., droughts, torna<br>Motor-powered rec   |  | Compliance and Enforcement   | Maı  | nage off-road travel   | M                      |
|   | •                                       |  |  | ·  | Маі<br>Гуре  |  | M<br>Primary           |
|   | •                                       | Motor-powered rec  | ereation   | Distribution Central Shortgrass Prairie  | Гуре   |  |                        |
| Physaria  | bellii                                  | Motor-powered rec  | Population Trend   | Distribution   | Гуре   | Habitat  | Primary                |
| Physaria Bell's twinpe  | bellii                                  | Motor-powered rec  | Population Trend   | Distribution Central Shortgrass Prairie  | Гуре   | Habitat  | Primary                |
| <b>Physaria</b> Bell's twinper  | <b>bellii</b> od Plants                 | Motor-powered rec  | Population Trend   | Distribution Central Shortgrass Prairie  | Гуре<br>Р<br>Р   | Habitat  | Primary                |
| Physaria  Bell's twinpe Tier 2 General Three  | <b>bellii</b> od Plants                 | Population Status Medium D  Specific Threat Vulnerability due to poor dispersal capa   | Population Trend Declining D  o movement barriers, icity, and/or   | Distribution  Central Shortgrass Prairie  Front Range  | Гуре<br>Р<br>Р<br>Spe  | Habitat<br>Barrens   | Primary                |
| Physaria Bell's twinper Tier 2 General Three Climate  | <b>bellii</b> od Plants                 | Population Status Medium D  Specific Threat Vulnerability due to   | Population Trend Declining D  o movement barriers, city, and/or abitat features  | Distribution Central Shortgrass Prairie Front Range General Conservation Action  | P P Spe See coll Mooresp   | Habitat Barrens ecific Conservation Action ed banking (incl. protocols,  | Primary  Priority      |
| Physaria Bell's twinper Tier 2 General Three Climate Climate  | <b>bellii</b> od Plants                 | Population Status Medium D  Specific Threat Vulnerability due to poor dispersal capa restriction to rare h Habitat shifting and climate change   | Population Trend Declining D  o movement barriers, city, and/or abitat features d alteration due to  | Distribution Central Shortgrass Prairie Front Range  General Conservation Action Ex-situ Conservation  | P P P Spee coll Moorespand situ Corand clim  | Habitat Barrens  ccific Conservation Action d banking (incl. protocols, lection, and cultivation) del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in  | Primary Priority H     |
| Physaria Bell's twinper Tier 2 General Three Climate Climate  | bellii od Plants eat                    | Population Status  Medium D  Specific Threat  Vulnerability due to poor dispersal capa restriction to rare h Habitat shifting and climate change  Phenological respo of species itself and   | Population Trend Declining D  o movement barriers, city, and/or abitat features d alteration due to  mse to climate change d/or inter-dependent  | Distribution Central Shortgrass Prairie Front Range  General Conservation Action Ex-situ Conservation  Planning and Zoning   | Type P P See coll Moorespand situ Corand clin (diss, Acc, hab  | Habitat Barrens  ceific Conservation Action d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms) quire conservation easement for itat protection  | Primary Priority H     |
| Physaria Bell's twinportier 2 General Three Climate Climate Climate Habitat Convention                                  | bellii  od Plants eat  version radation | Population Status  Medium D  Specific Threat  Vulnerability due to poor dispersal capa restriction to rare h Habitat shifting and climate change  Phenological respo of species itself and species unknown  Housing, urban, and development  Roads or Railroads                        | Population Trend Declining D  o movement barriers, city, and/or abitat features d alteration due to  mse to climate change d/or inter-dependent  d ex-urban  | Distribution Central Shortgrass Prairie Front Range  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Land Protection (Public, Private)   | Type P P See coll Moorespand situ Corand clin (dist, Acchab  | Habitat Barrens  ceific Conservation Action d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms) quire conservation easement for itat protection blement Best Management Practices transportation projects  | Primary Priority H H H |
| Physaria  Bell's twinper Tier 2  General Three Climate  Climate  Climate  Habitat Control  Habitat Degral Lack of known | bellii  od Plants eat  version radation | Population Status  Medium D  Specific Threat  Vulnerability due to poor dispersal capa restriction to rare h Habitat shifting and climate change  Phenological respo of species itself and species unknown  Housing, urban, and development  | Population Trend Declining D  o movement barriers, city, and/or abitat features d alteration due to  mse to climate change d/or inter-dependent  d ex-urban  | Distribution Central Shortgrass Prairie Front Range  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Land Protection (Public, Private), Easements, and Resource Rights                     | Type P P See coll Moorespand situ Corand clin (diss, Accapable Imp for Cor   | Habitat Barrens  ceific Conservation Action and banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors repersal mechanisms, mutualisms) quire conservation easement for citat protection  plement Best Management Practices   | Primary Priority H H H |
| Physaria  Bell's twinportier 2  General Three  Climate  Climate  Climate  Habitat Convention                            | bellii  od Plants eat  version radation | Population Status  Medium D  Specific Threat  Vulnerability due to poor dispersal capa restriction to rare h Habitat shifting and climate change  Phenological respo of species itself and species unknown  Housing, urban, and development  Roads or Railroads  Complete distribution | Population Trend Declining D  o movement barriers, city, and/or abitat features d alteration due to  nse to climate change d/or inter-dependent  d ex-urban  ion in Colorado (intensification or 1 weather patterns, | Distribution Central Shortgrass Prairie Front Range  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Land Protection (Public, Private), Easements, and Resource Rights Voluntary Standards | Type P P See coll Moorespand situ Corand clin (dist) Acchab Impfor Cordist Eng   | Habitat Barrens  ceific Conservation Action d banking (incl. protocols, lection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms) quire conservation easement for itat protection blement Best Management Practices transportation projects induct field inventory to refine known | Primary Priority H H H |

| Physaria     | obcordata | Population S                                     | Status   | Population Trend                                      | Distribution                         | Type             | Habitat   | Primary  |
|--------------|-----------|--|----------|---|--------------------------------------|------------------|---|----------|
| •            |           | Medium   | D        | Unknown   | Utah High Plateau                    | P                | Barrens   | <b>✓</b> |
| Piceance twi | inpod     |  |          |   |                                      |                  |   |          |
| Tier 1       | Plants    |  |          |   |                                      |                  |   |          |
| General Thre | eat       | Specific Thre                                    | at       |   | General Conservation Action          | Spe              | ecific Conservation Action  | Priority |
| Climate      |           | Vulnerability<br>poor dispersa<br>restriction to | l capac  |   | Ex-situ Conservation                 |                  | d banking (incl. protocols, lection, and cultivation)   | Н        |
| Climate      |           | Habitat shifti<br>climate chanş                  | _        | alteration due to                                     | Planning and Zoning                  | res <sub>l</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate      |           |  | elf and  | se to climate change<br>for inter-dependent           | Research and Monitoring              | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Habitat Deg  | radation  | Utility and pi                                   | peline   | construction  | Voluntary Standards                  |                  | plement Best Management Practices energy development and mining   | Н        |
| Habitat Deg  | radation  | Roads  |          |   | Voluntary Standards                  |                  | plement Best Management Practices transportation projects   | Н        |
| Lack of kno  | wledge    | Population st                                    | atus un  | known   | Research and Monitoring              | Mo               | nitor population status   | Н        |
| Lack of kno  | wledge    | Response to                                      | change   |   | Research and Monitoring              | of c             | estigate how plants respond to layer<br>lust deposited during resource<br>raction   | s H      |
| Resource Ex  | traction  | Oil and gas d                                    | rilling, | and oil shale mining                                  | Voluntary Standards                  |                  | plement Best Management Practices energy development and mining   | Н        |
| Climate      |           |  | normal   | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Lack of kno  | wledge    | Complete dis<br>unknown                          | tributio | on in Colorado  | Research and Monitoring              |                  | nduct field inventory to refine know  | ı L      |

| Physari     | a pulvinata         | Population S   | Status    | Population Trend                                      | Distribution                      | Type  | Habitat   | Primary  |
|-------------|---------------------|--|-----------|---|-----------------------------------|---|---|----------|
|             |                     | Medium   | D         | Unknown   | Southern Rocky Mountains          | P   | Barrens   |          |
| Cushion bl  | adderpod            |  |           |   |                                   |   | Deciduous Oak<br>Ponderosa Pine   |          |
| Tier 1      | Plants              |  |           |   |                                   |   | Sagebrush   |          |
| General Th  | nreat               | Specific Thre  | eat       |   | General Conservation Action       | Spe   | cific Conservation Action   | Priority |
| Climate     |                     | Vulnerability due to movement barriers,<br>poor dispersal capacity, and/or<br>restriction to rare habitat features |           |   | Ex-situ Conservation              | Seed banking (incl. protocols, collection, and cultivation) |   | Н        |
| Climate     |                     | Habitat shifti<br>climate chang  |           | alteration due to                                     | Planning and Zoning               | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate     |                     |  | elf and/  | se to climate change<br>for inter-dependent           | Research and Monitoring           | and<br>clin   | duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)    | Н        |
| Lack of kn  | owledge             | Complete dis<br>unknown  | tributio  | on in Colorado  | Research and Monitoring           |   | nduct field inventory to refine known ribution on private land  | Н        |
|             | mptive Disturbance  | Motor-power  |           |   | Compliance and Enforcement        |   | nage off-road travel  | Н        |
| Non-consu   | imptive Disturbance | Infrastructure visitor use at  |           | opment for Park<br>Mesa                               | Protected Area Management         | con   | ign public improvements to be negatible with biodiversity   | Н        |
| Resource E  | Extraction          | Oil and gas d  | rilling a | and seismic testing                                   | Voluntary Standards               |   | energy development and mining   | Н        |
| Climate     |                     |  | normal    | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and Cooperation | _   | gage in collaborative, proactive uning and conservation programs  | M        |
| Habitat Co  | nversion            | Water storage  | e         |   | Protected Area Management         |   | nage public use to be compatible n biodiversity   | M        |
| Lack of kn  | owledge             | Population st  | atus un   | known   | Research and Monitoring           | Mo  | nitor population status   | M        |
| Physari     | a rollinsii         | Population S   | Status    | Population Trend                                      | Distribution                      | Type  | Habitat   | Primary  |
|             |                     | Low  | D         | Unknown   | Southern Rocky Mountains          | P   | Barrens   | ✓        |
| Rollins twi | inpod               |  |           |   |                                   |   |   |          |
| Tier 2      | Plants              |  |           |   |                                   |   |   |          |
| General Th  | nreat               | Specific Thre  | eat       |   | General Conservation Action       | Spe   | cific Conservation Action   | Priority |
| Climate     |                     | Vulnerability<br>poor dispersa<br>restriction to   | l capac   | ity, and/or   | Ex-situ Conservation              |   | d banking (incl. protocols, ection, and cultivation)  | Н        |
| Climate     |                     | Habitat shifti<br>climate chang  |           | alteration due to                                     | Planning and Zoning               | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate     |                     |  | elf and/  | se to climate change<br>for inter-dependent           | Research and Monitoring           | and<br>clin   | duct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)    | Н        |
| Lack of kn  | owledge             | Threats and r  |           | e to change are                                       | Research and Monitoring           |   | earch species/habitat response to nagement or disturbance   | Н        |
| Lack of kn  | owledge             | Biology, ecol<br>are poorly kn   | 0.0       | nd detailed habitat                                   | Research and Monitoring           |   | earch critical life history/habitat   | Н        |
| Lack of kn  | owledge             | Complete dis<br>unknown  | tributio  | on in Colorado  | Research and Monitoring           |   | nduct field inventory to refine known ribution  | Н        |
| Lack of kn  | owledge             | Population st  | atus un   | known   | Research and Monitoring           | Mo  | nitor population status   | Н        |
| Climate     |                     | Climate varia  | hility (  | intensification or                                    | Capacity Building and             | Eng   | gage in collaborative, proactive  | M        |

| Physaria  | a scrotiformis    | Population Status  | Population Trend   | Distribution   | Type Habitat  | Primary   |
|---|-------------------|--|--|--|---|---|
|   |                   | Unknown  | Unknown  | Southern Rocky Mountains   | P Barrens   |   |
| West Silver   | r bladderpod      |  |  |  | Meadow Tundra<br>Spruce-Fir   |   |
| Tier 1  | Plants            |  |  |  | Spruce-I'll   |   |
| General Th  | reat              | Specific Threat  |  | General Conservation Action  | Specific Conservation Action  | Priority  |
| Climate   |                   | Vulnerability due to<br>poor dispersal capac<br>restriction to rare ha   | •  | Ex-situ Conservation   | Seed banking (incl. protocols, collection, and cultivation)   | Н   |
| Climate   |                   | Habitat shifting and climate change  | alteration due to  | Planning and Zoning  | Model potential habitat/range shifts<br>response to projected climate chang<br>and prepare adaptation plan to defir<br>situ and ex situ conservation needs  | es  |
| Climate   |                   | Phenological responder of species itself and species unknown   |  | Research and Monitoring  | Conduct primary research on rare p<br>and pollinator responses to changin<br>climate, and other vulnerability fact<br>(dispersal mechanisms, mutualisms   | g<br>ors  |
| Lack of kno   | owledge           | Threats and respons poorly understood  | e to change are  | Research and Monitoring  | Research species/habitat response to management or disturbance  | о Н   |
| Lack of kno   | owledge           | Biology, ecology, a are poorly known   | nd detailed habitat  | Research and Monitoring  | Research critical life history/habitat components   | Н   |
| Lack of kno   | owledge           | Complete distribution unknown  | on in Colorado   | Research and Monitoring  | Conduct field inventory to refine kn distribution   | nown H  |
| Lack of kno   | owledge           | Population status ur   |  | Research and Monitoring  | Monitor population status   | Н   |
| Climate   |                   | Climate variability of<br>alteration of normal<br>e.g., droughts, torna  | weather patterns,  | Capacity Building and Cooperation  | Engage in collaborative, proactive planning and conservation program  | M<br>s  |
| Potentil  | la rupincola      | Population Status  | Population Trend   | Distribution   | Type Habitat  | Primary   |
| Rocky Mou   | untain cinquefoil | Medium D   | Unknown  | Southern Rocky Mountains   | P Cliff and Canyon  |   |
| Tier 2  | Plants            |  |  |  |   |   |
| General Th  | reat              | Specific Threat  |  | General Conservation Action  | Specific Conservation Action  | Priority  |
| Climate   |                   | poor dispersal capac   | movement barriers,<br>city, and/or   | Ex-situ Conservation   | Seed banking (incl. protocols, collection, and cultivation)   | Н   |
| Climate   |                   | restriction to rare na   | bitat features   |  |   |   |
|   |                   | Habitat shifting and climate change  |  | Planning and Zoning  | Model potential habitat/range shifts<br>response to projected climate chang<br>and prepare adaptation plan to defir<br>situ and ex situ conservation needs  | es  |
| Climate   |                   | Habitat shifting and climate change  | alteration due to  | Planning and Zoning  Research and Monitoring   | response to projected climate chang<br>and prepare adaptation plan to defir   | es<br>ne in<br>lant H<br>g<br>ors                 |
| Climate  Lack of known                                      | owledge           | Habitat shifting and climate change  Phenological respon of species itself and   | alteration due to  nse to climate change /or inter-dependent   |  | response to projected climate chang<br>and prepare adaptation plan to defir<br>situ and ex situ conservation needs<br>Conduct primary research on rare p<br>and pollinator responses to changin<br>climate, and other vulnerability fact  | es<br>ne in<br>lant H<br>g<br>ors                 |
|   | owledge           | Habitat shifting and climate change  Phenological respor of species itself and species unknown   | alteration due to  use to climate change /or inter-dependent  uknown (intensification or weather patterns,             | Research and Monitoring  | response to projected climate chang<br>and prepare adaptation plan to defir<br>situ and ex situ conservation needs<br>Conduct primary research on rare p<br>and pollinator responses to changin<br>climate, and other vulnerability fact<br>(dispersal mechanisms, mutualisms   | es he in H g ors ) H M                            |
| Lack of kno   |                   | Phenological respondences unknown  Population status unclimate variability alteration of normal  | alteration due to  use to climate change /or inter-dependent  uknown (intensification or weather patterns,             | Research and Monitoring Research and Monitoring Capacity Building and  | response to projected climate chang<br>and prepare adaptation plan to defir<br>situ and ex situ conservation needs<br>Conduct primary research on rare p<br>and pollinator responses to changin<br>climate, and other vulnerability fact<br>(dispersal mechanisms, mutualisms,<br>Monitor population status<br>Engage in collaborative, proactive   | es e in H g ors ) H M s                           |
| Lack of kno   | gradation         | Phenological respondence of species itself and species unknown  Population status un Climate variability alteration of normal e.g., droughts, torna                                | alteration due to  use to climate change /or inter-dependent  uknown (intensification or weather patterns, idos, etc.) | Research and Monitoring Research and Monitoring Capacity Building and Cooperation  | response to projected climate chang and prepare adaptation plan to defir situ and ex situ conservation needs Conduct primary research on rare p and pollinator responses to changin climate, and other vulnerability fact (dispersal mechanisms, mutualisms Monitor population status Engage in collaborative, proactive planning and conservation program Implement Best Management Practifor transportation projects Conduct field inventory to refine kridistribution  | es de in H g ors ) H M s s ces M mown M           |
| Lack of kno   | gradation         | Phenological respondences of species itself and species unknown  Population status unclimate variability alteration of normal e.g., droughts, tornal Roads  Complete distribution  | alteration due to  use to climate change /or inter-dependent  uknown (intensification or weather patterns, idos, etc.) | Research and Monitoring Research and Monitoring Capacity Building and Cooperation Voluntary Standards  | response to projected climate chang and prepare adaptation plan to defir situ and ex situ conservation needs  Conduct primary research on rare p and pollinator responses to changin climate, and other vulnerability fact (dispersal mechanisms, mutualisms Monitor population status  Engage in collaborative, proactive planning and conservation program  Implement Best Management Practifor transportation projects  Conduct field inventory to refine kr   | es de in H g ors ) H M s s ces M mown M           |
| Lack of knot Climate  Habitat Deg  Lack of knot Invasive or | gradation         | Phenological respondences of species itself and species unknown  Population status unclimate variability alteration of normal e.g., droughts, tornate Roads  Complete distribution | alteration due to  use to climate change /or inter-dependent  uknown (intensification or weather patterns, idos, etc.) | Research and Monitoring  Research and Monitoring Capacity Building and Cooperation  Voluntary Standards  Research and Monitoring  Invasive Species Control and | response to projected climate chang and prepare adaptation plan to defir situ and ex situ conservation needs  Conduct primary research on rare p and pollinator responses to changin climate, and other vulnerability fact (dispersal mechanisms, mutualisms Monitor population status  Engage in collaborative, proactive planning and conservation program  Implement Best Management Practifor transportation projects  Conduct field inventory to refine kr distribution  Map weed infestations and sensitive | es es en in Hant H g ors ) H M s s ces M en own M |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

## Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Ptilagrostis porteri | Population S   | tatus   | Population '   | Trend   | Distribution   | Гуре             | Habitat   | Primary  |
|----------------------|--|---------|----------------|---------|--|------------------|---|----------|
| 0 1                  | Medium   | D       | Declining      | D       | Southern Rocky Mountains   | P                | Grass/Forb Dominated Wetlands   | ✓        |
| Porter feathergrass  |  |         |                |         |  |                  |   |          |
| Tier 2 Plants        |  |         |                |         |  |                  |   |          |
| General Threat       | Specific Three   | at      |                |         | General Conservation Action  | Spe              | ecific Conservation Action  | Priority |
|                      |  |         |                |         | Land Protection (Public, Private),<br>Easements, and Resource Rights | hab              | ablish legal designation to protect<br>bitat (e.g., Research Natural Area,<br>ecial Interest Area)  | Н        |
| Habitat Degradation  | Altered hydro<br>aquifer)  | logical | regime (surfa  | ice or  | Land Protection (Public, Private),<br>Easements, and Resource Rights | Est              | ablish in-stream flow rights  | Н        |
| Habitat Degradation  | Altered hydrological regime (surface or aquifer)   |         |                |         | Maintain or Restore Natural<br>Processes                             | Res              | store natural hydrologic regime   | Н        |
| Resource Extraction  | Mining (peat,  | placer  | )              |         | Education and Communication  |                  | Educate miners about avoiding and/or mitigating impacts   |          |
| Climate              | Climate varial alteration of n e.g., droughts  | ormal   | weather patter |         | Capacity Building and<br>Cooperation                                 |                  | gage in collaborative, proactive nning and conservation programs  | M        |
| Climate              | Vulnerability<br>poor dispersal<br>restriction to a  | capac   | ity, and/or    | rriers, | Ex-situ Conservation   |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | M        |
| Climate              | Habitat shiftir<br>climate chang   |         | alteration due | to      | Planning and Zoning  | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | M        |
| Climate              | Phenological response to climate change<br>of species itself and/or inter-dependent<br>species unknown |         |                |         | Research and Monitoring  | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | M        |
| Lack of knowledge    | Response to c  | hange   | is poorly unde | erstood | Research and Monitoring  |                  | search species/habitat response to nagement or disturbance  | M        |
| Lack of knowledge    | Complete dist<br>unknown   | ributio | n in Colorado  |         | Research and Monitoring  |                  | nduct field inventory to refine known tribution   | M        |
| Lack of knowledge    | Restoration m<br>understood  | ethods  | are poorly     |         | Research and Monitoring  |                  | ed banking and identification of ective restoration methods   | L        |

| Puccinellia parishii   | Population                                     | Status              | Population Trend                                      | Distribution                                     | Туре   | Habitat   | Primary  |
|--|--|---------------------|---|--|--|---|----------|
| 1 исстини ран <i>ы</i> т   | Medium   | D                   | Unknown   | Southern Rocky Mountains                         | P  | Grass/Forb Dominated Wetlands   | <b>✓</b> |
| Parish's alkali grass  |  |                     |   |  |  |   |          |
| Tier 2 Plants  |  |                     |   |  |  |   |          |
| General Threat   | Specific Thr                                   | eat                 |   | General Conservation Action                      | Spe  | ecific Conservation Action  | Priority |
| Climate  | Vulnerability<br>poor dispers                  | y due to<br>al capa | movement barriers,<br>city, and/or<br>abitat features | Ex-situ Conservation                             | See  | Н   |          |
| Climate  | Habitat shift climate chan                     | _                   | alteration due to                                     | Planning and Zoning                              | Mo<br>resp<br>and<br>situ                            | Н   |          |
| Climate  |  | self and            | nse to climate change<br>/or inter-dependent          | Research and Monitoring                          | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Degradation  | Altered hydraquifer)                           | ologica             | l regime (surface or                                  | Maintain or Restore Natural<br>Processes         |  | intain natural hydrologic regime  | Н        |
| Climate  | Climate vari<br>alteration of<br>e.g., drought | normal              | intensification or<br>weather patterns,<br>dos, etc.) | Capacity Building and<br>Cooperation             |  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Indirect Consumptive Use (Mortality)                                       | Grazing  |                     | ·   | Compatible Resource Use                          | Imp<br>mai   | M   |          |
| Invasive or Exotic Species   | Invasive pla                                   | nts                 |   | Invasive Species Control and Prevention          | Imp<br>mai   | M   |          |
| Lack of knowledge  | Population s                                   | tatus ur            | nknown  | Research and Monitoring                          | Mo   | M   |          |
| Salix arizonica  | Population                                     | Status              | Population Trend                                      | Distribution                                     | Туре   | Habitat   | Primary  |
| Saux ar Lonica   | Low  | D                   | Unknown   | Southern Rocky Mountains                         | P  | Shrub-dominated Wetlands  | <b>✓</b> |
| Arizona willow   |  |                     |   |  |  |   |          |
|  |  |                     |   |  |  |   |          |
| Tier 2 Plants General Threat   | Specific Thr                                   | ant                 |   | General Conservation Action                      | Sne  | ecific Conservation Action  | Priority |
| Climate  | Vulnerability<br>poor dispers                  | y due to<br>al capa | novement barriers,<br>city, and/or<br>bitat features  | Ex-situ Conservation                             | See  | Н   |          |
| Climate  | Habitat shift climate chan                     |                     | alteration due to                                     | Planning and Zoning                              | res <sub>l</sub>                                     | del potential habitat/range shifts in<br>ponse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate  |  | self and            | nse to climate change<br>/or inter-dependent          | Research and Monitoring                          | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
|  | T  | e Grazii            | ng  | Compatible Resource Use                          |  | plement compatible grazing nagement   | Н        |
| •  | Incompatible                                   |                     |   |  | Conduct field inventory to refine known distribution |   |          |
| (Mortality)  |  |                     | on in Colorado  | Research and Monitoring                          |  | -   | Н        |
| Indirect Consumptive Use (Mortality)  Lack of knowledge  Lack of knowledge | Complete di                                    | stributio           |   | Research and Monitoring  Research and Monitoring | dist   | -   | Н        |

## Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

| Saussurea weberi            | Population Status  | s Population Trend  | Distribution                         | Type   | Habitat   | Primary  |
|-----------------------------|--|---|--------------------------------------|--|---|----------|
|                             | Medium D   | Unknown   | Southern Rocky Mountains             | P  | Meadow Tundra   | <b>✓</b> |
| Weber saussurea             |  |   |                                      |  |   |          |
| Tier 2 Plants               |  |   |                                      |  |   |          |
| General Threat              | Specific Threat  |   | General Conservation Action          | Spe  | ecific Conservation Action  | Priority |
| Climate                     | Vulnerability due<br>poor dispersal cap<br>restriction to rare |   | Ex-situ Conservation                 |  | ed banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                     | Habitat shifting ar climate change                             | nd alteration due to  | Planning and Zoning                  | res <sub>j</sub>   | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |  | onse to climate change<br>nd/or inter-dependent               | Research and Monitoring              | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms) |   | Н        |
| Lack of knowledge           | Threats and responsible poorly understood                      | •   | Research and Monitoring              |  | search species/habitat response to nagement or disturbance  | Н        |
| Lack of knowledge           | Biology, ecology, are poorly known                             | and detailed habitat  | Research and Monitoring              | spe  | search critical life history (e.g., is<br>cies rhizomatous?)/habitat<br>nponents  | Н        |
| Lack of knowledge           | Complete distribu<br>unknown                                   | tion in Colorado  | Research and Monitoring              |  | nduct field inventory to refine known tribution   | Н        |
| Lack of knowledge           | Population status  | unknown   | Research and Monitoring              | Mo   | onitor population status  | Н        |
| Climate                     |  | y (intensification or<br>al weather patterns,<br>nados, etc.) | Capacity Building and<br>Cooperation | ,  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Non-consumptive Disturbance | Motor-powered re   | ecreation   | Compliance and Enforcement           | Ma   | nage off-road travel  | M        |
| Resource Extraction         | Mining   |   | Voluntary Standards                  |  | plement Best Management Practices mining  | M        |
| Non-consumptive Disturbance | Non-motorized re   | creation  | Education and Communication          | edu  | olish educational material/sponsor<br>acational programs to raise public<br>areness   | L        |

**Table 3. - Continued.** 

| Sclerocactus glaucus     | Population                 | n Status    | Population Trend                                     | Distribution  | Type             | Habitat   | Primary  |
|--------------------------|----------------------------|-------------|--|---|------------------|---|----------|
| o o                      | Low                        | D           | Unknown  | Colorado Plateau  | P                | Desert Shrub  | <b>✓</b> |
| C-11- h11                |                            |             |  | Utah High Plateau   | P                |   |          |
| Colorado hookless cactus |                            |             |  | Southern Rocky Mountains  | O                |   |          |
| Tier 1 Plants            |                            |             |  |   |                  |   |          |
| General Threat           | Specific Th                | nreat       |  | General Conservation Action   | Spe              | ecific Conservation Action  | Priority |
| Climate                  | poor disper                | rsal capac  | movement barriers,<br>ity, and/or<br>pitat features  | Ex-situ Conservation  |                  | ed banking (incl. protocols,<br>lection, and cultivation)   | Н        |
| Climate                  | Habitat shi<br>climate cha | 0           | alteration due to                                    | Planning and Zoning   | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                  |                            | itself and/ | se to climate change<br>or inter-dependent           | Research and Monitoring   | and<br>clir      | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)    | Н        |
| Lack of knowledge        | Complete of unknown        | distributio | n in Colorado  | Research and Monitoring   |                  | nduct field inventory to refine knowr<br>tribution  | ı H      |
| Lack of knowledge        | Population                 | status un   | known  | Research and Monitoring   | Mo               | onitor population status  | Н        |
| Resource Extraction      | Oil and gas                | s drilling  |  | Voluntary Standards   |                  | plement Best Management Practices energy development and mining   | Н        |
|                          |                            |             |  | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab              | ablish legal designation to protect<br>bitat (e.g., Area of Critical<br>vironmental Concern)  | M        |
| Climate                  |                            | of normal   | ntensification or<br>weather patterns,<br>los, etc.) | Capacity Building and<br>Cooperation                                | •                | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Habitat Degradation      | Roads, pov                 | werlines, a | nd pipelines   | Voluntary Standards   | for              | plement Best Management Practices<br>energy development and<br>asportation projects   | M        |

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| Sclerocac                   | ctus mesae-     | Population  | Status      | Population Trend                                     | Distribution                         | Type        | Habitat  | Primary  |
|-----------------------------|-----------------|-------------|-------------|--|--------------------------------------|-------------|--|----------|
| verdae                      |                 | Low         | D           | Unknown  | Colorado Plateau                     | P           | Barrens Saltbrush Fans and Flats   | <b>✓</b> |
| Mesa Verde                  | hookless cactus |             |             |  |                                      |             | Sandrush Fans and Flats  |          |
| Tier 1                      | Plants          |             |             |  |                                      |             |  |          |
| General Thre                | at              | Specific Th | reat        |  | General Conservation Action          | Spe         | ecific Conservation Action   | Priority |
| Climate                     |                 | poor disper | sal capac   | movement barriers,<br>ity, and/or<br>pitat features  | Ex-situ Conservation                 |             | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                     |                 | Habitat shi | _           | alteration due to                                    | Planning and Zoning                  | res         | odel potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs | Н        |
| Climate                     |                 | _           | tself and/  | se to climate change<br>or inter-dependent           | Research and Monitoring              | and<br>clir | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)     | Н        |
| Direct Consu<br>(Mortality) | mptive Use      | Gathering/0 | Collecting  | <u> </u>   | Compliance and Enforcement           | Ent         | force collecting regulations   | Н        |
| Lack of know                | vledge          | Complete d  | listributio | n in Colorado  | Research and Monitoring              |             | nduct field inventory to refine known tribution  | n H      |
| Climate                     |                 |             | f normal    | ntensification or<br>weather patterns,<br>los, etc.) | Capacity Building and<br>Cooperation | ,           | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Lack of know                | vledge          | Population  | status un   | known  | Research and Monitoring              | Mo          | onitor population status   | M        |
| Natural Facto               | ors             | Insect herb | ivory       |  | Research and Monitoring              | Mo          | onitor population status   | M        |
| Direct Consu<br>(Mortality) | mptive Use      | Gathering/0 | Collecting  | ;  | Education and Communication          | edu         | blish educational material/sponsor<br>acational programs to raise public<br>areness  | L        |

| Sisyrinch                    | ium pallidum      | Population St                                    | atus     | Population Trend                                    | Distribution  | Гуре             | Habitat  | Primary  |
|------------------------------|-------------------|--|----------|---|---|------------------|--|----------|
| •                            | 1                 | Low  | D        | Unknown   | Southern Rocky Mountains  | P                | Grass/Forb Dominated Wetlands  | <b>✓</b> |
| Pale blue-eye                | ed-grass          |  |          |   |   |                  |  |          |
| Tier 2                       | Plants            |  |          |   |   |                  |  |          |
| General Thre                 | at                | Specific Threa                                   | ıt       |   | General Conservation Action   | Spe              | ecific Conservation Action   | Priority |
|                              |                   |  |          |   | Land Protection (Public, Private)<br>Easements, and Resource Rights | hab<br>Res       | ablish legal designation to protect<br>bitat (e.g., Special Interest Area,<br>search Natural Area, Area of Critical<br>vironmental Concern, state Natural<br>ea) | Н        |
| Climate                      |                   | Vulnerability of poor dispersal restriction to r | capaci   | ty, and/or  | Ex-situ Conservation  |                  | ed banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate                      |                   | Habitat shiftin<br>climate change                | _        | lteration due to                                    | Planning and Zoning   | res <sub>j</sub> | del potential habitat/range shifts in<br>ponse to projected climate changes<br>I prepare adaptation plan to define in<br>a and ex situ conservation needs        | Н        |
| Climate                      |                   |  | lf and/o | e to climate change<br>or inter-dependent           | Research and Monitoring   | and<br>clir      | nduct primary research on rare plant<br>I pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)           | Н        |
| Habitat Degra                | adation           | Altered hydrol<br>aquifer)                       | logical  | regime (surface or                                  | Maintain or Restore Natural<br>Processes                            | Res              | store natural hydrologic regime  | Н        |
| Resource Ext                 | raction           | Peat mining                                      |          |   | Land Protection (Public, Private)<br>Easements, and Resource Rights |                  | quire conservation easement for<br>bitat protection  | Н        |
| Resource Ext                 | raction           | Peat mining                                      |          |   | Voluntary Standards   |                  | plement Best Management Practices mining   | Н        |
| Climate                      |                   |  | ormal v  | ntensification or<br>weather patterns,<br>os, etc.) | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Indirect Cons<br>(Mortality) | sumptive Use      | Grazing  |          |   | Compatible Resource Use   |                  | plement compatible grazing nagement  | M        |
| Lack of know                 | vledge            | Threats and re<br>poorly underst                 |          | to change are                                       | Research and Monitoring   |                  | search species/habitat response to nagement or disturbance   | M        |
| Lack of know                 | vledge            | Complete distr<br>unknown                        | ributior | n in Colorado                                       | Research and Monitoring   |                  | nduct field inventory to refine known tribution  | M        |
| Non-consump                  | ptive Disturbance | Recreation                                       |          |   | Education and Communication   | edu              | olish educational material/sponsor<br>acational programs to raise public<br>areness  | M        |

| Spiranthes diluvialis | Population                 | 1 Status    | Population                                    | Trend   | Distribution  | Type             | Habitat   | Primary  |
|-----------------------|----------------------------|-------------|---|---------|---|------------------|---|----------|
| 1                     | Low                        | D           | Declining                                     | D       | Front Range   | P                | Grass/Forb Dominated Wetlands   | <b>✓</b> |
| TT4- 1- 4:? 4         |                            |             |   |         | Southern Rocky Mountains  | P                |   |          |
| Ute ladies'-tresses   |                            |             |   |         | Central Shortgrass Prairie  | O                |   |          |
| Tier 1 Plants         |                            |             |   |         | Utah-Wyoming Rocky<br>Mountains                                     | О                |   |          |
| General Threat        | Specific Th                | reat        |   |         | General Conservation Action   | Spe              | ecific Conservation Action  | Priority |
|                       |                            |             |   |         | Protected Area Management   |                  | nage public use to be compatible<br>h biodiversity  | Н        |
| Climate               | poor disper                | sal capac   | movement ba<br>ity, and/or<br>pitat features  | rriers, | Ex-situ Conservation  |                  | d banking (incl. protocols,<br>lection, and cultivation)  | Н        |
| Climate               | Habitat shi<br>climate cha | C           | alteration due                                | to      | Planning and Zoning   | res <sub>j</sub> | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate               |                            | tself and/  | se to climate<br>or inter-deper               |         | Research and Monitoring   | and<br>clir      | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Habitat Degradation   | Altered hyd<br>aquifer)    | drological  | regime (surf                                  | ace or  | Compliance and Enforcement  | Enf              | Force 404 wetlands regulations  | Н        |
| Habitat Degradation   | Altered hyd<br>aquifer)    | drological  | regime (surf                                  | ace or  | Maintain or Restore Natural<br>Processes                            | Res              | store natural hydrologic regime   | Н        |
|                       |                            |             |   |         | Research and Monitoring   | Mo               | nitor population status   | M        |
| Climate               |                            | f normal    | ntensification<br>weather patte<br>los, etc.) |         | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive nning and conservation programs  | M        |
| Habitat Conversion    | Housing, u                 |             | ex-urban                                      |         | Land Protection (Public, Private)<br>Easements, and Resource Rights | *                | quire conservation easement for itat protection   | M        |
| Lack of knowledge     | Complete d<br>unknown      | listributio | n in Colorado                                 | )       | Research and Monitoring   |                  | nduct field inventory to refine known ribution  | M        |

| Teleson                                      | ix jamesii         | Population S   |                              | Population Trend  | Distribution   | Туре   | Habitat  | Primary  |
|--|--------------------|--|------------------------------|---|--|--|--|----------|
|  |                    | Medium   | D                            | Unknown   | Southern Rocky Mountains                               | P  | Cliff and Canyon<br>Meadow Tundra  |          |
| James teles                                  | sonix              |  |                              |   |  |  | Mixed Conifer  |          |
| Tier 2                                       | Plants             |  |                              |   |  |  |  |          |
| General Th                                   | reat               | Specific Three   |                              |   | General Conservation Action                            |  | ecific Conservation Action   | Priorit  |
| Climate                                      |                    | Vulnerability<br>poor dispersal<br>restriction to a                        | capac                        |   | Ex-situ Conservation                                   | See<br>coll  | Н  |          |
| Climate                                      |                    | Habitat shiftir<br>climate chang   | _                            | alteration due to   | Planning and Zoning                                    | Mo<br>resp<br>and<br>situ  | Н  |          |
| Climate                                      |                    |  | lf and/                      | se to climate change<br>or inter-dependent                      | Research and Monitoring                                | and<br>clin  | nduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>spersal mechanisms, mutualisms)   | Н        |
| Lack of kno                                  | owledge            | Threats and re<br>poorly unders  | •                            | e to change are   | Research and Monitoring                                |  | search species/habitat response to nagement or disturbance   | Н        |
| Lack of kno                                  | owledge            | Complete dist<br>unknown   | ributio                      | n in Colorado   | Research and Monitoring                                |  | nduct field inventory to refine known<br>ribution  | Н        |
| Lack of kno                                  | owledge            | Population sta   | itus un                      | known   | Research and Monitoring                                | Mo   | nitor population status  | Н        |
| Climate                                      |                    |  | ormal                        | ntensification or<br>weather patterns,<br>los, etc.)            | Capacity Building and<br>Cooperation                   |  | gage in collaborative, proactive<br>nning and conservation programs  | M        |
| Non-consu                                    | mptive Disturbance | Recreation   | ,                            |   | Education and Communication                            | Publish educational material/sponsor<br>educational programs to raise public<br>awareness                                  |  | M        |
| Thalictr                                     | ·um                | Population S   | tatus                        | Population Trend  | Distribution   | Type   | Habitat  | Primary  |
| heliophi                                     | ilum               | Medium   | D                            | Stable D  | Utah High Plateau                                      | P  | Barrens  | <b>✓</b> |
| -  | meadow rue         |  |                              |   | Southern Rocky Mountains                               | O  |  |          |
| Tier 2                                       | Plants             |  |                              |   |  |  |  |          |
| General Th                                   |                    | Specific Three   | at                           |   | General Conservation Action                            | Spe  | ecific Conservation Action   | Priority |
| ounerur Til                                  |                    | Specific Time  |                              |   | Research and Monitoring                                |  | nitor population status  | Н        |
| Climate                                      |                    | Vulnerability<br>poor dispersal<br>restriction to i                        | capac                        | ity, and/or   | Ex-situ Conservation                                   | See  | d banking (incl. protocols, lection, and cultivation)  | Н        |
| Climate                                      |                    | Habitat shiftir climate chang  | -                            | alteration due to   | Planning and Zoning                                    | resp<br>and  | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs  | Н        |
| Climate                                      |                    |  |                              | se to climate change or inter-dependent                         | Research and Monitoring                                | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors |  | Н        |
|  |                    | species unkno  |                              | or mer dependent  |  | (dis   | spersal mechanisms, mutualisms)  |          |
| Invasive or                                  | Exotic Species     |  | own                          |   | Invasive Species Control and<br>Prevention             | (dis   | spersal mechanisms, mutualisms) nitor for the presence of noxious eds and implement weed control nediately if detected   | Н        |
|  |                    | species unkno  | own                          | •   | -  | (dis<br>Mo<br>wee<br>imm<br>Imp<br>for   | nitor for the presence of noxious<br>eds and implement weed control<br>nediately if detected<br>olement Best Management Practices<br>energy development and mining                                     | Н        |
| Resource E                                   |                    | Invasive plant Oil and gas dr Climate varial                               | ewn  ts  rilling,  bility (i | and oil shale mining<br>intensification or<br>weather patterns, | Prevention   | (dis   | nitor for the presence of noxious<br>eds and implement weed control<br>nediately if detected<br>blement Best Management Practices  |          |
| Invasive or Resource E Climate Lack of known | extraction         | Invasive plant Oil and gas dr Climate varial alteration of re.g., droughts | rilling, bility (i           | and oil shale mining<br>intensification or<br>weather patterns, | Prevention  Voluntary Standards  Capacity Building and | (dis   | nitor for the presence of noxious<br>eds and implement weed control<br>nediately if detected<br>olement Best Management Practices<br>energy development and mining<br>gage in collaborative, proactive | Н        |

 $X = Best \ professional \ judgement, \ D = Science-based \ decision, \ P = Primary \ area \ of \ distribution, \ O = Other \ areas \ where \ species \ occurs.$ 

| Thelypodiopsis                          | Population Status  | Population Trend   | Distribution  | Type             | Habitat   | Primary  |
|---|--|--------------------|---|------------------|---|----------|
| juniperorum                             | Unknown  | Unknown            | Colorado Plateau  | P                | Pinyon-Juniper  | <b>✓</b> |
| , <u>-</u>                              |  |                    | Southern Rocky Mountains  | O                | Sagebrush   |          |
| Juniper tumble mustard                  |  |                    | Utah High Plateau   | O                |   |          |
| Tier 2 Plants General Threat            | Specific Threat  |                    | General Conservation Action   | Cma              | ecific Conservation Action  | Priority |
| Climate                                 | Vulnerability due to   | maxamant harriars  | Ex-situ Conservation  |                  | ed banking (incl. protocols,  | H        |
| Cimate                                  | poor dispersal capac<br>restriction to rare hal                          | ity, and/or        | Ex-situ Conseivation  |                  | dection, and cultivation)   | п        |
| Climate                                 | Habitat shifting and climate change                                      | alteration due to  | Planning and Zoning   | res <sub>l</sub> | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs | Н        |
| Climate                                 | Phenological respon<br>of species itself and/<br>species unknown         |                    | Research and Monitoring   | and<br>clin      | nduct primary research on rare plant<br>pollinator responses to changing<br>mate, and other vulnerability factors<br>spersal mechanisms, mutualisms)  | Н        |
| Lack of knowledge                       | Threats and response poorly understood                                   | e to change are    | Research and Monitoring   |                  | search species/habitat response to nagement or disturbance  | Н        |
| Lack of knowledge                       | Biology, ecology, an are poorly known                                    | d detailed habitat | Research and Monitoring   |                  | search critical life history/habitat<br>inponents   | Н        |
| Lack of knowledge                       | Population status un   | known              | Research and Monitoring   | Mo               | nitor population status   | Н        |
| Lack of knowledge                       | Complete distributio unknown   | n in Colorado      | Research and Monitoring   |                  | nduct field inventory to refine known ribution  | Н        |
| Climate                                 | Climate variability (i<br>alteration of normal<br>e.g., droughts, tornad | weather patterns,  | Capacity Building and<br>Cooperation                                |                  | gage in collaborative, proactive<br>nning and conservation programs   | M        |
| Habitat Conversion                      | Housing, urban, and development  | ex-urban           | Land Protection (Public, Private)<br>Easements, and Resource Rights | ,                | quire conservation easement for itat protection   | M        |
| Indirect Consumptive Use<br>(Mortality) | Grazing  |                    | Compatible Resource Use   |                  | plement compatible grazing nagement   | M        |
| Non-consumptive Disturbance             | Motor-powered recre  | eation             | Compliance and Enforcement  | Ma               | nage off-road travel  | M        |
| Invasive or Exotic Species              | Invasive plants  |                    | Invasive Species Control and Prevention                             |                  | plement integrated weed/pest<br>nagement plan   | L        |
| Resource Extraction                     | Oil and gas drilling   |                    | Voluntary Standards   |                  | plement Best Management Practices energy development and mining   | L        |

| Thelypodium                          | Population Status Population 7   | Trend   | Habitat   | Primary       |
|--------------------------------------|--|---|---|---------------|
| paniculatum                          | Unknown Unknown  |   | Grass/Forb Dominated Wetlands   | ✓             |
| Northwestern thelypody               |  |   |   |               |
| Tier 2 Plants                        |  |   |   |               |
| General Threat                       | Specific Threat  | General Conservation Action   | Specific Conservation Action  | Priority      |
| Climate                              | Vulnerability due to movement bar<br>poor dispersal capacity, and/or<br>restriction to rare habitat features | riers, Ex-situ Conservation   | Seed banking (incl. protocols, collection, and cultivation)   | Н             |
| Climate                              | Habitat shifting and alteration due climate change   | to Planning and Zoning  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н             |
| Climate                              | Phenological response to climate confusion of species itself and/or inter-dependences unknown                |   | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н             |
| Lack of knowledge                    | Threats and response to change are poorly understood   | Research and Monitoring   | Research species/habitat response to management or disturbance  | Н             |
| Lack of knowledge                    | Biology, ecology, and detailed hab are poorly known  | itat Research and Monitoring  | Research critical life history/habitat components   | Н             |
| Lack of knowledge                    | Complete distribution in Colorado unknown  | Research and Monitoring   | Conduct field inventory to refine known distribution  | н Н           |
| Lack of knowledge                    | Population status unknown  | Research and Monitoring   | Monitor population status   | Н             |
| Climate                              | Climate variability (intensification alteration of normal weather patter e.g., droughts, tornados, etc.)     |   | Engage in collaborative, proactive planning and conservation programs   | M             |
| Townsendia fendleri                  | Population Status Population 7   | Frend Distribution  | Type Habitat  | Primary       |
| Fendler's townsend-daisy             | Low D Unknown  | Central Shortgrass Prairie<br>Southern Rocky Mountains              | P Barrens<br>P  | <b>✓</b>      |
| •                                    |  |   |   |               |
| Tier 2 Plants General Threat         | Specific Threat  | General Conservation Action   | Specific Conservation Action  | Deioeity      |
| Climate                              | Specific Threat  Vulnerability due to movement bar   |   | Specific Conservation Action Seed banking (incl. protocols,   | Priority<br>H |
| Cilinate                             | poor dispersal capacity, and/or restriction to rare habitat features   | ners, Ex-situ Conservation  | collection, and cultivation)  | n             |
| Climate                              | Habitat shifting and alteration due climate change   | to Planning and Zoning  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define in<br>situ and ex situ conservation needs | Н             |
| Climate                              | Phenological response to climate c<br>of species itself and/or inter-depen-<br>species unknown               | 0   | Conduct primary research on rare plant<br>and pollinator responses to changing<br>climate, and other vulnerability factors<br>(dispersal mechanisms, mutualisms)    | Н             |
| Habitat Conversion                   | Housing, urban, and ex-urban development   | Land Protection (Public, Private)<br>Easements, and Resource Rights |   | Н             |
| Lack of knowledge                    | Population status unknown  | Research and Monitoring   | Monitor population status   | Н             |
| Climate                              | Climate variability (intensification alteration of normal weather patter e.g., droughts, tornados, etc.)     | 1 , 2   | Engage in collaborative, proactive planning and conservation programs   | M             |
| Invasive or Exotic Species           | Invasive plants  | Invasive Species Control and Prevention                             | Map weed infestations and sensitive no spray/no mow zones   | M             |
| Invasive or Exotic Species           | Invasive plants  | Invasive Species Control and Prevention                             | Implement integrated weed/pest management plan  | M             |
| Non-consumptive Disturbance          | Motor-powered recreation   | Compliance and Enforcement  | Manage off-road travel  | M             |
| Indirect Consumptive Use (Mortality) | Grazing  | Compatible Resource Use   | Implement compatible grazing management   | L             |

X = Best professional judgement, D = Science-based decision, P = Primary area of distribution, O = Other areas where species occurs.

| Townsendia glabella   | Population  | 1 Status  | Population Trend   | Distribution   | Type  | Habitat   | Primary            |  |
|---|---|---|--|--|---|---|--------------------|--|
|   | Low   | D   | Unknown  | Southern Rocky Mountains<br>Colorado Plateau   | P<br>O  | Barrens   | <b>✓</b>           |  |
| Gray's townsend-daisy   |   |   |  |  |   |   |                    |  |
| Tier 2 Plants   |   |   |  |  | -   |   |                    |  |
| General Threat  | Specific Th   |   |  | General Conservation Action  |   | cific Conservation Action   | Priority<br>H      |  |
| Climate   | poor disper   | sal capac   | movement barriers,<br>ity, and/or<br>bitat features  | Ex-situ Conservation   |   | Seed banking (incl. protocols, collection, and cultivation)   |                    |  |
| Climate   | Habitat shit<br>climate cha   | _   | alteration due to  | Planning and Zoning  | resp<br>and   | del potential habitat/range shifts in<br>conse to projected climate changes<br>prepare adaptation plan to define in<br>and ex situ conservation needs   | Н                  |  |
| Climate   |   | tself and/  | se to climate change<br>for inter-dependent  | Research and Monitoring  | and<br>clin   | aduct primary research on rare plant<br>pollinator responses to changing<br>nate, and other vulnerability factors<br>persal mechanisms, mutualisms)   | Н                  |  |
| Habitat Conversion  | Housing, undevelopmen   |   | ex-urban   | Land Protection (Public, Private)<br>Easements, and Resource Rights  |   | quire conservation easement for itat protection   | Н                  |  |
| Habitat Degradation   | Roads   |   |  | Voluntary Standards  | -   | element Best Management Practices transportation projects   | Н                  |  |
| Lack of knowledge   | Population  | status un   | known  | Research and Monitoring  | Mo  | nitor population status   | Н                  |  |
| Climate   |   | f normal  | intensification or<br>weather patterns,<br>dos, etc.)  | Capacity Building and Cooperation  | _   | gage in collaborative, proactive nning and conservation programs  | M                  |  |
|   |   | ~   |  |  |   |   |                    |  |
| Townsendia rothrockii   | Population  | 1 Status  | Population Trend   | Distribution   | Type  | Habitat   | Primary            |  |
| Townsendia rothrockii   | Population<br>Medium  | n Status<br>D   | Unknown  | Distribution Southern Rocky Mountains  | Type<br>P   | Habitat<br>Meadow Tundra  | Primary            |  |
| Townsendia rothrockii  Rothrock townsend-daisy  |   |   |  |  | * *   |   |                    |  |
|   |   |   |  |  | * *   | Meadow Tundra   |                    |  |
| Rothrock townsend-daisy   |   | D   |  |  | P   | Meadow Tundra   |                    |  |
| Rothrock townsend-daisy Tier 2 Plants   | Medium  Specific Th  Vulnerabili poor disper  | D<br>nreat<br>ity due to<br>rsal capac  | Unknown movement barriers,   | Southern Rocky Mountains   | P<br>Spe<br>See   | Meadow Tundra<br>Spruce-Fir   |                    |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat  | Medium  Specific Th  Vulnerabili poor disper restriction t  | D<br>nreat<br>ity due to<br>rsal capac<br>to rare ha  | Unknown  movement barriers, ity, and/or  | Southern Rocky Mountains  General Conservation Action  | Spe<br>See<br>coll<br>Mooresp   | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols,   | Priority           |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat Climate  | Medium  Specific Th  Vulnerabili poor disper restriction t  Habitat shii climate cha  | D<br>nreat<br>ity due to<br>real capactor rare ha<br>fting and<br>ange  | Unknown  movement barriers, ity, and/or bitat features alteration due to   | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  | P Spe See coll Mooresp and situ Cor and clim                              | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in   | Priority H         |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat Climate Climate  | Medium  Specific Th  Vulnerabili poor disper restriction t  Habitat shir climate cha  Phenologic of species i   | nreat<br>ity due to<br>sal capac<br>to rare ha<br>fting and<br>ange   | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent  | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  Planning and Zoning   | P Spe See coll Mooresp and situ Corr and clin (dis                        | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in sonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors  | Priority H         |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat Climate Climate Climate  | Medium  Specific Th  Vulnerabili poor disper restriction t  Habitat shir climate cha  Phenologic of species i species unk  Motor-pow  Climate var alteration o e.g., drougl   | nreat ity due to real capactor rare ha fiting and real respon tself and/ known rered recr riability (  f normal   | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent eation intensification or weather patterns, dos, etc.)                 | Southern Rocky Mountains  General Conservation Action  Ex-situ Conservation  Planning and Zoning  Research and Monitoring  | P Spe See coll Moorespand situ Cor and clin (dis Mai                      | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)   | Priority H         |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat Climate  Climate  Climate  Non-consumptive Disturbance                           | Medium  Specific Th  Vulnerabili poor disper restriction t  Habitat shit climate cha  Phenologic of species i species unk  Motor-pow  Climate var alteration o e.g., drougl  Threats and poorly under                         | nreat ity due to real capactor rare ha fiting and real respon tself and/ cnown rered recr riability (  f normal hts, tornad d response                                  | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent eation intensification or weather patterns, dos, etc.) e to change are | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Compliance and Enforcement Capacity Building and             | P Spe See coll Moorespand situ Cor and clin (dis Mai Engplar              | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nage off-road travel gage in collaborative, proactive   | Priority H H       |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat Climate  Climate  Climate  Non-consumptive Disturbance Climate                   | Medium  Specific Th  Vulnerabili poor disper restriction t  Habitat shit climate cha  Phenologic of species i species unk  Motor-pow  Climate var alteration o e.g., drougl  Threats and poorly under                         | nreat ity due to real capactor rare ha fiting and large al respon tself and/ known rered recr riability ( if normal hts, tornad d response                              | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent eation intensification or weather patterns, dos, etc.)                 | Southern Rocky Mountains  General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Compliance and Enforcement Capacity Building and Cooperation | P Spe See coll Moorespand situ Corrand clin (diss Man Engplar Res         | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nage off-road travel gage in collaborative, proactive ming and conservation programs earch species/habitat response to  | Priority H H H M   |  |
| Rothrock townsend-daisy Tier 2 Plants General Threat Climate Climate  Climate  Non-consumptive Disturbance Climate  Lack of knowledge | Medium  Specific Th  Vulnerabili poor disper restriction t  Habitat shir climate cha  Phenologic of species i species unk  Motor-pow  Climate var alteration o e.g., drough Threats and poorly unde  Biology, ec are poorly l | nreat ity due to real capactor rare ha fiting and large all respon teself and/ known rered recr riability (  if normal hts, tornad if response restood cology, ar known | movement barriers, ity, and/or bitat features alteration due to see to climate change for inter-dependent eation intensification or weather patterns, dos, etc.) e to change are | General Conservation Action Ex-situ Conservation  Planning and Zoning  Research and Monitoring  Compliance and Enforcement Capacity Building and Cooperation  Research and Monitoring  | P Spe See coll Moorespand situ Cor and clin (dis Mai Eng plar Res com Cor | Meadow Tundra Spruce-Fir  cific Conservation Action d banking (incl. protocols, ection, and cultivation)  del potential habitat/range shifts in conse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs aduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nage off-road travel tage in collaborative, proactive nning and conservation programs earch species/habitat response to nagement or disturbance earch critical life history/habitat | Priority H H M M M |  |

Table 4. Key Plant Habitats – Priorities, Threats, and Conservation Actions Sorted by Priority (High, Medium, Low), Habitat Type, and Habitat Name.

## Very High Priority Shrub Tundra Alpine

**Tier 1 Species** 

Species Common Name Primary

Eriogonum Colorado wild buckwheat coloradense

Castilleja puberula Downy Indian paintbrush

✓

San Juan whitlow-grass

**Tier 2 Species** 

| General Threat | Specific Threat                                       | General Conservation Action              | Specific Conservation Action  | Priority |
|----------------|---|--|---|----------|
| Climate        | Habitat shifting and alteration due to climate change | Legislation, Policies and<br>Regulations | Reduce CO2 emissions  | Н        |
| Climate        | Habitat shifting and alteration due to climate change | Research and Monitoring                  | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define<br>conservation needs | Н        |

Group

Plants

Plants

Plants

Draba graminea

## Very High Priority Exposed Rock (alpine) Tier 1 Species Tier 2 Species

Group Species Common Name Primary
Plants Oreoxis humilis Pikes Peak spring parsley
Plants Aliciella sedifolia Stonecrop gilia

✓

| Tier 2 species |                      |                           |          |
|----------------|----------------------|---------------------------|----------|
| Group          | Species              | Common Name               | Primary  |
| Plants         | Physaria alpina      | Avery Peak twinpod        |          |
| Plants         | Draba exunguiculata  | Clawless draba            |          |
| Plants         | Ipomopsis globularis | Globe gilia               |          |
| Plants         | Draba grayana        | Gray's Peak whitlow-grass |          |
| Plants         | Draba graminea       | San Juan whitlow-grass    | <b>✓</b> |

# Very High Priority Meadow Tundra Alpine Tier 1 Species Tier 2 Species

| Group  | Species                          | Common Name                | Primary  |
|--------|----------------------------------|----------------------------|----------|
| Plants | Botrychium tax. nov. "furcatum"  | Fork-leaved moonwort       | <b>✓</b> |
| Plants | Descurainia kenheilii            | Heil's tansy mustard       | <b>✓</b> |
| Plants | Eutrema edwardsii ssp. penlandii | Penland alpine fen mustard | <b>V</b> |
| Plants | Oreoxis humilis                  | Pikes Peak spring parsley  |          |
| Plants | Aliciella sedifolia              | Stonecrop gilia            | <b>~</b> |
| Plants | Physaria scrotiformis            | West Silver bladderpod     |          |

| Group  | Species                          | Common Name             | Primary  |
|--------|----------------------------------|-------------------------|----------|
| Plants | Draba exunguiculata              | Clawless draba          |          |
| Plants | Delphinium ramosum var. alpestre | Colorado larkspur       | <b>✓</b> |
| Plants | Machaeranthera coloradoensis     | Colorado tansy-aster    |          |
| Plants | Eriogonum coloradense            | Colorado wild buckwheat |          |
| Plants | Ipomopsis globularis             | Globe gilia             | <b>✓</b> |
| Plants | Telesonix jamesii                | James telesonix         |          |
| Plants | Townsendia rothrockii            | Rothrock townsend-daisy | <b>✓</b> |
| Plants | Saussurea weberi                 | Weber saussurea         | <b>✓</b> |

| General Threat      | Specific Threat                                       | General Conservation Action           | Specific Conservation Action  | Priority |
|---------------------|---|---------------------------------------|---|----------|
| Climate             | Habitat shifting and alteration due to climate change | Legislation, Policies and Regulations | Reduce CO2 emissions  | Н        |
| Climate             | Habitat shifting and alteration due to climate change | Research and Monitoring               | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define<br>conservation needs   | Н        |
| Habitat Degradation | Altered native vegetation                             | Recreation Management                 | Implement compatible recreation<br>management and trail network to avoid<br>development of social trails and<br>trampling of sensitive vegetation | L        |

## **Very High Priority**

## **Barrens**

## **Sparsely Vegetated**

## **Tier 1 Species**

| Group  | Species                             | Common Name                   | Primary  |
|--------|-------------------------------------|-------------------------------|----------|
| Plants | Corispermum navicula                | Boat-shaped bugseed           | <b>✓</b> |
| Plants | Eriogonum brandegeei                | Brandegee wild buckwheat      | <b>✓</b> |
| Plants | Physaria pulvinata                  | Cushion bladderpod            | <b>✓</b> |
| Plants | Phacelia submutica                  | DeBeque phacelia              | <b>✓</b> |
| Plants | Lesquerella congesta                | Dudley Bluffs bladderpod      | ✓        |
| Plants | Penstemon gibbensii                 | Gibben's beardtongue          | ✓        |
| Plants | Cryptantha gypsophila               | Gypsum Valley cat's- eye      | ✓        |
| Plants | Gutierrezia elegans                 | Lone Mesa snakeweed           | ✓        |
| Plants | Sclerocactus mesae-<br>verdae       | Mesa Verde<br>hookless cactus | <b>✓</b> |
| Plants | Boechera glareosa                   | NA                            | <b>✓</b> |
| Plants | Phacelia formosula                  | North Park phacelia           | <b>✓</b> |
| Plants | Ipomopsis polyantha                 | Pagosa skyrocket              | <b>✓</b> |
| Plants | Penstemon debilis                   | Parachute penstemon           | ✓        |
| Plants | Physaria obcordata                  | Piceance twinpod              | <b>✓</b> |
| Plants | Physaria scrotiformis               | West Silver bladderpod        |          |
| Plants | Penstemon scariosus var. albifluvis | White River penstemon         | <b>✓</b> |

## **Tier 2 Species**

| Group  | Species                | Common Name              | Primary  |
|--------|------------------------|--------------------------|----------|
| Plants | Oenothera harringtonii | Arkansas Valley evening  | ✓        |
|        |                        | primrose                 |          |
| Plants | Physaria bellii        | Bell's twinpod           | <b>✓</b> |
| Plants | Lomatium concinnum     | Colorado desert-parsley  |          |
| Plants | Astragalus debequaeus  | DeBeque milkvetch        | <b>✓</b> |
| Plants | Townsendia fendleri    | Fendler's townsend-daisy | <b>✓</b> |
| Plants | Nuttallia chrysantha   | Golden blazing star      | <b>✓</b> |
| Plants | Penstemon grahamii     | Graham beardtongue       | <b>✓</b> |
| Plants | Townsendia glabella    | Gray's townsend-daisy    | <b>✓</b> |
| Plants | Oreocarya osterhoutii  | Osterhout cat's-eye      | <b>✓</b> |
| Plants | Lesquerella pruinosa   | Pagosa bladderpod        | ✓        |
| Plants | Lupinus crassus        | Payson lupine            |          |
| Plants | Lesquerella parviflora | Piceance bladderpod      | ✓        |
| Plants | Oonopsis puebloensis   | Pueblo goldenweed        | ✓        |
| Plants | Mentzelia rhizomata    | Roan Cliffs blazing star | ✓        |
| Plants | Lesquerella calcicola  | Rocky Mountain           | ✓        |
|        |                        | bladderpod               |          |
| Plants | Physaria rollinsii     | Rollins twinpod          | ✓        |
| Plants | Oxybaphus              | Round-leaf four o'clock  | ✓        |
|        | rotundifolius          |                          |          |
| Plants | Thalictrum             | Sun-loving meadow rue    | <b>✓</b> |
|        | heliophilum            |                          |          |

| General Threat      | Specific Threat                          | General Conservation Action  | Specific Conservation Action          | Priority |
|---------------------|--|--|---------------------------------------|----------|
| Habitat Conversion  | Housing, urban, and ex-urban development | Land Protection (Public, Private),<br>Easements, and Resource Rights |                                       | Н        |
|                     |  |  | purpose                               |          |
| Habitat Degradation | Oil and gas development                  | Compatible Resource Use  | Implement compatible mining practices | Н        |

## **High Priority**

## Pinyon-Juniper

## Forestlands

## **Tier 1 Species**

| Group  | Species                                       | Common Name                 | Primary     |
|--------|---|-----------------------------|-------------|
| Plants | Lygodesmia<br>doloresensis                    | Dolores River skeletonplant | <b>\</b>    |
| Plants | Penstemon gibbensii                           | Gibben's beardtongue        |             |
| Plants | Cryptantha gypsophila                         | Gypsum Valley cat's- eye    | <b>&gt;</b> |
| Plants | Astragalus<br>lonchocarpus<br>var. hamiltonii | Hamilton milkvetch          | >           |
| Plants | Pediocactus knowltonii                        | Knowlton cactus             | <b>~</b>    |
| Plants | Hackelia gracilenta                           | Mesa Verde stickseed        | <b>✓</b>    |
| Plants | Astragalus schmolliae                         | Schmoll milkvetch           | <b>✓</b>    |
| Plants | Astragalus<br>microcymbus                     | Skiff milkvetch             |             |
| Plants | Erigeron wilkenii                             | Wilken fleabane             |             |

## **Tier 2 Species**

| Group  | Species                                | Common Name                | Primary  |
|--------|--|----------------------------|----------|
| Plants | Nuttallia densa                        | Arkansas Canyon stickleaf  | <b>✓</b> |
| Plants | Oxytropis besseyi var. obnapiformis    | Bessey locoweed            |          |
| Plants | Herrickia horrida                      | Canadian River spiny aster | <b>✓</b> |
| Plants | Astragalus debequaeus                  | DeBeque milkvetch          | <b>✓</b> |
| Plants | Penstemon degeneri                     | Degener beardtongue        | <b>✓</b> |
| Plants | Asclepias uncialis ssp. uncialis       | Dwarf milkweed             |          |
| Plants | Camissonia<br>eastwoodiae              | Eastwood evening primrose  |          |
| Plants | Astragalus piscator                    | Fisher Towers milkvetch    |          |
| Plants | Nuttallia chrysantha                   | Golden blazing star        |          |
| Plants | Lesquerella vicina                     | Good-neighbor bladderpod   | <b>✓</b> |
| Plants | Penstemon grahamii                     | Graham beardtongue         |          |
| Plants | Opuntia heacockiae                     | Heacock's prickly-pear     | <b>✓</b> |
| Plants | Astragalus equisolensis                | Horseshoe milkvetch        | <b>✓</b> |
| Plants | Thelypodiopsis juniperorum             | Juniper tumble mustard     | <b>✓</b> |
| Plants | Aletes macdougalii ssp. breviradiatus  | Mesa Verde aletes          | <b>✓</b> |
| Plants | Astragalus naturitensis                | Naturita milkvetch         | <b>✓</b> |
| Plants | Lupinus crassus                        | Payson lupine              | <b>✓</b> |
| Plants | Penstemon scariosus var. cyanomontanus | Plateau penstemon          | <b>V</b> |
| Plants | Astragalus rafaelensis                 | San Rafael milkvetch       | <b>✓</b> |

| General Threat      | Specific Threat   | General Conservation Action | Specific Conservation Action                              | Priority |
|---------------------|---|-----------------------------|---|----------|
| Habitat Conversion  | Housing, urban, and ex-urban development  | Planning and Zoning         | Promote zoning that concentrates use and protects habitat | M        |
| Habitat Degradation | Altered native vegetation (riparian area<br>deforestation, woody encroachment,<br>chaining sagebrush, seral stage<br>imbalance, etc.) | Compatible Resource Use     | Implement compatible grazing management                   | M        |
| Habitat Degradation | Oil and gas development   | Compatible Resource Use     | Implement compatible mining practices                     | M        |

## **High Priority**

## **Douglas Fir**

## Forestlands

Tier 1 Species

| Group  | Species                             | Common Name      | Primary |
|--------|-------------------------------------|------------------|---------|
| Plants | Aquilegia chrysantha var. rydbergii | Golden columbine |         |
|        |                                     |                  |         |

**Tier 2 Species** 

| General Threat      | Specific Threat                          | General Conservation Action  | Specific Conservation Action   | Priority |
|---------------------|--|--|--|----------|
| Habitat Degradation | Altered fire regime                      | Maintain or Restore Natural<br>Processes                             | Restore natural fire regime  | M        |
| Habitat Conversion  | Housing, urban, and ex-urban development | Land Protection (Public, Private),<br>Easements, and Resource Rights | Purchase habitat or Acquire conservation easement for conservation purpose | L        |

## **High Priority**

## **Eastern Plains Streams**

## Riparian/Wetlands

## **Tier 1 Species**

| Group  | Species                             | Common Name              | Primary  |
|--------|-------------------------------------|--------------------------|----------|
| Plants | Gaura neomexicana ssp. coloradensis | Colorado butterfly plant | <b>✓</b> |
|        |                                     |                          |          |

| Group        | Species                             | Common Name                | Primary  |          |
|--------------|-------------------------------------|----------------------------|----------|----------|
| Plants       | Gaura neomexicana ssp. coloradensis | a Colorado butterfly plant | <b>✓</b> | _        |
| General Thre | at G                                | Specific Threat            | G        | eneral ( |

| General Threat             | Specific Threat                              | General Conservation Action              | Specific Conservation Action                                    | Priority |
|----------------------------|--|--|---|----------|
| Habitat Degradation        | Altered hydrological regime ( aquifer)       | Maintain or Restore Natural<br>Processes | Reduce ground-water pumping                                     | Н        |
| Habitat Degradation        | Altered hydrological regime (surface )       | Maintain or Restore Natural<br>Processes | Adjust operation of dam   | M        |
| Habitat Degradation        | Decreased water quality                      | Maintain or Restore Natural<br>Processes | Improve erosion and excess sedimentation conditions             | M        |
| Invasive or Exotic Species | Invasive plants - tamarisk and Russian Olive | Invasive Species Control and Prevention  | Implement integrated weed/pest management plan                  | M        |
| Pollution                  | Herbicide/pesticide spraying or runoff       | Voluntary Standards                      | Implement Best Management Practices for agricultural production | M        |
| Pollution                  | Nutrient loads                               | Voluntary Standards                      | Implement Best Management Practices for agricultural production | M        |

## **High Priority**

## **Grass/Forb Dominated Wetlands**

## Riparian/Wetlands

**Tier 1 Species** 

| Group  | Species                             | Common Name              | Primary  |
|--------|-------------------------------------|--------------------------|----------|
| Plants | Mimulus gemmiparus                  | Budding monkey flower    |          |
| Plants | Gaura neomexicana ssp. coloradensis | Colorado butterfly plant | ✓        |
| Plants | Spiranthes diluvialis               | Ute ladies'-tresses      | <b>✓</b> |

## **Tier 2 Species**

**Tier 2 Species** 

| Group  | Species                 | Common Name            | Primary  |
|--------|-------------------------|------------------------|----------|
| Plants | Oenothera acutissima    | Narrow-leaf            | <b>✓</b> |
|        |                         | evening primrose       |          |
| Plants | Thelypodium paniculatum | Northwestern thelypody | <b>✓</b> |
| Plants | Sisyrinchium pallidum   | Pale blue-eyed-grass   | <b>✓</b> |
| Plants | Puccinellia parishii    | Parish's alkali grass  | <b>✓</b> |
| Plants | Ptilagrostis porteri    | Porter feathergrass    | <b>~</b> |
| Plants | Cleome multicaulis      | Slender spiderflower   | <b>~</b> |

| General Threat             | Specific Threat                                  | General Conservation Action              | Specific Conservation Action                   | Priority |
|----------------------------|--|--|--|----------|
| Habitat Degradation        | Altered hydrological regime (surface or aquifer) | Maintain or Restore Natural<br>Processes | Restore natural hydrological regime            | Н        |
| Invasive or Exotic Species | Invasive plants                                  | Invasive Species Control and Prevention  | Implement integrated weed/pest management plan | Н        |
| Indirect Consumptive Use   | Incompatible grazing                             | Compatible Resource Use                  | Implement compatible grazing management        | M        |

## **High Priority**

Group

Plants

## **Mountain Streams**

## Riparian/Wetlands **Tier 2 Species**

## **Tier 1 Species**

| Species      | Common Name   | Primary  |
|--------------|---------------|----------|
| Draba weberi | Weber's draba | <b>✓</b> |

| Group  | Species                             | Common Name        | Primary  |
|--------|-------------------------------------|--------------------|----------|
| Plants | Aquilegia chrysantha var. rydbergii | Golden columbine   | <b>✓</b> |
| Plants | Carex stenoptila                    | Small-winged sedge | <b>✓</b> |

| General Threat             | Specific Threat                                  | General Conservation Action              | Specific Conservation Action                   | Priority |
|----------------------------|--|--|--|----------|
| Invasive or Exotic Species | Invasive plants                                  | Invasive Species Control and Prevention  | Implement integrated weed/pest management plan | M        |
| Habitat Degradation        | Altered hydrological regime (surface or aquifer) | Maintain or Restore Natural<br>Processes | Adjust operation of dam and ditches            | L        |
| Invasive or Exotic Species | Invasive animals                                 | Invasive Species Control and Prevention  | Control non-native fish                        | L        |

| 1 abic     | r Continucu.                         |   |         |                                |                              |                       |   |          |
|------------|--------------------------------------|---|---------|--------------------------------|------------------------------|-----------------------|---|----------|
| I          | High Priority                        |   |         | <u>Playas</u>                  |                              |                       | Riparian/W  | etlands  |
|            | Ti                                   | ier 1 Species   |         |                                |                              | Tier 2                | 2 Species   |          |
|            |                                      |   |         | Group                          | Species                      |                       | Common Name   | Primary  |
|            |                                      |   |         | Plants                         | Cleome mul                   | lticaulis             | Slender spiderflower                                |          |
| General T  | hreat                                | Specific Threat   |         | General Conserv                | ation Action                 | Specific              | Conservation Action                                 | Priority |
| Habitat C  | onversion                            | Conversion to cropland  |         | Maintain or Rest               | tore Habitat                 | Restore r             | native prairie                                      | Н        |
| Lack of k  | nowledge                             | Complete distribution in Colorac unknown  | do      | Research and Mo                | onitoring                    | Conduct<br>distributi | field inventory to refine know on                   | n H      |
| Habitat D  | egradation                           | Replace ephemeral playa with lotterm water catchment  | onger-  | Maintain or Rest               | tore Habitat                 | Restore p             | olaya   | M        |
| I          | High Priority                        | Shr   | ub-dor  | ninated We                     | tlands_                      |                       | Riparian/W  | etlands  |
|            | Ti                                   | ier 1 Species   |         |                                |                              | Tier                  | 2 Species   |          |
| Group      | Species                              | Common Name   | Primary | Group                          | Species                      |                       | Common Name   | Primary  |
| Plants     | Gaura neomexica                      | J I   |         | Plants                         | Salix arizon                 | nica                  | Arizona willow                                      | <b>✓</b> |
|            | ssp. coloradensis                    | <u> </u>  |         | Plants                         | Carex steno                  | ptila                 | Small-winged sedge                                  | <b>✓</b> |
| General T  | hreat                                | Specific Threat   |         | General Conserv                | ation Action                 | Specific              | Conservation Action                                 | Priority |
| Habitat D  | egradation                           | Altered native vegetation (riparia<br>deforestation, woody encroachm<br>chaining sagebrush, seral stage<br>imbalance, etc.) |         | Maintain or Rest               | tore Habitat                 |                       | grazing for compatible<br>n height, structure, etc. | Н        |
| Invasive o | or Exotic Species                    | Invasive plants - tamarisk  |         | Invasive Species<br>Prevention | Control and                  | Impleme               | nt integrated weed/pest<br>nent plan                | Н        |
| Habitat D  | egradation                           | Altered hydrological regime (sur aquifer)   |         | Maintain or Rest<br>Processes  | tore Natural                 | Adjust o              | peration of dam and ditches                         | M        |
| Invasive o | r Exotic Species                     | Invasive plants   |         | Invasive Species<br>Prevention | Control and                  | Implement<br>managen  | nt integrated weed/pest<br>nent plan                | M        |
| I          | High Priority                        |   | Seeps   | and Spring                     | <u>ts</u>                    |                       | Riparian/W  | etlands  |
|            | Ti                                   | ier 1 Species   |         | _                              |                              | Tier                  | 2 Species   |          |
| Group      | Species                              | Common Name   | Primary | Group                          | Species                      |                       | Common Name   | Primary  |
| Plants     | Mimulus gemmi                        | •   | ~       | Plants                         | Limnorchis                   | zothecina             | Alcove bog orchid                                   |          |
| Plants     | Gaura neomexica<br>ssp. coloradensis | <b>7</b> 1  |         | Plants                         | Aquilegia cl<br>var. rydberg | -                     | Golden columbine                                    |          |
| General T  | hreat                                | Specific Threat   |         | General Conserv                | ation Action                 | Specific              | Conservation Action                                 | Priority |
| Habitat D  | egradation                           | Invasive or exotic species  |         | Invasive Species<br>Prevention | Control and                  | managen               |   | M        |
| Habitat D  | egradation                           | Invasive or exotic species  |         | Invasive Species<br>Prevention | Control and                  | _                     | d infestations and sensitive no<br>mow zones        | о М      |
| Habitat D  | egradation                           | Altered hydrological regime (sur aquifer)   |         | Maintain or Rest<br>Processes  | tore Natural                 | Restore r             | natural hydrological regime                         | M        |

Group

Plants

Plants

Plants

Plants

Plants

Plants

Plants

## **High Priority**

Species

Eriogonum pelinophilum

Lygodesmia doloresensis

Astragalus lonchocarpus var. hamiltonii

Aletes latilobus

Sclerocactus glaucus

Astragalus tortipes

Penstemon scariosus var. albifluvis

## **Sand Dunes Complex (Shrubland)**

**Shrublands** 

**Tier 1 Species** 

**Tier 2 Species** 

| General Threat     | Specific Threat        | General Conservation Action | Specific Conservation Action | Priority |
|--------------------|------------------------|-----------------------------|------------------------------|----------|
| Habitat Conversion | Conversion to cropland | Maintain or Restore Habitat | Re-seed native species       | Н        |

#### **High Priority Desert Shrub Shrublands Tier 2 Species**

**Tier 1 Species** 

| =                             |          |
|-------------------------------|----------|
| Common Name                   | Primary  |
| Canyonlands aletes            |          |
| Clay-loving<br>wild buckwheat | <b>~</b> |
| Colorado hookless cactus      | <b>✓</b> |
| Dolores River skeletonplant   |          |
| Hamilton milkvetch            |          |
| Sleeping Ute milkvetch        |          |
| White River penstemon         |          |

| Group  | Species                                | Common Name              | Primary  |
|--------|--|--------------------------|----------|
| Plants | Lepidium crenatum                      | Alkaline pepperwort      | <b>✓</b> |
| Plants | Eriogonum clavellatum                  | Comb Wash buckwheat      | <b>✓</b> |
| Plants | Caesalpinia repens                     | Creeping rush-pea        |          |
| Plants | Astragalus cronquistii                 | Cronquist milkvetch      | <b>✓</b> |
| Plants | Astragalus debequaeus                  | DeBeque milkvetch        |          |
| Plants | Astragalus piscator                    | Fisher Towers milkvetch  |          |
| Plants | Lesquerella vicina                     | Good-neighbor bladderpod |          |
| Plants | Oreocarya osterhoutii                  | Osterhout cat's-eye      |          |
| Plants | Penstemon scariosus var. cyanomontanus | Plateau penstemon        |          |

| General Threat     | Specific Threat                          | General Conservation Action  | Specific Conservation Action   | Priority |
|--------------------|--|--|--|----------|
| Habitat Conversion | Housing, urban, and ex-urban development | Land Protection (Public, Private),<br>Easements, and Resource Rights | Purchase habitat or Acquire conservation easement for conservation purpose | M        |
|                    |  |  | rr   |          |

## High Priority Sagebrush Shrublands

| Tier | 1 | <b>Species</b> |
|------|---|----------------|
| 1101 |   | Species        |

#### Group Common Name Primary Species Plants Eriogonum brandegeei Brandegee wild buckwheat Plants Physaria pulvinata Cushion bladderpod Plants Astragalus osterhoutii Kremmling milkvetch **V** Plants Gutierrezia elegans Lone Mesa snakeweed **V** Plants Penstemon penlandii Penland penstemon **V** Plants Astragalus Skiff milkvetch microcymbus

## **Tier 2 Species**

| Group  | Species                              | Common Name                     | Primary  |
|--------|--------------------------------------|---------------------------------|----------|
| Plants | Cirsium perplexans                   | Adobe thistle                   | <b>✓</b> |
| Plants | Lepidium crenatum                    | Alkaline pepperwort             |          |
| Plants | Oxytropis besseyi var. obnapiformis  | Bessey locoweed                 | <b>V</b> |
| Plants | Lomatium concinnum                   | Colorado desert-parsley         | <b>✓</b> |
| Plants | Boechera crandallii                  | Crandall's rock-cress           | <b>✓</b> |
| Plants | Astragalus debequaeus                | DeBeque milkvetch               |          |
| Plants | Penstemon fremontii var. glabrescens | Fremont's beardtongue           | <b>V</b> |
| Plants | Penstemon teucrioides                | Germander beardtongue           | <b>✓</b> |
| Plants | Astragalus anisus                    | Gunnison milkvetch              | <b>✓</b> |
| Plants | Thelypodiopsis juniperorum           | Juniper tumble mustard          |          |
| Plants | Oenothera acutissima                 | Narrow-leaf<br>evening primrose |          |
| Plants | Astragalus naturitensis              | Naturita milkvetch              |          |
| Plants | Mertensia humilis                    | Rocky Mountain bluebells        | <b>✓</b> |
| Plants | Astragalus iodopetalus               | Violet milkvetch                | <b>✓</b> |

| General Threat      | Specific Threat  | General Conservation Action  | Specific Conservation Action  | Priority |
|---------------------|--|--|---|----------|
| Habitat Degradation | Altered native vegetation (low forb and grass diversity) | Restore Habitat  | Re-seed native species  | Н        |
| Habitat Degradation | Altered native vegetation (low forb and grass diversity) | Compatible Resource Use  | Implement compatible grazing management   | Н        |
| Habitat Degradation | Oil and gas pipelines                                    | Planning and Zoning  | Promote consideration of biodiversity issues in transportation and land use planning processes  | Н        |
| Habitat Degradation | Fragmentation  | Voluntary Standards  | Implement Best Management Practices<br>for energy development and mining<br>(reduce footprint and/or extend<br>implementation timeline) | Н        |
| Habitat Conversion  | Housing, urban, and ex-urban development                 | Land Protection (Public, Private),<br>Easements, and Resource Rights | Purchase habitat or Acquire conservation easement for conservation purpose  | M        |
| Habitat Degradation | Altered native vegetation (juniper encroachment)         | Maintain or Restore Habitat  | Remove trees/shrubs   | M        |
| Habitat Degradation | Altered fire regime                                      | Maintain or Restore Natural<br>Processes                             | Restore natural fire regime   | M        |
| Habitat Degradation | Overhead utility lines and towers                        | Voluntary Standards  | Implement Best Management Practices<br>for energy development and mining<br>(bury or consolidate lines)                                 | M        |

## High Priority <u>Upland Shrub</u> Shrublands

Tier 1 Species

| lier 2 | Species |  |
|--------|---------|--|
|--------|---------|--|

| Group  | Species             | Common Name       | Primary | Group  | Species         | Common Name               | Primary |
|--------|---------------------|-------------------|---------|--------|-----------------|---------------------------|---------|
| Plants | Penstemon penlandii | Penland penstemon |         | Plants | Nuttallia densa | Arkansas Canyon stickleaf |         |
|        |                     |                   |         | Plants | Draba smithii   | Smith whitlow-grass       |         |
|        |                     |                   |         |        |                 |                           |         |

| General Threat      | Specific Threat                          | General Conservation Action  | Specific Conservation Action   | Priority |
|---------------------|--|--|--|----------|
| Habitat Conversion  | Housing, urban, and ex-urban development | Land Protection (Public, Private),<br>Easements, and Resource Rights | Purchase habitat or Acquire conservation easement for conservation purpose | Н        |
| Habitat Degradation | Altered fire regime                      | Maintain or Restore Natural<br>Processes                             | Restore natural fire regime  | M        |
| Habitat Degradation | Recreation                               | Recreation Management  | Implement compatible recreation management                                 | M        |

Group

Plants

Group

Plants

## **High Priority**

## **Saltbrush Fans and Flats**

**Shrublands** 

| Tier | 1 | Species |
|------|---|---------|
| 1101 |   | Species |

| 1101 1              | Species         |         |
|---------------------|-----------------|---------|
| Species             | Common Name     | Primary |
| Sclerocactus mesae- | Mesa Verde      |         |
| verdae              | hookless cactus |         |

|        |                           | _                         |          |
|--------|---------------------------|---------------------------|----------|
| Group  | Species                   | Common Name               | Primary  |
| Plants | Cirsium perplexans        | Adobe thistle             |          |
| Plants | Eriogonum clavellatur     | m Comb Wash buckwheat     |          |
| Plants | Camissonia<br>eastwoodiae | Eastwood evening primrose | <b>V</b> |

**Tier 2 Species** 

| General Threat     | Specific Threat                          | General Conservation Action  | Specific Conservation Action                                       | Priority |
|--------------------|--|--|--|----------|
| Habitat Conversion | Housing, urban, and ex-urban development | Land Protection (Public, Private),<br>Easements, and Resource Rights | Purchase habitat or Acquire conservation easement for conservation | M        |
|                    |  |  | purpose  |          |

| High Priority  | <b>Deciduous Oak</b> |                | Shrublands |
|----------------|----------------------|----------------|------------|
| Tier 1 Species |                      | Tier 2 Species |            |

|                    | -                  |         |
|--------------------|--------------------|---------|
| Species            | Common Name        | Primary |
| Physaria pulvinata | Cushion bladderpod |         |

| Group  | Species   | Common Name        | Primary  |
|--------|---|--------------------|----------|
| Plants | Astragalus<br>missouriensis<br>var. humistratus | Missouri milkvetch | <b>V</b> |

| General Threat     | Specific Threat                          | General Conservation Action        | Specific Conservation Action                                       | Priority |
|--------------------|--|------------------------------------|--|----------|
| Habitat Conversion | Housing, urban, and ex-urban development | Land Protection (Public, Private), | Purchase habitat or Acquire conservation easement for conservation | M        |
|                    | development                              | Easements, and Resource Rights     | purpose  |          |

## **High Priority**

## **Cliff and Canyon**

## **Sparsely Vegetated**

## **Tier 1 Species**

| Group  | Species               | Common Name            | Primary  |
|--------|-----------------------|------------------------|----------|
| Plants | Mimulus gemmiparus    | Budding monkey flower  | ✓        |
| Plants | Aletes latilobus      | Canyonlands aletes     | ✓        |
| Plants | Astragalus deterior   | Cliff-palace milkvetch | ✓        |
| Plants | Astragalus humillimus | Mancos milkvetch       | ✓        |
| Plants | Erigeron wilkenii     | Wilken fleabane        | <b>✓</b> |

## **Tier 2 Species**

| Group  | Species                 | Common Name                | Primary  |
|--------|-------------------------|----------------------------|----------|
| Plants | Limnorchis zothecina    | Alcove bog orchid          | ✓        |
| Plants | Anticlea vaginatus      | Alcove death camas         | <b>✓</b> |
| Plants | Herrickia horrida       | Canadian River spiny aster |          |
| Plants | Telesonix jamesii       | James telesonix            | <b>✓</b> |
| Plants | Erigeron kachinensis    | Kachina daisy              | <b>✓</b> |
| Plants | Aletes humilis          | Larimer aletes             | <b>✓</b> |
| Plants | Astragalus naturitensis | Naturita milkvetch         | <b>✓</b> |
| Plants | Lesquerella parviflora  | Piceance bladderpod        |          |
| Plants | Potentilla rupincola    | Rocky Mountain cinquefoil  | <b>✓</b> |
| Plants | Draba smithii           | Smith whitlow-grass        | <b>✓</b> |
| Plants | Delphinium robustum     | Wahatoya Creek larkspur    | <b>✓</b> |

| General Threat      | Specific Threat                         | General Conservation Action | Specific Conservation Action             | Priority |
|---------------------|---|-----------------------------|--|----------|
| Habitat Degradation | Altered hydrological regime (surface or | Maintain or Restore Natural | Maintain or restore natural hydrological | M        |
|                     | aquifer)                                | Processes                   | regime                                   |          |

## **High Priority**

## Tier 1 Species

## **Exposed Rock**

## **Sparsely Vegetated**

## Tier 2 Species

| Group  | Species                      | Common Name          | Primary |
|--------|------------------------------|----------------------|---------|
| Plants | Machaeranthera coloradoensis | Colorado tansy-aster |         |
| Plants | Carex stenoptila             | Small-winged sedge   |         |

| General Threat              | Specific Threat  | General Conservation Action | Specific Conservation Action   | Priority |
|-----------------------------|--|-----------------------------|--|----------|
| Habitat Degradation         | Cave/mine closures                                       | Compliance and Enforcement  | Manage recreation and/or permitted activities (e.g., rock climing, grazing leases) | M        |
| Non-consumptive Disturbance | Non-motorized recreation (including caving and climbing) | Compliance and Enforcement  | Manage recreation and/or permitted activities (e.g., rock climing, grazing leases) | M        |

## Medium Priority Mixed Forest Forestlands

| Tier 1 Species | Tier 2 Species |
|----------------|----------------|
|----------------|----------------|

| Group  | Species              | Common Name            | Primary |
|--------|----------------------|------------------------|---------|
| Plants | Hackelia gracilenta  | Mesa Verde stickseed   |         |
| Plants | Cirsium scapanolepis | Mountain-slope thistle |         |
|        |                      |                        |         |

| Group  | Species                | Common Name         | Primary |
|--------|------------------------|---------------------|---------|
| Plants | Draba smithii          | Smith whitlow-grass |         |
| Plants | Astragalus iodopetalus | Violet milkvetch    |         |
|        |                        |                     |         |

# Medium Priority Tier 1 Species Group Species Common Name Primary Plants Carex stenoptila Small-winged sedge Description of the specific Threat General Conservation Action Specific Conservation Action Priority Forestlands Tier 2 Species Common Name Primary Plants Carex stenoptila Small-winged sedge

| General Threat | Specific Threat                                       | General Conservation Action           | Specific Conservation Action  | Priority |
|----------------|---|---------------------------------------|---|----------|
| Climate        | Habitat shifting and alteration due to climate change | Legislation, Policies and Regulations | Reduce CO2 emissions  | M        |
| Climate        | Habitat shifting and alteration due to climate change | Research and Monitoring               | Model potential habitat/range shifts in<br>response to projected climate changes<br>and prepare adaptation plan to define<br>conservation needs | M        |

## Medium PriorityMixed ConiferForestlands

Tier 1 Species Tier 2 Species

| Group                          | Species | Common Name            | Primary  |
|--------------------------------|---------|------------------------|----------|
| Plants Cirsium scapanolepis Mo |         | Mountain-slope thistle | <b>✓</b> |
|                                |         |                        |          |
|                                |         |                        |          |

|        |                                 | -                     |          |
|--------|---------------------------------|-----------------------|----------|
| Group  | Species                         | Common Name           | Primary  |
| Plants | Hackelia besseyi                | Bessey's stickseed    | <b>V</b> |
| Plants | Telesonix jamesii               | James telesonix       |          |
| Plants | Botrychium lineare              | Narrowleaf grape fern |          |
| Plants | Ipomopsis aggregata ssp. weberi | Rabbit Ears gilia     | <b>V</b> |

**Aspen Forest** 

Forestlands

## **Table 4. - Continued.**

**Medium Priority** 

| Meur        | uiii i i ioi ity<br>Tion          | 1 Species   | Азрс        | ii rurest                         |  | Tion                 | 2 Species   | suanus   |
|-------------|-----------------------------------|---|-------------|-----------------------------------|--|----------------------|---|----------|
| Group       | Species                           | Common Name                                       | Primary     | Group                             | Species                                      | 1101                 | Common Name   | Primary  |
| Plants      | Draba malpighiacea                | Whitlow-grass                                     |             | Plants                            | Botrychium 1                                 | ineare               | Narrowleaf grape fern   | <b>V</b> |
|             | 1.0                               |   |             | Plants                            | Carex stenop                                 |                      | Small-winged sedge  |          |
|             |                                   |   |             | Plants                            | Draba smithi                                 | i                    | Smith whitlow-grass   |          |
|             |                                   |   |             | Plants                            | Delphinium 1                                 | obustum              |   |          |
| General Thr | reat S <sub>1</sub>               | pecific Threat                                    | Ge          | eneral Conserva                   | tion Action                                  | Specific             | Conservation Action   | Priority |
| Habitat Deg | gradation A                       | ltered fire regime                                |             | aintain or Resto<br>ocesses       | re Natural                                   | Restore 1            | natural fire regime   | Н        |
| Natural Fac |                                   | radication of aspen sprouts by rowsing animals    |             | aintain or Resto<br>ocesses       | re Natural                                   | Manage               | natural herbivory   | Н        |
| Disease     | Si                                | udden Aspen Death                                 | Re          | esearch and Mo                    | nitoring                                     |                      | ue research on causes and nent options  | M        |
| Disease     | Si                                | udden Aspen Death                                 | Sp          | ecies Managen                     | ent  | burning,             | e clone regeneration through<br>cutting, or other methods<br>oot systems become too weak                        | M<br>to  |
| Medi        | um Priority                       |   | Ponde       | erosa Pine                        |  |                      | Fore  | stlands  |
|             | Tier                              | 1 Species   |             |                                   |  | Tier                 | 2 Species   |          |
| Group       | Species                           | Common Name                                       | Primary     | Group                             | Species                                      |                      | Common Name   | Primary  |
| Plants      | Physaria pulvinata                | Cushion bladderpod                                |             | Plants                            | Aletes humili                                | is                   | Larimer aletes  |          |
| Plants      | Ipomopsis polyantha               | a Pagosa skyrocket                                |             | Plants                            | Astragalus<br>missouriensis<br>var. humistra |                      | Missouri milkvetch  | ✓        |
|             |                                   |   |             | Plants                            | Lesquerella c                                |                      | Rocky Mountain<br>bladderpod  |          |
| General Thr | reat S                            | pecific Threat                                    | Ge          | eneral Conserva                   | tion Action                                  | Specific             | Conservation Action   | Priority |
| Habitat Cor | iversion H                        | ousing, urban, and ex-urban evelopment            |             | nd Protection (<br>sements, and R | Public, Private),<br>esource Rights          | Purchase             | habitat or Acquire<br>tion easement for conservation  | H<br>on  |
| Habitat Deg |                                   | Itered native vegetation (increases)              | ased tree M | aintain or Resto                  | re Habitat                                   |                      | trees/shrubs  | Н        |
| Habitat Deg | gradation A                       | ltered fire regime                                |             | aintain or Resto                  | re Natural                                   | Restore 1            | natural fire regime   | Н        |
| Habitat Cor |                                   | ousing, urban, and ex-urban evelopment            |             |                                   | Public, Private),<br>esource Rights          |                      | nt Purchase/Transfer<br>ment Rights program for<br>rotection  | M        |
| Habitat Deg | gradation Fi                      | ragmentation                                      | Pla         | anning and Zon                    | ing  |                      | zoning that concentrates use ects habitat   | M        |
| Habitat Deg | gradation R                       | oads or Railroads                                 |             | vasive Species (<br>evention      | Control and                                  |                      | nt integrated weed/pest<br>nent plan  | L        |
| Medi        | um Priority                       |   | <u>Spr</u>  | uce-Fir                           |  |                      | Fore  | estlands |
|             | Tier                              | 1 Species   |             |                                   |  | Tier                 | 2 Species   |          |
| Group       | Species                           | Common Name                                       | Primary     | Group                             | Species                                      |                      | Common Name   | Primary  |
| Plants      | Botrychium tax. nov<br>"furcatum" | 7. Fork-leaved moonwort                           |             | Plants<br>Plants                  | Townsendia :                                 |                      | Rothrock townsend-daisy Small-winged sedge  | <u> </u> |
| Plants      | Physaria scrotiformi              |   |             |                                   |  |                      |   |          |
| Plants      | Draba malpighiacea                | Whitlow-grass                                     |             |                                   |  |                      |   |          |
| General Thr | reat S <sub>1</sub>               | pecific Threat                                    | Ge          | eneral Conserva                   | tion Action                                  | Specific             | Conservation Action   | Priority |
| Climate     |                                   | abitat shifting and alteration dimate change      |             | gislation, Polic<br>gulations     | ies and                                      | Reduce (             | CO2 emissions   | M        |
| Climate     |                                   | abitat shifting and alteration d<br>limate change | ue to Re    | esearch and Mo                    | nitoring                                     | response<br>and prep | otential habitat/range shifts in<br>to projected climate changes<br>are adaptation plan to define<br>tion needs |          |

## **Medium Priority**

## **Shortgrass Prairie**

## Grasslands

**Tier 1 Species** 

## **Tier 2 Species**

| Group  | Species                          | Common Name                      | Primary  |
|--------|----------------------------------|----------------------------------|----------|
| Plants | Oenothera harringtonii           | Arkansas Valley evening primrose | <b>✓</b> |
| Plants | Asclepias uncialis ssp. uncialis | Dwarf milkweed                   | <b>V</b> |
| Plants | Oonopsis puebloensis             | Pueblo goldenweed                | <b>~</b> |
| Plants | Oonopsis foliosa var.            | Rayless goldenweed               | <b>✓</b> |

| General Threat             | Specific Threat  | General Conservation Action  | Specific Conservation Action  | Priority |
|----------------------------|--|--|---|----------|
| Climate                    | Climate variability (intensification or<br>alteration of normal weather patterns,<br>e.g., droughts, tornados, etc.) | Legislation, Policies and<br>Regulations                             | Reduce CO2 emissions  | Н        |
| Habitat Conversion         | Housing, urban, and ex-urban development   | Land Protection (Public, Private),<br>Easements, and Resource Rights | Purchase habitat or Acquire conservation easement for conservation purpose                          | Н        |
| Habitat Conversion         | Conversion to cropland   | Maintain or Restore Habitat  | Avoid destruction of large tracts of<br>native habitat (e.g., ski area<br>development, sod-busting) | Н        |
| Habitat Degradation        | Altered animal community (loss of<br>herbivores, esp. BTPD complexes,<br>predators, pollintors, etc.)                | Education and Communication  | Implement landowner<br>outreach/education program   | Н        |
| Habitat Degradation        | Roads or Railroads (super slab)  | Research and Monitoring  | Research habitat response to management   | Н        |
| Indirect Consumptive Use   | Grazing  | Maintain or Restore Habitat  | Maintain appropriate patch size and habitat mosaic  | Н        |
| Habitat Degradation        | Altered native vegetation (woody encroachment, seral stage imbalance, etc.)  | Compatible Resource Use  | Implement compatible grazing management   | M        |
| Habitat Conversion         | Conversion to cropland   | Maintain or Restore Habitat  | Restore native prairie  | L        |
| Habitat Degradation        | Natural system modification<br>(terrestrial) - windbreaks, agricultural<br>methods such as tilling, pitting          | Maintain or Restore Habitat  | Discourage planting windbreaks  | L        |
| Habitat Degradation        | Overhead utility lines and towers  | Planning and Zoning  | Promote consideration of biodiversity issues in transportation and land use planning processes      | L        |
| Invasive or Exotic Species | Invasive plants  | Invasive Species Control and<br>Prevention                           | Implement integrated weed/pest management plan  | L        |

## **Medium Priority**

Species

Cirsium scapanolepis

Group

Plants

## Foothill/Mountain Grassland

Group

Species

## Grasslands

Primary

## **Tier 1 Species**

| Common Name            | Primary |
|------------------------|---------|
| Mountain-slope thistle |         |

| Group  | Species   | Common runic            | 1 IIIIIai y |
|--------|---|-------------------------|-------------|
| Plants | Machaeranthera coloradoensis                    | Colorado tansy-aster    | <b>V</b>    |
| Plants | Eriogonum coloradense                           | Colorado wild buckwheat | <b>✓</b>    |
| Plants | Penstemon degeneri                              | Degener beardtongue     |             |
| Plants | Astragalus<br>missouriensis<br>var. humistratus | Missouri milkvetch      |             |
| Plants | Botrychium lineare                              | Narrowleaf grape fern   | <b>✓</b>    |
| Plants | Lesquerella pruinosa                            | Pagosa bladderpod       |             |
|        |   |                         |             |

**Tier 2 Species** 

Common Name

| General Threat      | Specific Threat            | General Conservation Action             | Specific Conservation Action                                      | Priority |
|---------------------|----------------------------|---|---|----------|
| Habitat Degradation | Altered native vegetation  | Compatible Resource Use                 | Manage grazing to maintain full suite of native grassland species | M        |
| Habitat Degradation | Invasive or exotic species | Invasive Species Control and Prevention | Implement integrated weed/pest management plan                    | M        |

## **Medium Priority**

Group

Plants

## **Sandy Areas**

## **Sparsely Vegetated**

| Tier 1 | Species |
|--------|---------|
|--------|---------|

|                      | ~Peeres             |         |
|----------------------|---------------------|---------|
| Species              | Common Name         | Primary |
| Corispermum navicula | Boat-shaped bugseed |         |
|                      |                     |         |

| Group  | Species                               | Common Name             | Primary  |
|--------|---------------------------------------|-------------------------|----------|
| Plants | Boechera crandallii                   | Crandall's rock-cress   |          |
| Plants | Caesalpinia repens                    | Creeping rush-pea       | <b>✓</b> |
| Plants | Astragalus piscator                   | Fisher Towers milkvetch | <b>~</b> |
| Plants | Aletes macdougalii ssp. breviradiatus | Mesa Verde aletes       |          |

**Tier 2 Species** 

| General Threat      | Specific Threat        | General Conservation Action | Specific Conservation Action    | Priority |
|---------------------|------------------------|-----------------------------|---------------------------------|----------|
| Habitat Degradation | Recreation (motorized) | Recreation Management       | Implement compatible recreation | M        |
|                     |                        |                             | management                      |          |

# Part 6: STRATEGIES FOR MONITORING SPECIES, HABITATS, AND SUCCESS OF CONSERVATION ACTIONS

## **Species and Habitats**

Nineteen PGCN are currently being monitored to help understand long-term trends and/or impacts of various land use activities (Box 1). Priorities for additional species monitoring are G1 ranked PGCN, and those with suspected downward trends. PGCN most in need of population status monitoring include:

- 1. Sleeping Ute milkvetch (*Astragalus tortipes*)
- 2. Boat-shaped bugseed (Corispermum navicula)
- 3. Gypsum Valley cateye (Cryptantha gypsophila)
- 4. Narrow-lead evening primrose (*Oenothera acutissima*)
- 5. Pikes Peak spring parsley (*Oreoxis humilis*)
- 6. Sun-loving meadowrue (Thalictrum heliophilum)

## Recommended monitoring actions include:

- Prioritize monitoring needs for PGCN annually (for example, during Annual Colorado Rare Plant Technical Committee Symposia, Biodiversity Scorecard updates, etc.), and share priorities with the scientific and academic communities.
- Support existing and establish new monitoring projects for priority species (for example, CNAP's Rare Plant Monitoring Stewards Program) and provide results to appropriate land managers to facilitate adaptive management for the long-term survival of PGCN.
- Ensure monitoring studies have adequate funding to address key questions in a scientifically rigorous manner, use consistent methodology, and effectively inform adaptive management.
- Devise a monitoring schedule to ensure that all PGCN populations are monitored at appropriate and cost effective intervals in order to quickly detect population declines and ensure occurrence persistence.
- Periodically update Natural Heritage ranks and the Biodiversity Scorecard to record changes in conservation status of rare plants.

## Box 1. PGCN currently being monitored in Colorado (with lead

organization/agency responsible for monitoring). Species are listed in alphabetical order by scientific name.

- 1. Larimer aletes (*Aletes humilis*): The Nature Conservancy
- 2. DeBeque milkvetch (Astragalus debequeus): Bureau of Land Management
- 3. Skiff milkvetch (*Astragalus microcymbus*): Bureau of Land Management, Denver Botanic Gardens
- 4. Kremmling milkvetch (Astragalus osterhoutii): Bureau of Land Management
- 5. Brandegee's buckwheat (*Eriogonum brandegei*): Bureau of Land Management, Denver Botanic Gardens
- 6. Clay-loving wild buckwheat (*Eriogonum pelinophilum*): Bureau of Land Management, Colorado Natural Heritage Program, Colorado Natural Areas Program
- 7. Colorado butterfly plant (*Gaura neomexicanassp. coloradensis*): City of Fort Collins
- 8. Pagosa skyrocket (Ipomopsis polyantha): Colorado Natural Heritage Program
- 9. Dudley Bluffs bladderpod (*Lesquerella congesta*): Colorado Natural Areas Program
- 10. Frosty bladderpod (*Lesquerella pruinosa*): Colorado Natural Heritage Program, The Nature Conservancy
- 11. Narrow-leaf evening primrose (*Oenothera acutissima*): Bureau of Land Management
- 12. Parachute penstemon (*Penstemon debilis*): Bureau of Land Management, Colorado Natural Areas Program
- 13. Graham's penstemon (Penstemon grahamii): Bureau of Land Management
- 14. Penland's penstemon (Penstemon penlandii): Denver Botanic Gardens
- 15. North Park phacelia (Phacelia formosula): Bureau of Land Management
- 16. Bell's twinpod (*Physaria bellii*): City of Boulder, Colorado Natural Areas Program, Denver Botanic Gardens, City of Fort Collins, The Nature Conservancy
- 17. Piceance twinpod (Physaria obcordata): Colorado Natural Areas Program
- 18. Colorado hookless cactus (*Sclerocactus glaucus*): Bureau of Land Management, Denver Botanic Gardens
- 19. Ute ladies'-tresses (Spiranthes diluvialis): City of Boulder, City of Fort Collins

## **Success of Conservation Actions**

Conserving Colorado's PGCN means that they are adequately protected, with low threats and high viability. Four fundamental questions over the long term are:

- How are Colorado's PGCN doing?
- Do we understand the challenges to the status of these plants and how to address them?
- Are the conservation actions we are taking having the intended effects?
- Is there adequate capacity to achieve our goals?

These four questions can be answered by monitoring indicators that gauge the status of the PGCN and their primary threats. Tracking progress towards goals and evaluating the effectiveness of conservation actions will provide the feedback needed to adjust priorities and objectives. Measuring results provides the basis for adaptive management in this conservation approach.

A framework for measuring success of conservation actions is proposed below. These indicators should be measured or assessed every five years unless greater urgency is identified.

## **Viability Status**

Viability status can be evaluated by monitoring:

- Proportion of all imperiled plant species with good to excellent viability scores (measured by the proportion of A or B ranked occurrences of each species in CNHP's database).
- Proportion of all imperiled plant species with viable seeds in seed bank.

#### Threat Status

Threat status can be evaluated by monitoring:

• Number of PGCN with average to low threat ranks in the Biodiversity Scorecard for Colorado (CNHP and TNC 2011). Presently, there are at least 43 species with high threat ranks. This number should decrease overtime.

#### **Protection/Conservation Status**

Protection and conservation status can be evaluated by monitoring:

- Proportion of all Important Plant Areas with conservation action plans completed with local stakeholder involvement. There are currently five areas with conservation action plans.
- Proportion of Important Plant Areas with land trusts or agencies working on habitat conservation.
- Proportion of occurrences of PGCN with on-the-ground habitat protection (e.g., conservation easements, special designations, management agreements, etc.).
- Success in obtaining state legislation to conserve PGCN.
- Success in obtaining a long-term program and funding mechanism to support a rare plant conservation program in Colorado.

## Part 7: COORDINATION, REVIEW, AND REVISION

Coordination, review, and revision will follow the process outlined in the Colorado SWAP, Section 4.3, which states:

In the near term, CWCS review and incorporation of new information will be performed in traditional fashion using similar procedures to this initial effort, at an interval of not less than 5 years, and no more than 10. This timeframe will allow the effects of the Strategy and the operational or action plans and activities that flow from it to be adequately expressed and evaluated before extensive modification. As described elsewhere, a future vision of adopting a more aggressive adaptive management strategy, with the CWCS residing on a database platform (vs. a fixed text document), allowing ongoing updates to reflect changes in species and habitat status, conservation accomplishments as they occur (i.e., a "living" strategy). This will facilitate ongoing communication and coordination among conservation partners and the incorporation of information they gain through their normal operations. Thus, updates and review of the CWCS would be a continuous, rather than a punctuated process. Oversight and maintenance of such a systems approach would be accomplished *via* pooled resources of collaborating entities, including an oversight committee of those collaborators. Given current fiscal, logistical, and technological constraints, contributors to the CWCS who recommended this approach typically acknowledged it as a longer-term vision rather than necessarily an initiative to be undertaken in the immediate future.

As the goal for Colorado's SWAP is to fully incorporate rare plant conservation in the next iteration, future revision of this Addendum will be subject to whatever process the CDOW ultimately employs in updating the SWAP. Coordination among conservation partners, agencies, and other interested parties for conservation of Colorado's rare plants will continue to be led by the RPCI.

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# APPENDIX A: TAXONOMIES OF THREATS AND CONSERVATION ACTIONS FOR SPECIES AND HABITATS

Table A1. Threat taxonomy for species

| General Threat                     | Specific Threat  |
|------------------------------------|--|
| Climate                            | Habitat shifting and alteration due to climate change  |
|                                    | Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)                       |
|                                    | Hunting, trapping, fishing   |
| Direct Consumptive Use (Mortality) | Poisoning  |
|                                    | Gathering  |
|                                    | Scientific research  |
|                                    | Collision (e.g., auto, turbine, aircraft)  |
|                                    | Housing, urban, and ex-urban development   |
|                                    | Conversion to cropland   |
| Habitat Conversion                 | Recreation area developments   |
|                                    | Water storage  |
|                                    | Commercial and industrial development  |
|                                    | Commercial hog farm or feedlot   |
|                                    | Natural system modification (hydrological) - dam construction, riprap, levees, bank stabilization, channelization, irrigation canals |
|                                    | Natural system modification (terrestrial) - windbreaks, agricultural methods such as tilling, pitting                                |
|                                    | Natural system modification - wetland filling  |
|                                    | Altered fire regime  |
|                                    | Altered hydrological regime (surface or aquifer)   |
|                                    | Decreased water quality  |
| Habitat Degradation                | Altered native vegetation (riparian area deforestation, woody encroachment, chaining sagebrush, seral stage imbalance, etc.)         |
|                                    | Fragmentation  |
|                                    | Altered animal community (loss of herbivores, predators, pollinators)  |
|                                    | Trail development  |
|                                    | Roads or Railroads   |
|                                    | Overhead utility lines and towers  |
|                                    | Oil and gas pipelines  |
|                                    | Cave/mine closures   |

| General Threat                          | Specific Threat  |  |
|---|--|--|
| Indirect Consumptive<br>Use (Mortality) | Forest and woodland management   |  |
|   | Grazing  |  |
|   | Water use (e.g., de-watering of streams)   |  |
|   | Invasive plants  |  |
|   | Invasive plants - tamarisk   |  |
| Invasive or Exotic                      | Invasive animals   |  |
| Species                                 | Pathogen - chytrid fungus  |  |
| ·                                       | Pathogen - sylvatic plague   |  |
|   | Introduced genetic material  |  |
|   | Problematic native species   |  |
|   | Complete distribution in Colorado unknown  |  |
|   | Population status unknown  |  |
| Lack of knowledge                       | Reproductive and/or pollination biology unknown  |  |
| Ç                                       | Phenological response to climate change of species itself and/or inter-<br>dependent species unknown |  |
|   | Response to climate change of ecological systems and processes unknown                               |  |
|   | Scarcity (leading to inbreeding depression)  |  |
| Natural Factors                         | Herbivory (e.g., resource competition, changes in habitat structure)                                 |  |
|   | Altered animal community (change in herbivores, predators, pollinators, etc.)                        |  |
|   | Motor-powered recreation   |  |
| Non-consumptive                         | Non-motorized recreation   |  |
| Disturbance                             | Scientific research  |  |
|   | Flight paths   |  |
|   | Proximal non-recreation disturbance  |  |
|   | Lack of coordination   |  |
| Organizational capacity                 | Lack of funding  |  |
| and management                          | Lack of common goals   |  |
|   | Confused or gaps in authorities  |  |
|   | Legislation/policy changes   |  |
|   | Chemicals and toxins   |  |
|   | Herbicide/pesticide spraying or runoff   |  |
|   | Nutrient loads   |  |
|   | Solid waste  |  |
| Pollution                               | Waste or residual materials (mine tailings, excess sediment loads, etc.)                             |  |
|   | Air pollution  |  |
|   | Radioactive materials  |  |
|   | Salt   |  |
|   | Light pollution  |  |
|   | Septic system failures   |  |

| General Threat      | Specific Threat                  |
|---------------------|----------------------------------|
|                     | Oil and gas drilling             |
| Resource Extraction | Mining (coal, sand/gravel, etc.) |
|                     | Water use, management            |
|                     | Wind energy                      |

Table A2. Conservation Action taxonomy for species

| General Action              | Specific Action   |  |
|-----------------------------|---|--|
|                             | Develop partnerships among agencies, NGOs, and stakeholders                                   |  |
| Capacity Building and       | Coordinate with related agencies to align goals, policies, measures of success, etc.          |  |
| Cooperation                 | Engage in collaborative, proactive planning and conservation programs                         |  |
|                             | Develop collaborative management agreements   |  |
| Compatible Resource Lice    | Implement compatible logging practices  |  |
| Compatible Resource Use     | Implement compatible grazing management   |  |
|                             | Monitor water quality standards   |  |
|                             | Enforce wildlife and habitat protection laws  |  |
|                             | Enforce hunting, fishing, collecting regulations  |  |
| Compliance and              | Enforce 404 wetlands regulations  |  |
| Enforcement                 | Enforce state/federal/local pollution standards   |  |
|                             | Identify and control point-source and non-point source pollution                              |  |
|                             | Manage recreation and/or permitted activities (e.g., rock climbing, grazing leases)           |  |
|                             | Manage off-road travel  |  |
|                             | Promote ecotourism  |  |
| Economic Incentives         | Promote green building, development, and lifestyle  |  |
| Loononiic incentives        | Increase efficiency of water use  |  |
|                             | Provide economic assistance for private land habitat improvements and/or species conservation |  |
| Education on I              | Publish educational material/sponsor educational programs to raise public awareness           |  |
| Education and Communication | Improve knowledge of species, habitats, problems, via professional meetings and other venues  |  |
|                             | Improve communication among researchers and policy/decision-makers                            |  |

| General Action                                    | Specific Action  |
|---|--|
| Education and Communication, cont.                | Implement landowner outreach/education program   |
|   | Educate development industries about avoiding and/or mitigating impacts to rare or sensitive species             |
| Ex-situ Conservation                              | Create captive breeding program  |
|   | Create gene-banking program  |
|   | Seed banking (incl. protocols, collection, and cultivation)  |
|   | Map weed infestations and sensitive no spray/no mow zones  |
|   | Implement integrated weed/pest management plan   |
| Invasive Species Control and Prevention           | Control bullfrogs  |
| and Prevention                                    | Control non-native fish  |
|   | Avoid transfer of chytrid fungus   |
|   | Dust for fleas to prevent plague outbreaks   |
|   | Create protected park, preserve, wildlife area   |
|   | Expand existing protected park, preserve, wildlife area  |
|   | Purchase habitat for conservation purpose  |
|   | Acquire conservation easement for habitat protection   |
| Land Protection (Public, Private), Easements, and | Establish legal designation to protect habitat (e.g., wilderness, Research Natural Area)                         |
| Resource Rights                                   | Implement Purchase/Transfer Development Rights program for habitat protection                                    |
|   | Establish in-stream flow rights  |
|   | Acquire water rights   |
|   | Mitigate species/habitat loss (e.g., grass banking, mitigation banking, credits for off-site habitat protection) |
|   | Regulate lethal control methods  |
|   | Establish mitigation requirements for developments and other projects that impact species/habitats               |
| Legislation, Policies and Regulations             | Encourage use of Farm Bill programs  |
|   | Develop uniform and effective regulations regarding collection of plants on public lands.                        |
|   | Establish state-wide rare plant policy   |
| Maintain or Restore                               | Restore native prairie   |
| Habitat   | Restore riparian vegetation  |
|   | Plant trees/shrubs   |

| General Action      | Specific Action  |
|---------------------|--|
|                     | Remove infrastructure (e.g., roads, dams)  |
|                     | Restore sagebrush  |
|                     | Re-seed native species   |
|                     | Manage grazing for compatible vegetation height, structure, etc.   |
|                     | Implement streambank or in-stream restoration/improvements   |
|                     | Remove trees/shrubs  |
| Maintain or Restore | Improve erosion and excess sedimentation conditions  |
| Habitat, cont.      | Discourage introduction of non-native ornamental species   |
|                     | Maintain linkages and connectivity (e.g., wildife over/under passes, habitat corridors, wildlife-friendly fences)    |
|                     | Maintain appropriate patch size and habitat mosaic   |
|                     | Manage caves/mines for native bats   |
|                     | Avoid destruction of large tracts of native habitat (e.g., ski area development, sod-busting)                        |
|                     | Coordinate on ecologically sensitive design of recreational facilities   |
|                     | Reduce CO2 emissions   |
|                     | Restore natural fire regime  |
|                     | Remove dam   |
|                     | Adjust operation of dam  |
| Maintain or Restore | Remove road(s)   |
| Natural Processes   | Manage for balance of interspecific interactions (predator, prey, pollinator, dispersor, etc.)                       |
|                     | Manage natural herbivory   |
|                     | Improve erosion and excess sedimentation conditions  |
|                     | Maintain linkages and connectivity   |
|                     | Write management plan for species or habitat   |
|                     | Promote zoning that concentrates use and protects habitat  |
| Diameira and Zanina | Promote consideration of biodiversity issues in transportation and land use planning processes                       |
| Planning and Zoning | Prepare climate change adaptation strategy to define in situ and ex situ conservation needs                          |
|                     | Prepare climate change adaptation strategy to identify and address barriers to species movement and habitat shifting |

| General Action               | Specific Action   |
|------------------------------|---|
|                              | Write and implement management plan   |
| Protected Area<br>Management | Manage public use to be compatible with biodiversity  |
|                              | Alter management of park, preserve, wildlife area   |
|                              | Follow established protocols for species research (e.g., to avoid spread of disease, trampling, overcollecting, etc.) |
|                              | Conduct field inventory to refine known distribution  |
|                              | Research critical life history/habitat components   |
|                              | Fill data gaps (e.g., basic research, expand museum and herbarium collections, write species assessments etc.)        |
| Research and Monitoring      | Develop and ground-truth habitat and species distribution models  |
|                              | Research species/habitat response to management or disturbance  |
|                              | Monitor population status   |
|                              | Conduct primary research on rare plant and pollinator responses to changing climate                                   |
|                              | Model ecological system response to projected climate changes and prepare adaptation plan                             |
|                              | Reintroduce extirpated native species   |
|                              | Provide artificial nesting boxes/platforms  |
|                              | Maintain genetic connection/integrity within and between populations  |
|                              | Maintain comprehensive species database   |
| Species Management           | Develop collaborative management agreements   |
| Species Management           | Write and implement management/recovery plan  |
|                              | Manage caves/mines for native bats  |
|                              | Develop proactive conservation program to prevent species from becoming a concern in the future                       |
|                              | Implement existing management/recovery plan   |
|                              | Provide artificial/hand pollination   |
|                              | Implement Best Management Practices for transportation projects   |
|                              | Implement Best Management Practices for energy development and mining   |
| Voluntary Standards          | Implement Best Management Practices for water resource development  |
|                              | Implement Best Management Practices for livestock grazing   |
|                              | Implement Best Management Practices for forestry  |

| General Action       | Specific Action  |
|----------------------|--|
| Voluntary Standards, | Implement Best Management Practices for agricultural production              |
| cont.                | Implement Best Management Practices for urban development, landscaping, etc. |

Table A3. Threat taxonomy for habitats

| General Threat           | Specific Threat  |
|--------------------------|--|
|                          | Habitat shifting and alteration due to climate change  |
| Climate                  | Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)                       |
|                          | Housing, urban, and ex-urban development   |
|                          | Conversion to cropland   |
| Habitat Canyaraian       | Recreation area developments   |
| Habitat Conversion       | Water storage  |
|                          | Commercial and industrial development  |
|                          | Commercial hog farm or feedlot   |
|                          | Natural system modification (hydrological) - dam construction, riprap, levees, bank stabilization, channelization, irrigation canals |
|                          | Natural system modification (terrestrial) - windbreaks, agricultural methods such as tilling, pitting                                |
|                          | Natural system modification - wetland filling  |
|                          | Altered fire regime  |
|                          | Altered hydrological regime (surface or aquifer)   |
|                          | Decreased water quality  |
| Habitat Degradation      | Altered native vegetation (riparian area deforestation, woody encroachment, chaining sagebrush, seral stage imbalance, etc.)         |
|                          | Fragmentation  |
|                          | Altered animal community (loss of herbivores, predators, pollinators, etc.)  |
|                          | Trail development  |
|                          | Roads or Railroads   |
|                          | Overhead utility lines and towers  |
|                          | Oil and gas pipelines  |
|                          | Cave/mine closures   |
|                          | Forest and woodland management   |
| Indirect Consumptive Use | Grazing  |
| ·                        | Water use (e.g., de-watering of streams)   |

| General Threat              | Specific Threat   |
|-----------------------------|---|
|                             | Invasive plants   |
|                             | Invasive plants - tamarisk  |
| Invasive or Exotic Species  | Invasive animals  |
| invasive of Exolic Species  | Introduced genetic material   |
|                             | Problematic native species (species originally found in ecosystem but out of balance or released due to humans) |
| Lack of knowledge           | Complete distribution in Colorado unknown   |
| Lack of knowledge           | Status unknown  |
|                             | Scarcity  |
| Natural Factors             | Herbivory (e.g., resource competition, changes in habitat structure)  |
|                             | Altered animal community (change in herbivores, predators, pollinators, etc.)                                   |
|                             | Motor-powered recreation  |
| Non-consumptive Disturbance | Non-motorized recreation  |
|                             | Proximal non-recreation disturbance   |
|                             | Lack of coordination  |
| Organizational capacity     | Lack of funding   |
| and management              | Lack of common goals  |
|                             | Legislation/policy changes  |
|                             | Chemicals and toxins  |
|                             | Herbicide/pesticide spraying or runoff  |
|                             | Nutrient loads  |
|                             | Solid waste   |
| Pollution                   | Waste or residual materials (mine tailings, excess sediment loads, etc.)  |
|                             | Air pollution   |
|                             | Radioactive materials   |
|                             | Salt  |
|                             | Septic system failures  |
|                             | Oil and gas drilling  |
| Resource Extraction         | Mining (coal, sand/gravel, etc.)  |
|                             | Water use, management   |
|                             | Wind energy   |

Table A4. Conservation Action taxonomy for habitats

| General Action                     | Specific Action   |
|------------------------------------|---|
|                                    | Develop partnerships among agencies, NGOs, and stakeholders                                   |
| Capacity Building and              | Coordinate with related agencies to align goals, policies, measures of success, etc.          |
| Cooperation                        | Engage in collaborative, proactive planning and conservation programs                         |
|                                    | Develop collaborative management agreements   |
| 0 171 5 11                         | Implement compatible logging practices  |
| Compatible Resource Use            | Implement compatible grazing management   |
|                                    | Monitor water quality standards   |
|                                    | Enforce 404 wetlands regulations  |
| Compliance and Enforcement         | Enforce state/federal/local pollution standards   |
|                                    | Identify and control point-source and non-point source pollution                              |
|                                    | Promote ecotourism  |
|                                    | Promote green building, development, and lifestyle  |
| Economic Incentives                | Increase efficiency of water use  |
|                                    | Provide economic assistance for private land habitat improvements and/or species conservation |
|                                    | Reduce ground-water pumping   |
|                                    | Publish educational material/sponsor educational programs to raise public awareness           |
|                                    | Improve knowledge of habitats, problems, via professional meetings and other venues           |
| Education and Communication        | Improve communication among researchers and policy/decision-makers                            |
|                                    | Implement landowner outreach/education program  |
|                                    | Educate development industries about avoiding and/or mitigating habitat impacts               |
|                                    | Map weed infestations and sensitive no spray/no mow zones                                     |
|                                    | Implement integrated weed/pest management plan  |
| Invasive Species Control and       | Control bullfrogs   |
| Prevention                         | Control non-native fish   |
|                                    | Avoid transfer of chytrid fungus  |
|                                    | Dust for fleas to prevent plague outbreaks  |
|                                    | Create protected park, preserve, wildlife area  |
| Land Protection (Public, Private), | Expand existing protected park, preserve, wildlife area                                       |
| Easements, and Resource Rights     | Purchase habitat or Acquire conservation easement for conservation purpose                    |

| General Action  | Specific Action  |
|---|--|
|   | Establish legal designation to protect habitat (e.g., wilderness, Research Natural Area)                           |
|   | Implement Purchase/Transfer Development Rights program for habitat protection                                      |
| Land Protection (Public, Private),<br>Easements, and Resource Rights, | Establish in-stream flow rights  |
| cont.   | Acquire water rights   |
|   | Mitigate species/habitat loss (e.g., grass banking, mitigation banking, credits for off-site habitat protection)   |
| Lariabetian Ballaian and  | Establish mitigation requirements for developments and other projects that impact species/habitats                 |
| Legislation, Policies and Regulations                                 | Encourage use of Farm Bill programs  |
|   | Reduce CO2 emissions   |
|   | Restore native prairie   |
|   | Restore riparian vegetation  |
|   | Plant trees/shrubs   |
|   | Remove infrastructure (e.g., roads, dams)  |
|   | Restore sagebrush  |
|   | Re-seed native species   |
|   | Manage grazing for compatible vegetation height, structure, etc.   |
|   | Implement stream bank or in-stream restoration/improvements  |
| Maintain or Restore Habitat   | Remove trees/shrubs  |
|   | Improve erosion and excess sedimentation conditions  |
|   | Discourage introduction of non-native ornamental species   |
|   | Maintain linkages and connectivity (e.g., wildlife over/under passes, habitat corridors, wildlife-friendly fences) |
|   | Maintain appropriate patch size and habitat mosaic   |
|   | Manage caves/mines for native bats   |
|   | Avoid destruction of large tracts of native habitat (e.g., ski area development, sod-busting)                      |
|   | Coordinate on ecologically sensitive design of   |
|   | recreational facilities  Reduce CO2 emissions  |
|   | Restore natural fire regime  |
|   | Remove dam   |
| Maintain or Restore Natural   | Adjust operation of dam  |
| Processes   | Remove road(s)   |
|   | Manage for predator/prey balance   |
|   | manago for productor/proy bullution  |

| General Action              | Specific Action  |
|-----------------------------|--|
|                             | Manage natural herbivory   |
| Maintain or Restore Natural | Improve erosion and excess sedimentation conditions                          |
| Processes, cont.            | Maintain linkages and connectivity   |
|                             | Reduce ground-water pumping  |
|                             | Write management plan for species or habitat                                 |
| Planning and Zoning         | Promote zoning that concentrates use and protects habitat                    |
|                             | Promote consideration of biodiversity issues in                              |
|                             | transportation and land use planning processes                               |
|                             | Write and implement management plan  |
| Protected Area Management   | Manage public use to be compatible with biodiversity                         |
|                             | Alter management of park, preserve, wildlife area                            |
|                             | Conduct field inventory to refine known distribution                         |
|                             | Fill data gaps   |
| Research and Monitoring     | Ground-truth habitat distribution model(s)                                   |
|                             | Research habitat response to management                                      |
|                             | Monitor habitat status   |
|                             | Implement Best Management Practices for transportation projects              |
|                             | Implement Best Management Practices for energy development and mining        |
|                             | Implement Best Management Practices for water resource development           |
| Voluntary Standards         | Implement Best Management Practices for livestock grazing                    |
|                             | Implement Best Management Practices for forestry                             |
|                             | Implement Best Management Practices for agricultural production              |
|                             | Implement Best Management Practices for urban development, landscaping, etc. |

# APPENDIX B: CLIMATE CHANGE VULNERABILITY INDEX (CCVI)

The CCVI uses a scoring system that integrates a species' predicted exposure to climate change within an assessment area and three sets of factors associated with climate change sensitivity, each supported by published studies: 1) indirect exposure to climate change, 2) species-specific factors (including dispersal ability, temperature and precipitation sensitivity, physical habitat specificity, interspecific interactions, and genetic factors), and 3) documented response to climate change (when available). The Index is a Microsoft Excel-based tool that facilitates a fairly rapid assessment of the vulnerability of a species to climate change within a defined geographic study area, and highlights the relative importance of factors contributing to that vulnerability.

The Index divides vulnerability into two components: 1) the **exposure** to climate change across the range of the species within the assessment area, and 2) the **sensitivity** of the species to climate change. A highly sensitive species will not suffer if the climate where it occurs remains stable. Similarly, an adaptable species would presumably not decline even in the face of significant changes in temperature and/or precipitation. Exposure to climate change is measured by examining the magnitude of predicted temperature and moisture change across the range of the species within the assessment area. In this analysis, exposure was calculated in GIS using data from the Climate Wizard (http://climatewizard.org). In the Index, sensitivity is assessed by scoring species against 20 factors of indirect exposure to climate change and species-specific sensitivity. For each factor, species were scored on a sliding scale from greatly increasing, to having no effect on, to decreasing vulnerability. The six possible scores are Extremely Vulnerable, Highly Vulnerable, Moderately Vulnerable, Not Vulnerable/Presumed Stable, Not Vulnerable/Increase Likely, and Insufficient Evidence.

# Scoring Category Definitions and Assumptions Used in Completing CCVIs for Colorado Plants of Greatest Conservation Need

OVER-ARCHING ASSUMPTION: Favorable conditions will generally shift northward in latitude and upward in elevation. It is possible that species that are closely associated with microclimate conditions will not necessarily follow this rule. However, for the purposes and scale of this rapid assessment, spatially explicit micro-climate conditions were not considered.

### <u>Section A - Exposure to Local Climate Change</u>

**Temperature**: percent of species known range/distribution that is expected to experience temperature increase, in categories defined by the CCVI. All of Colorado falls within the top 2 categories: >5 degrees warmer and 5.1-5.5 degrees warmer. This was a GIS calculation using

CNHP Element Occurrence Records and the ensemble average climate model from Climate Wizard, with the medium emissions scenario. Analysis period was to 2050.

**AET:PET Moisture Metric**: This index integrates projected temperature and precipitation changes to indicate how much drying will take place. This metric was created by NatureServe as part of the CCVI. We used a GIS calculation to determine the percent of each species' range/distribution (represented by EORs) that fall within each rating category. Categories are:

| < -0.119    |
|-------------|
| -0.0970.119 |
| -0.0740.096 |
| -0.0510.073 |
| -0.0280.050 |
| >-0.028     |

### <u>Section B - Indirect Exposure to Climate Change</u>

- 1. Exposure to sea level rise: not applicable to Colorado. We rated all species 'Neutral.'
- 2a. **Distribution relative to natural barriers**: degree to which species' vulnerability is influenced by its ability to shift range/distribution in response to climate change. Scoring categories *for both natural barriers and anthropogenic barriers* are:

| Greatly                    | Barriers completely OR almost completely surround the current distribution such that the species' range in the assessment area is unlikely to be able to shift significantly with climate change, or the direction of climate change-caused shift in the species' favorable climate envelope is fairly well understood and barriers prevent a range shift in that direction. See <i>Neutral</i> for species in habitats not vulnerable to climate change.  Examples for natural barriers: lowland terrestrial species completely surrounded by high mountains (or bordered closely and completely on the north side by high mountains); cool-water stream fishes for which barriers would completely prevent access to other cool- |
|----------------------------|--|
| Increase                   | water areas if the present occupied habitat became too warm as a result of climate   |
| Vulnerability:             | change; most nonvolant species that exist only on the south side of a very large lake in an area where habitats are expected to shift northward with foreseeable climate change.   |
|                            | Examples for anthropogenic barriers: species limited to small habitats within intensively developed urban or agricultural landscapes through which the species cannot pass, A specific example of this category is provided by the quino checkerspot butterfly (Euphydryas editha quino), a resident of northern Baja California and southern California; warming climates are forcing this butterfly northward, but urbanization in San Diego blocks its movement (Parmesan 1996, Nature 382:765).  |
|                            | Barriers border the current distribution such that climate change-caused distributional shifts in the assessment area are likely to be greatly but not completely or almost completely impaired.   |
| Increase<br>Vulnerability: | Examples for natural barriers: certain lowland plant or small mammal species whose ranges are mostly (50-90%) bordered by high mountains or a large lake.  |
|                            | Examples for anthropogenic barriers: most streams inhabited by a fish species have dams that would prevent access to suitable habitat if the present occupied habitat became too warm as a result of climate change; intensive urbanization surrounds 75% of the range of a salamander species.  |

|  | Barriers border the current distribution such that climate change-caused distributional shifts in the assessment area are likely to be significantly but not greatly or completely impaired.   |
|--|--|
| Somewhat<br>Increase<br>Vulnerability: | Examples for natural barriers: certain lowland plant or small mammal species whose ranges are partially but not mostly bordered by high mountains or a large lake.   |
| vaniorability.                         | Examples for anthropogenic barriers: 10-50% of the margin of a plant species' range is bordered by intensive urban development; 25% of the streams occupied by a fish species include dams that are likely to impede range shifts driven by climate change.  |
|  | Significant barriers do not exist for this species, OR small barriers exist in the assessment area but likely would not significantly impair distributional shifts with climate change, OR substantial barriers exist but are not likely to contribute significantly to a reduction or loss of the species' habitat or area of occupancy with projected climate change in the assessment area.   |
| Neutral:                               | Examples of species in this category: most birds (for which barriers do not exist); terrestrial snakes in extensive plains or deserts that may have small barriers that would not impede distributional shifts with climate change; small alpine-subalpine mammal (e.g., ermine, snowshoe hare) in extensive mountainous wilderness area lacking major rivers or lakes; fishes in large deep lakes or large main-stem rivers that are basically invulnerable to projected climate change and lack dams, waterfalls, and significant pollution; a plant whose climate envelope is shifting northward and range is bordered on the west by a barrier but for which no barriers exist to the north. |

We rated all species tied to specific substrates (i.e., barrens and cliff/canyon species) 'Increase' since the edge of these substrates will function as a barrier to plant movement. We rated all alpine species that occur below 12,500 feet (i.e., could still shift upward in elevation) 'Increase' and all alpine species that only occur above 12,500 feet 'Greatly Increase.' All other species were evaluated individually based on spatial relationship (viewed in GIS) among known EOs, extent of modeled range/habitat (described below), and natural barriers (e.g., edge of habitat; surrounding mountains, canyons).

Previously developed models were available for: Astragalus anisus, Astragalus debequaeus, Astragalus humillimus, Astragalus tortipes, Lesquerella congesta, Nuttallia chrysantha, Oenothera harringtonii, Oonopsis puebloensis, Oxybaphus rotundifolius, Penstemon grahamii, Phacelia submutica, Physaria obcordata, and Sclerocactus mesa-verdae. For other species, we developed models using minimum convex polygons (defined by EORs and buffered by 50% of the polygon area) and SWReGAP vegetation. Vegetation types that intersected with EORs and overlapped the buffered minimum convex polygons were selected; all others were filtered out. Models were further constrained by elevation (defined in GIS by EOR distribution, and buffered on maximum and minimum ends by 10% of the elevation range). For barrens species, models were also constrained by SWReGAP geology. Geological types that overlapped EORs and overlapped the buffered minimum convex polygons were selected; all others were filtered out.

2b. **Distribution relative to anthropogenic barriers**: We rated all species individually based on the spatial relationship among known EOs, extent of modeled range/potential habitat (described above), and non-natural barriers (e.g., urban development, cropland). The natural and non-

natural land cover used in this analysis was developed by reclassifying SWReGAP land cover categories. Definitions of scoring categories are listed above.

- 3. Impact of land use changes resulting from human responses to climate change: This factor is intended to identify species that might be further threatened by strategies designed to mitigate or adapt to climate change (e.g., renewable energy projects such as wind-farms, solar arrays, biofuels production, hydro-power; tree-planting for carbon offsets). We made the assumptions that:
  - Tree planting for carbon offsets is not likely in Colorado;
  - Wind development is most likely to occur on the eastern plains and Front Range;
  - Solar array development is potential for any grassland or shrubland habitat on both east and west slopes;
  - Significant hydro-power development is not likely in Colorado;
  - Natural gas drilling should be included here based on on-going political "clean fuel" dialogue, and the assumption that natural gas drilling could increase because of this.

Definitions of scoring categories are:

| Increase<br>Vulnerability: | The natural history/requirements of the species are known to be incompatible with mitigation-related land use changes that are likely to very likely to occur within its current and/or potential future range. This includes (but is not limited to) the following:  ✓ Species requiring open habitats within landscapes likely to be reforested or afforested. If the species requires openings within forests that are created/maintained by natural processes (e.g., fire), and if those processes have a reasonable likelihood of continuing to operate within its range, a lesser impact category may be appropriate.  ✓ Bird and bat species whose migratory routes, foraging territory, or lekking sites include existing and/or suitable wind farm sites. If numerous wind farms already exist along the species' migratory route, negative impacts have been found in relevant studies; if such studies exist but negative impacts have not been found, a lesser impact category may be appropriate.  ✓ Greater than 20% of the species' range within the assessment area occurs on marginal agricultural land, such as CRP land or other open areas with suitable soils for agriculture ("prime farmland", etc.) that are not currently in agricultural production OR > 50% of the species' range within the assessment area occurs on any non-urbanized land with suitable soils, where there is a reasonable expectation that such land may be converted to biofuel production.  ✓ The species occurs in one or more river/stream reaches not yet developed for hydropower, but with the potential to be so developed.  ✓ Species of deserts or other permanently open, flat lands with potential for placement of solar arrays.  ✓ Species dependent on dynamic shoreline habitats (e.g., active dunes or salt marshes) likely to be destroyed by human fortifications against rising sea levels. |
|----------------------------|---|
| Somewhat                   | The natural history/requirements of the species are known to be incompatible with   |
| Increase                   | mitigation-related land use changes that <i>may possibly</i> occur within its current and/or  |
| Vulnerability:             | potential future range, including any of the above (under Increase).  |
| vuiriorability.            | potential ruture range, including any or the above (under increase).  |

| Neutral:                               | The species is unlikely to be significantly affected by mitigation-related land use changes that may occur within its current and/or potential future range, including any of the above; OR it is unlikely that any mitigation-related land use changes will occur within the species' current and/or potential future range.  |
|--|--|
| Somewhat<br>Decrease<br>Vulnerability: | The species is likely to benefit from mitigation-related land use changes that may occur within its current and/or potential future range. This includes (but is not limited to) the following:  ✓ Forest-associated species currently found within a landscape with < 40% forest cover, where increases in forest cover may occur as a result of reforestation or afforestation projects. |
|  | ✓ Species currently subject to a higher frequency of fires than experienced historically, where there may now be greater incentive to control such fires.  |
|  | ✓ Species occurring on unprotected lands which may be protected and managed for conservation due to their carbon storage and/or sequestration ability.   |
| Decrease<br>Vulnerability:             | The species is likely to benefit from mitigation-related land use changes that are likely to very likely to occur within its current and/or potential future range, including any of the above (under Somewhat Decrease).  |

We rated species that occupy primarily barrens and grasslands 'Increase' based on the potential for wind, solar, and biofuels. One exception to this is *Corispermum navicula*, which we rated 'Neutral' based on the assumption that these resources would not likely be developed in sand dune habitats. We rated shrubland species 'Increase' based on the potential for wind and solar, with the exception of *Eriogonum brandegei*, which occurs on erodible, steep slopes that are not as likely to be developed for these resources. Species listed in the RPCI strategy as being particularly threatened by oil and gas development were rated 'Increase' based on potential for natural gas. Alpine species, wetland species, and cliff/canyon species that are restricted to seeps were rated 'Neutral' based on assumption that these habitat types would be less likely to be developed in most mitigation scenarios. One exception to this general assumption is *Cleome multicaulis*, which we rated 'Increase' based on the potential for solar thermal plants in adjacent habitat, which could alter local hydrologic regimes. We rated forest species 'Somewhat Decrease' based on the assumption that forest management may be improved in the future in the interest of carbon sequestration. However, we rated Pinyon-juniper species 'Neutral' based on the assumption that the PJ woodlands would have less carbon value than montane/subalpine forests.

#### **Section C - Sensitivity**

1. **Dispersal and movement**: *Mimulus gemmiparus* was rated 'Greatly Increase' because it propagates vegetatively within a very narrowly distributed habitat. The *Botrychium* species were rated 'Increase.' According to Beatty et al. (2003), dispersal of *Botrychium lineare* spores probably occurs over short distances via gravity. They suggested that though spores may also travel long distances via wind, effective long-distance dispersal would require specific conditions and isolation, fragmentation, and small population size are likely still important dispersal factors. *Eriogonum pelinophilum* was rated 'Increase' based on the fact that nearly all known plants are older, the species apparently reproduces infrequently, and most seedlings do not survive (P. Lyon, pers. comm.). This rating was extrapolated to *E. clavellatum*, since it is similar in this

respect. *Nuttallia chrysantha* was rated 'Somewhat Increase' based on potential for dispersal by animals and wind, but limited long-term seed viability (Anderson 2006). *Eriogonum* species were given a split rating of 'Somewhat Increase' and 'Neutral' based on U.S. Forest Service species assessment for *E. coloradense* (Anderson 2004), which indicated potential for effective dispersal by animals, water and wind. This information was extrapolated to *E. brandegei*, as it is similar in this respect. *Ptilagrostis*, *Puccinellia*, *Machaeranthera*, and the *Cirsiums* were rated 'Neutral' based on their ability to efficiently disperse via wind. All other species were rated 'Increase' due to the fact that they reproduce primarily by seeds that fall close to the parent plant.

# Definitions of scoring categories are:

| Greatly<br>Increase<br>Vulnerability:  | Species is characterized by severely restricted dispersal or movement capability. This category includes species represented by sessile organisms that almost never disperse more than a few meters per dispersal event. Examples include: plants with large or heavy propagules for which the disperser is extinct or so rare as to be ineffective; species with dispersal limited to vegetative shoots, buds, or similar structures that do not survive (at least initially) if detached from the parent.  |
|--|--|
| Increase<br>Vulnerability:             | Species is characterized by highly restricted dispersal or movement capability. This category includes species that rarely disperse through unsuitable habitat more than about 10 meters per dispersal event, and species in which dispersal beyond a very limited distance (or outside a small isolated patch of suitable habitat) periodically or irregularly occurs but is dependent on highly fortuitous or rare events. Examples include: plants dispersed ballisticly; plant or animal species with free-living propagules or individuals that may be carried more than 10 meters by a tornado or unusually strong hurricane or large flood but that otherwise rarely disperse more than 10 meters; plants that do not fit criteria for Greatly Increase but lack obvious dispersal adaptations (i.e., propagules lack any known method for moving more than 10 meters away from the source plant).  |
| Somewhat<br>Increase<br>Vulnerability: | Species is characterized by limited but not severely or highly restricted dispersal or movement capability. A significant percentage (at least approximately 5%) of propagules or individuals disperse approximately 10-100 meters per dispersal event (rarely farther), or dispersal capability likely is consistent with one of the following examples. Examples include; species that exist in small isolated patches of suitable habitat but regularly disperse or move among patches that are up to 100 meters (rarely farther) apart; many ant-dispersed plant species; plants whose propagules are dispersed primarily by small animals (e.g., some rodents) that typically move propagules approximately 10-100 meters from the source (propagules may be cached or transported incidentally on fur or feathers); plants dispersed by wind with low efficiency (e.g., species with inefficiently plumed seeds and/or that occur predominantly in forests). |
| Neutral:                               | Species is characterized by moderate dispersal or movement capability. A significant percentage (at least approximately 5%) of propagules or individuals disperse approximately 100-1,000 meters per dispersal event (rarely farther), or dispersal capability likely is consistent with one of the following examples. Examples include: species whose individuals exist in small isolated patches of suitable habitat but regularly disperse or move among patches that are 100-1,000 meters (rarely farther) apart; many plant species dispersed by wind with high efficiency (e.g., species with efficiently plumed seeds or very small propagules that occur predominantly in open areas); plant and animal species whose propagules or individuals are dispersed by small animals (e.g., rodents, grouse) that regularly but perhaps infrequently move propagules approximately 100-1,000 meters from the source).   |

| Somewhat<br>Decrease<br>Vulnerability: | Species is characterized by good dispersal or movement capability. Species has propagules or dispersing individuals that readily move 1-10 kilometers from natal or source areas (rarely farther), or dispersal capability likely is consistent with one of the following examples. Examples include: plant species regularly dispersed up to 10 km (rarely farther) by large or mobile animals (e.g., plant has seeds that are cached, regurgitated, or defecated 1-10 kilometers from the source by birds [e.g., corvids, songbirds that eat small fleshy fruits] or mammals or that are transported on fur of large mobile animals such as most Carnivora or ungulates). |
|--|---|
| Decrease<br>Vulnerability:             | Species is characterized by excellent dispersal or movement capability. Species has propagules or dispersing individuals that readily move more than 10 kilometers from natal or source areas, or dispersal capability likely is consistent with one of the following examples.  Examples include: plant or animal species whose individuals often or regularly are dispersed more than 10 kilometers by migratory or otherwise highly mobile animals, air or ocean currents, or humans, including species that readily become established outside their native ranges as a result of intentional or unintentional translocations by humans.                                |

- 2. **Sensitivity to temperature and moisture changes**: This factor pertains to the breadth of temperature and precipitation conditions, at both broad and local scales, within which a species is known to be capable of reproducing, growing, or otherwise existing. Species with narrow environmental tolerances/requirements may be more vulnerable to habitat loss from climate change than are species that thrive under diverse conditions.
- (a.i.) **historical thermal niche**: This factor measures large-scale temperature variation that a species has experienced in recent historical times (i.e., the past 50 years), as approximated by mean seasonal temperature variation (difference between highest mean monthly maximum temperature and lowest mean monthly minimum temperature). It is a proxy for species' temperature tolerance at a broad scale. This factor was calculated in GIS by assessing the relationship between EORs and historical temperature variation data downloaded from NatureServe.

# Definitions of scoring categories are:

| Greatly<br>Increase<br>Vulnerability:  | Considering the mean seasonal temperature variation for occupied cells, the species has experienced <b>very small (&lt; 37° F/20.8° C)</b> temperature variation in the past 50 years. Includes cave obligates and species occurring in thermally stable groundwater habitats. |
|--|--|
| Increase<br>Vulnerability:             | Considering the mean seasonal temperature variation for occupied cells, the species has experienced <b>small (37 - 47° F/20.8 - 26.3° C)</b> temperature variation in the past 50 years.   |
| Somewhat<br>Increase<br>Vulnerability: | Considering the mean seasonal temperature variation for occupied cells, the species has experienced <b>slightly lower than average (47.1 - 57° F/26.3 - 31.8° C)</b> temperature variation in the past 50 years.   |
| Neutral:                               | Considering the mean seasonal temperature variation for occupied cells, the species has experienced <b>average (57.1 - 77° F/31.8 - 44.0° C)</b> temperature variation in the past 50 years.   |
| Somewhat<br>Decrease<br>Vulnerability: | Considering the mean seasonal temperature variation for occupied cells, the species has experienced <b>greater than average (&gt; 77° F/43.0° C)</b> temperature variation in the past 50 years.   |

(a.ii.) **physiological thermal niche**: This factor assesses the degree to which a species is restricted to relatively cool or cold environments that are thought to be vulnerable to loss or significant reduction as a result of climate change. Alpine and cliff/canyon species were rated 'Increase' based on the assumption that these habitats are likely to be reduced as Colorado becomes warmer, and presumably drier. All others were rated 'Neutral.' Definitions of scoring categories are:

| Greatly                                | Species is completely or almost completely (> 90% of occurrences or range) restricted to   |
|--|--|
| Increase<br>Vulnerability:             | relatively cool or cold environments that may be lost or reduced in the assessment area as a result of climate change.   |
| Increase<br>Vulnerability:             | Species is moderately (50-90% of occurrences or range) restricted to relatively cool or cold environments that may be lost or reduced in the assessment area as a result of climate change.                              |
| Somewhat<br>Increase<br>Vulnerability: | Species is somewhat (10-50% of occurrences or range) restricted to relatively cool or cold environments that may be lost or reduced in the assessment area as a result of climate change.                                |
| Neutral:                               | Species distribution is not significantly affected by thermal characteristics of the environment in the assessment area, or species occupies habitats that are thought to be not vulnerable to projected climate change. |
| Somewhat                               | Species shows a preference for environments toward the warmer end of the spectrum.   |
| Decrease<br>Vulnerability:             |  |

(b.i.) **historical hydrological niche**: This factor measures large-scale precipitation variation that a species has experienced in recent historical times (i.e., the past 50 years), as approximated by mean annual precipitation variation across occupied cells within the assessment area. Ratings for this factor were calculated in GIS by overlaying the species' Element Occurrence Records on mean annual precipitation data (1951-2006) from Climate Wizard, and subtracting the lowest pixel value from the highest value.

# Definitions of scoring categories are:

| Greatly                    | Considering the range of mean annual precipitation across occupied cells, the species   |
|----------------------------|---|
| Increase                   | has experienced very small (< 4 inches/100 mm) precipitation variation in the past 50   |
| Vulnerability:             | years.  |
| Increase<br>Vulnerability: | Considering the range of mean annual precipitation across occupied cells, the species has experienced <b>small (4 - 10 inches/100 - 254 mm)</b> precipitation variation in the past 50 years. |
| Somewhat                   | Considering the range of mean annual precipitation across occupied cells, the species   |
| Increase                   | has experienced slightly lower than average (11 - 20 inches/255 - 508 mm)   |
| Vulnerability:             | precipitation variation in the past 50 years.   |
| Neutral:                   | Considering the range of mean annual precipitation across occupied cells, the species has experienced average (21 - 40 inches/509 - 1,016 mm) precipitation variation in the past 50 years.   |
| Somewhat                   | Considering the range of mean annual precipitation across occupied cells, the species   |
| Decrease                   | has experienced greater than average (> 40 inches/1,016 mm) precipitation variation in  |
| Vulnerability:             | the past 50 years.  |

(b.ii.) **physiological hydrological niche**: This factor pertains to a species' dependence on a narrowly defined precipitation/hydrologic regime, including strongly seasonal precipitation patterns and/or specific aquatic/wetland habitats (e.g., certain springs, vernal pools, seeps, seasonal standing or flowing water) or localized moisture conditions that may be highly vulnerable to loss or reduction with climate change. Definitions of scoring categories are:

| Greatly<br>Increase<br>Vulnerability: | Completely or almost completely (>90% of occurrences or range) dependent on a specific aquatic/wetland habitat or localized moisture regime that is highly vulnerable to loss or reduction with climate change AND the expected direction of moisture change (drier or wetter) is likely to reduce the species' distribution, abundance, or habitat quality. If this second condition is not met (e.g., species dependent on springs tied to a regional aquifer that would not be expected to change significantly with climate change), the species should be scored as Neutral. Examples for Greatly Increase include plants that are exclusively or very strongly associated with localized moist microsites (e.g., "hanging gardens" in arid landscapes).   |
|---------------------------------------|---|
| Increase<br>Vulnerability:            | Moderately (50-90% of occurrences or range) dependent on a strongly seasonal hydrologic regime and/or a specific aquatic/wetland habitat or localized moisture regime that is highly vulnerable to loss or reduction with climate change AND the expected direction of moisture change (drier or wetter) is likely to reduce the species' distribution, abundance, or habitat quality. If this second condition is not met, the species should be scored as Neutral. Examples for Increase include certain plants whose life cycles are highly synchronized with Mediterranean precipitation patterns in areas vulnerable to large changes in the amount and seasonal distribution of precipitation. Also included are desert or semidesert plants that frequently occur in but are not restricted to or almost restricted to moisture-accumulating microsites, as well as plants (and animals that depend on these species) for which >50% of populations occur in areas such as sandy soils that are sensitive to changes in precipitation. |

| Somewhat<br>Increase<br>Vulnerability: | Somewhat (10-50%) dependent on a strongly seasonal hydrologic regime and/or a specific aquatic/wetland habitat or localized moisture regime that is highly vulnerable to loss or reduction with climate change AND the expected direction of moisture change (drier or wetter) is likely to reduce the species' distribution, abundance, or habitat quality. If this second condition is not met, the species should be scored as Neutral. Examples: plants (and animals that depend on these species) for which 10-50% of populations occur in areas such as sandy soils that are sensitive to changes in precipitation; certain plants with ranges restricted to seasonal precipitation environments (e.g., summer rainfall deserts) and which have a moderate degree of adaptation to that seasonality. |
|--|--|
| Neutral:                               | Species has little or no dependence on a strongly seasonal hydrologic regime and/or a specific aquatic/wetland habitat or localized moisture regime that is highly vulnerable to loss or reduction with climate change OR hydrological requirements are not likely to be significantly disrupted in major portion of the range.  |
| Somewhat<br>Decrease<br>Vulnerability: | Species has very broad moisture regime tolerances OR would benefit by the predicted change in hydrologic regime. Examples include water-limited species that could increase with increasing precipitation or arid-adapted species that could increase in areas with decreasing moisture availability.  |

Most of the rare plants are already adapted to wide variations in wet versus dry years. Wetland species, cliff/canyon species restricted to seeps, alpine species that prefer wetter micro-sites, and *Aquilegia chrysantha* were rated 'Greatly Increase.' Alpine species that are not restricted to wetter micro-sites were rated 'Neutral.' All other species were rated 'Increase' based on the assumption that most areas within Colorado will get drier (note that there is much less agreement among climate models on predictions for precipitation than there is for temperature). Photosynthetic pathways are unknown for the rare plants, but in all cases where pathways were known for other species in these Genera, those species were C3 (i.e., more vulnerable to decline under drying conditions than C4 plants would be).

(c.) **dependence on specific disturbance regime**: This factor pertains to a species' response to specific disturbance regimes such as fires, floods, severe winds, pathogen outbreaks, or similar events. Definitions of scoring categories are:

| Increase<br>Vulnerability:             | Strongly affected by specific disturbance regime, and climate change is likely to change the frequency, severity, or extent of that disturbance regime in a way that reduces the species' distribution, abundance, or habitat quality. For example, many sagebrush-associated species in regions predicted to experience increased fire frequency/intensity would be scored here due to the anticipated deleterious effects of increased fire on their habitat.   |
|--|---|
| Somewhat<br>Increase<br>Vulnerability: | Moderately affected by specific disturbance regime, and climate change is likely to change the frequency, severity, or extent of that disturbance regime in a way that reduces the species' distribution, abundance, or habitat quality, OR strongly affected by specific disturbance regime, and climate change is likely to change that regime in a way that causes minor disruption to the species' distribution, abundance, or habitat quality. For example, plants in a riverscour community that are strongly tied to natural erosion and deposition flood cycles, which may shift position within the channel rather than disappear as a result of climate change. |
| Neutral:                               | Little or no response to a specific disturbance regime, or climate change is unlikely to change the frequency, severity, or extent of that disturbance regime in a way that affects the range or abundance of the species.  |

| Somewhat<br>Decrease<br>Vulnerability: | Moderately affected by specific disturbance regime, and climate change is likely to change the frequency, severity, or extent of that disturbance regime in a way that increases the species' distribution, abundance, or habitat quality. Many fire-adapted plants can be scored here if a predicted increase in fire frequency/intensity is anticipated to be beneficial.  |
|--|--|
| Decrease<br>Vulnerability:             | Strongly affected by specific disturbance regime, and climate change is likely to change the frequency, severity, or extent of that disturbance regime in a way that increases the species' distribution, abundance, or habitat quality (e.g.,in areas predicted to experience increased fire frequency, invasive grasses that have a strong positive response to fire (e.g., ecosystem function-altering) could be scored here. |

Species that primarily inhabit forest habitats were rated 'Increase' based on the assumption that these systems will be likely to experience more frequent and intense disturbance events (e.g., fire, insect outbreaks) under projected climate change scenarios. One exception to this is *Ipomopsis aggregata* ssp. weberi, which was rated 'Neutral' based on increasing numbers in the wake of landscape-scale beetle kill. Species that inhabit shrublands and Pinyon-juniper were rated 'Somewhat Increase' based on the assumption that these habitats would be more likely to burn under climate change scenarios due to increased temperatures and increase in weedy understory (especially cheatgrass). *Spiranthes diluvialis* was rated 'Somewhat Increase' based on potential for flooding. All other species were rated 'Neutral.'

(d.) **dependence on ice, ice-edge, or snow covered habitats**: Alpine species rated 'Somewhat Increase;' all other species rated 'Neutral.' Definitions of scoring factors are:

| Greatly                                | Highly dependent (>80% of subpopulations or range) on ice- or snow-associated  |
|--|--|
| Increase                               | habitats; or found almost exclusively on or near ice or snow during at least one stage   |
| Vulnerability:                         | of the life cycle.   |
| Increase<br>Vulnerability:             | Moderately dependent (50-80% of subpopulations or range) on ice- or snow-associated habitats; or often found most abundantly on or near ice or snow but also regularly occurs away from such areas.  |
| Somewhat<br>Increase<br>Vulnerability: | Somewhat (10-49% of subpopulations or range) dependent on ice- or snow-associated habitats, or may respond positively to snow or ice but is not dependent on it. For example, certain alpine plants are often associated with long-lasting snowbeds but also commonly occur away from such areas; certain small mammals experience increased survival and may develop relatively large populations under winter snow cover but do not depend on snow cover. Species that benefit from a minimum thickness of ice or snowpack for winter insulation should also be scored here. |
| Neutral:                               | Little dependence on ice- or snow-associated habitats (may be highly dependent in up   |
|  | to 10% of the range).  |

3. **Restriction to uncommon geological features or derivatives** - This factor pertains to a species' need for a particular soil/substrate, geology, water chemistry, or specific physical feature (e.g., caves, cliffs, active sand dunes) for reproduction, feeding, growth, or otherwise existing for one or more portions of the life cycle (e.g., normal growth, shelter, reproduction, seedling establishment). It focuses on the commonness of suitable conditions for the species on the landscape, as indicated by the commonness of the features themselves combined with the degree

of the species' restriction to them. Climate envelopes may shift away from the locations of fixed (within at least a 50 year timeframe) geological features or their derivatives, making species tied to these uncommon features potentially more vulnerable to habitat loss from climate change than are species that thrive under diverse conditions. Definitions of scoring categories are:

| Increase<br>Vulnerability:             | Very highly dependent upon, i.e., more or less endemic to (> 85% of occurrences found on) a particular highly uncommon geological feature or derivative (e.g., soil, water chemistry). Such features often have their own endemics. Examples include serpentine (broad and strict) endemic plants, plants of calcareous substrates where such substrates are uncommon (e.g., California, southeastern U.S.), plants restricted to one or a few specific rock strata, organisms more or less restricted to inland sand dunes or shale barrens, obligate cave-dwelling organisms, and springsnails restricted to springs with high dissolved CO2. This category could also include fish species that require a highly uncommon substrate particle size for their stream bottoms, such as the Colorado pikeminnow ( <i>Ptychocheilus lucius</i> ) that spawns only on rare cobble bars cleared of debris by strong upstream currents.   |
|--|--|
| Somewhat<br>Increase<br>Vulnerability: | Moderately to highly dependent upon a particular geological feature or derivative, i.e., (1) an indicator of but not an endemic to (65-85% of occurrences found on) the types of features described under Increase, OR (2) more or less restricted to a geological feature or derivative that is not highly uncommon within the species' range, but is not one of the dominant types. Examples of the latter include species more or less restricted to active coastal sand dunes, cliffs, salt flats (including shorebirds that require sodic soils), inland waters within a particular salinity range, and non-dominant rock types such as occasional igneous rock intrusions within a landscape mostly dominated by sedimentary and/or metamorphic rocks. This category could also include fish species that require a specific substrate particle size for their stream bottoms, if that type of stream bottom is not one of the dominant types within the species' range. |
| Neutral:                               | Having a <b>clear preference</b> for (> 85% of occurrences found on) a certain geological feature or derivative, where the feature is among the dominant types within the species' range. For example, red spruce prefers acidic, organic soils (not uncommon within its range), although it is occasionally found on other soil types. Many species whose habitat descriptions specify one pH category (acidic, neutral, or basic) and/or one soil particle size (e.g., rocky, sandy, or loamy) will probably fall here, upon confirmation that the substrate type is not particularly uncommon within the species' range.  |
| Somewhat<br>Decrease<br>Vulnerability: | Somewhat flexible but not highly generalized in dependence upon geological features or derivatives, i.e., found on a subset of the dominant substrate/water chemistry types within its range. Most habitat descriptions that mention more than one type of relatively widespread geological feature should probably go here; however, if all types mentioned are uncommon within the species' range, Somewhat Increase may be appropriate. This category also encompasses species not strongly tied to any specific geological feature or derivative, such as many birds and mammals.  |
| Decrease<br>Vulnerability:             | <b>Highly generalized</b> relative to dependence upon geological features or derivatives, i.e., the species is described as a generalist and/or a significant proportion of its occurrences have been documented on substrates or in waters that represent opposite ends of the spectrum of types within the assessment region (e.g., many occurrences known from both acidic and basic soils or waters, or from both sandy and clay soils). Species such as common yarrow ( <i>Achillea millefolium</i> ) and coyote ( <i>Canis latrans</i> ) should be assigned to this category.  |

Species that are tied primarily to barrens habitats were rated 'Increase.' *Ipomopsis globularis* and *Saussurea weberi* were also rated 'Increase' based on their restriction to calcareous substrates. Cliff/canyon species were rated 'Somewhat Increase.' Species that have more than two habitat types as primary habitats were rated 'Somewhat Decrease' based on the assumption that species occupying multiple suitable habitat types will be better able to shift their range/distribution in response to changing habitat conditions. All others were rated 'Neutral.'

- 4. **Reliance on specific interactions** The primary impact of climate change on many species may occur via effects on synchrony with other species on which they depend, rather than through direct physiological stress.
- (a) **Dependence on other species to generate habitat**: rated 'Neutral' for all species. Definitions of scoring categories are:

| Greatly Increase<br>Vulnerability:  | Required habitat generated primarily by one species, and that species is highly to extremely vulnerable to climate change within the assessment area.  |
|-------------------------------------|--|
| Increase<br>Vulnerability:          | Required habitat generated primarily by one species, and that species is at most moderately vulnerable to climate change within the assessment area. See examples of species requiring other species to generate habitat under Greatly Increase Vulnerability. If the climate change vulnerability of the habitat-generating species is unknown, check both Greatly Increase and Increase Vulnerability.   |
| Somewhat Increase<br>Vulnerability: | Required habitat generated primarily by one or more of not more than a few species. For example, a certain degree of specificity exists between particular cactus species and certain nurse plants; burrowing owls ( <i>Athene cunicularia</i> ) depend on excavations made by relatively few species of burrowing mammals; certain plant species depend on large grazing animals to generate disturbance required for establishment and early growth. |
| Neutral:                            | Required habitat generated by more than a few species, or does not involve species-specific processes.   |

- (b) **Dietary versatility**: not applicable to plants.
- (c) **Pollinator versatility**: *Oenothera harringtonii* was rated 'Increase' because it is primarily pollinated by the sphinx moth (Spackman Panjabi 2004). The *Penstemon* species and the *Sclerocactus* species were rated 'Somewhat Increase' based on the need for pollinators, which are thought to be comprised of several genera and species. *Astragalus* species were rated 'Neutral' based on the USFS species assessments for *Astragalus anisus* and *A. missouriensis* var. *humistratus*, which indicated some western *Astragalus* species are visited by over 27 species of bees. This rating was extrapolated to the other *Astragalus* species. Note that pollinators of these Colorado *Astragalus* species have not been identified, so this extrapolation is based on an untested assumption. *Ptilagrostis*, *Puccinellia*, and the *Botrychium* species were rated 'Neutral' because they are wind pollinated. *Townsendia glabella* was rated 'Neutral' based on its

similarities with *A. missouriensis* and *Ipomopsis polyantha* (P. Lyon, pers. comm.). All others were rated either 'Neutral' based on species assessments (also Tepedino 2009 for *Physaria obcordata*), or 'Unknown.'

Definitions of scoring categories are:

| Increase<br>Vulnerability:             | Completely or almost completely dependent on one species for pollination (> 90% of effective pollination accomplished by 1 species) or, if no observations exist, morphology suggests very significant limitation of potential pollinators (e.g., very long corolla tube).  |
|--|---|
| Somewhat<br>Increase<br>Vulnerability: | Completely or almost completely dependent on 2-4 species for pollination (> 90% of effective pollination accomplished by 2-4 species) or, if no observations exist, morphology suggests conformation to a specific "pollination syndrome" (e.g., van der Pijl 1961, Evolution 15: 44-59, http://www.fs.fed.us/wildflowers/pollinators/syndromes.shtml). |
| Neutral:                               | Pollination apparently flexible; five or more species make significant contributions to pollination or, if no observations exist, morphology does not suggest pollinator limitation or pollination syndrome.  |

(d) **Dependence on other species for propagule dispersal**: All species were rated 'Neutral.' Definitions for scoring categories are:

| Increase<br>Vulnerability: | Completely or almost completely (roughly > 90%) dependent on a single species for propagule dispersal. For example, whitebark pine would fit here because Clark's nutcracker is the primary dispersal agent. |
|----------------------------|--|
| Somewhat                   | Completely or almost completely (roughly > 90%) dependent on a small number of   |
| Increase                   | species for propagule dispersal. For example, a freshwater mussel for which only a few   |
| Vulnerability:             | species of fish can disperse larvae.   |
| Neutral:                   | Disperses on its own (most animals) OR propagules can be dispersed by more than a  |
| iveutiai.                  | few species.   |

(e) **Other inter-specific interactions**: This factor refers to interactions unrelated to habitat, seedling establishment, diet, pollination, or propagule dispersal. Here an inter-specific interaction can include mutualism, parasitism, commensalism, or predator-prey relationship.

Definitions for scoring categories are:

| Increase                               | Requires an interaction with a single other species for persistence.  |
|--|---|
| Vulnerability:                         |   |
| Somewhat<br>Increase<br>Vulnerability: | 2006, TREE 21: 64-65).  |
| Neutral:                               | Does not require an interspecific interaction or, if it does, many potential candidates for partners are available. |

The *Astragalus* species were rated 'Increase' based on their known symbiotic relationship with *Rhizobium* bacteria to fix nitrogen. One exception to this is *A. osterhoutii*, which apparently does not share this symbiotic relationship (C. Dawson, pers. comm.). All others were rated either 'Neutral' based on species assessments, or 'Unknown.'

- 5. **Genetic factors** Rated 'Unknown' for all species.
- 6. **Phenological response** Rated 'Unknown' for all species.

# Section D - Documented or modeled response to climate change

All species rated 'Unknown' for each factor in this section.

# Results of the CCVI analysis for PGCN

Of the 121 species scored, 107 were Extremely Vulnerable or Highly Vulnerable (Table B1). Scoring factors are summarized by number of species receiving each possible score in Table B2. Table B3 details the results of the CCVI analysis by species. See Part 3 (Problems Affecting the Species) of this document for discussion.

Table B1. Summary of climate change vulnerability scores for PGCN.

| Index Score           | Number of PGCN |
|-----------------------|----------------|
| Extremely Vulnerable  | 103            |
| Highly Vulnerable     | 4              |
| Moderately Vulnerable | 2              |
| Presumed Stable       | 1              |
| Insufficient Evidence | 11             |

Table B2. Number of PGCN in each scoring category, by exposure and sensitivity

**factors.** \*These factors are calculated as percent of range (e.g., a species range may have 80% in one category and 20% in another category). Number of species column reflects number of species for which the greatest percentage of the range falls within the scoring category.

| Scoring Factor                     | Score                | Number of Species |
|------------------------------------|----------------------|-------------------|
|                                    | >5.5                 | 94                |
| Exposure to temperature increase*  | 5.5 – 5.1            | 16                |
|                                    | Unknown distribution | 11                |
|                                    | <119                 | 5                 |
|                                    | 0.119                | 42                |
| Exposure to reduction in moisture* | 0.096                | 48                |
| Exposure to reduction in moisture  | 0.073                | 14                |
|                                    | 0.05                 | 1                 |
|                                    | Unknown distribution | 11                |
| Natural Barriers                   | Greatly Increase     | 5                 |
| Ivaluiai Dallicis                  | Increase             | 81                |

| Scoring Factor              | Score             | Number of Species |
|-----------------------------|-------------------|-------------------|
|                             | Somewhat Increase | 8                 |
|                             | Neutral           | 18                |
|                             | Unknown           | 9                 |
|                             | Greatly Increase  | 2                 |
|                             | Increase          | 12                |
| Anthropogenic Barriers      | Somewhat Increase | 29                |
|                             | Neutral           | 66                |
|                             | Unknown           | 12                |
|                             | Increase          | 58                |
|                             | Somewhat Increase | 1                 |
| Climate Change Mitigation   | Neutral           | 52                |
|                             | Somewhat Decrease | 6                 |
|                             | Unknown           | 4                 |
|                             | Greatly Increase  | 1                 |
|                             | Increase          | 111               |
|                             | Somewhat Increase | 2                 |
| Dispersal                   | Neutral           | 5                 |
|                             | Somewhat Decrease | 0                 |
|                             | Decrease          | 0                 |
|                             | Unknown           | 2                 |
|                             | Greatly Increase  | 0                 |
|                             | Increase          | 0                 |
| Historical Thermal Niche    | Somewhat Increase | 1                 |
| Thistorical Thermal Niche   | Neutral           | 75                |
|                             | Somewhat Decrease | 34                |
|                             | Unknown           | 11                |
| Physiological Thormal Nicha | Greatly Increase  | 0                 |
| Physiological Thermal Niche | Increase          | 30                |

| Scoring Factor                   | Score             | Number of Species |
|----------------------------------|-------------------|-------------------|
|                                  | Somewhat Increase | 0                 |
|                                  | Neutral           | 88                |
|                                  | Somewhat Decrease | 0                 |
|                                  | Unknown           | 3                 |
|                                  | Greatly Increase  | 33                |
|                                  | Increase          | 48                |
| Historical Hydrological Nicho    | Somewhat Increase | 17                |
| Historical Hydrological Niche    | Neutral           | 12                |
|                                  | Somewhat Decrease | 0                 |
|                                  | Unknown           | 11                |
|                                  | Greatly Increase  | 19                |
|                                  | Increase          | 88                |
| Dhysiological Hydrological Nicks | Somewhat Increase | 1                 |
| Physiological Hydrological Niche | Neutral           | 11                |
|                                  | Somewhat Decrease | 0                 |
|                                  | Unknown           | 2                 |
|                                  | Increase          | 0                 |
|                                  | Somewhat Increase | 44                |
| Diatushanaa Dagima               | Neutral           | 75                |
| Disturbance Regime               | Somewhat Decrease | 0                 |
|                                  | Decrease          | 0                 |
|                                  | Unknown           | 2                 |
|                                  | Greatly Increase  | 1                 |
|                                  | Increase          | 0                 |
| Dependence on Ice/Snow           | Somewhat Increase | 15                |
|                                  | Neutral           | 103               |
|                                  | Unknown           | 2                 |
| Physical Habitat Restriction     | Increase          | 31                |

| Scoring Factor                                     | Score             | Number of Species |
|--|-------------------|-------------------|
|  | Somewhat Increase | 13                |
|  | Neutral           | 66                |
|  | Somewhat Decrease | 9                 |
|  | Decrease          | 0                 |
|  | Unknown           | 2                 |
|  | Greatly Increase  | 0                 |
|  | Increase          | 0                 |
| Dependence on Other Species to<br>Generate Habitat | Somewhat Increase | 0                 |
|  | Neutral           | 119               |
|  | Unknown           | 2                 |
|  | Increase          | 1                 |
| Pollinator Versatility                             | Somewhat Increase | 13                |
| Polimator versatility                              | Neutral           | 49                |
|  | Unknown           | 58                |
|  | Increase          | 0                 |
| Dependence on Other Species for                    | Somewhat Increase | 0                 |
| Propagule Dispersal                                | Neutral           | 117               |
|  | Unknown           | 4                 |
|  | Increase          | 15                |
| Other Species Interactions (e.g.,                  | Somewhat Increase | 2                 |
| mutualisms)  | Neutral           | 17                |
|  | Unknown           | 87                |

**Table B3. Climate Change Vulnerability Index results for PGCN.** GI = Greatly Increase; Inc = Increase; SI = Somewhat Increase; N = Neutral; SD = Somewhat Decrease; D = Decrease; U = Unknown; EV = Extremely Vulnerable; HV = Highly Vulnerable; MV = Moderately Vulnerable; PS = Presumed Stable; IE = Insufficient Evidence to score.

| NatureServe                              | Temperature Scope         |         |       | % <    | -0.051 -0.038 |        |        |       | Natural barriers | Anthropogenic barriers | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |
|--|---------------------------|---------|-------|--------|---------------|--------|--------|-------|------------------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|
| Species                                  | Common Name               | % >5.5F | 5.5 F | -0.119 | 0.119         | -0.096 | -0.073 | -0.05 |                  |                        |                           |                    |                          |                             |                               |                                  |                           |                        |                              |                                 |             | Δ                                 |                          |                     |
| Aletes humilis                           | Larimer Aletes            | 60      | 40    |        |               | 100    |        |       | Inc              | N                      | SD                        | Inc                | N                        | Inc                         | Inc                           | Inc                              | N                         | N                      | SI                           | U                               | N           | N                                 | N                        | EV                  |
| Aletes latilobus                         | Canyonlands aletes        | 100     |       |        |               |        | 100    |       | Inc              | Inc                    | Inc                       | Inc                | N                        | Inc                         | GI                            | Inc                              | N                         | N                      | SI                           | N                               | U           | N                                 | U                        | EV                  |
| Aletes macdougalii<br>ssp. Breviradiatus | Mesa Verde aletes         | 100     |       |        |               | 100    |        |       | N                | SI-N                   | N                         | Inc                | N                        | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | U           | N                                 | U                        | EV                  |
| Aliciella sedifolia                      | Stonecrop gilia           | 100     |       |        |               | 93     | 7      |       | GI               | N                      | N                         | Inc                | N                        | Inc                         | GI                            | GI                               | N                         | SI                     | N                            | N                               | U           | N                                 | U                        | EV                  |
| Anticlea vaginatus                       | Alcove death camas        | 100     |       |        | 100           |        |        |       | Inc              | N                      | N                         | Inc                | N                        | Inc                         | GI                            | GI                               | N                         | N                      | SI                           | N                               | U           | N                                 | U                        | EV                  |
| Aquilegia chrysantha<br>var. rydbergii   | Golden columbine          | 100     |       |        | 100           |        |        |       | N                | N                      | N                         | Inc                | SI                       | N                           | Inc                           | GI                               | N                         | N                      | SD                           | N                               | SI          | N                                 | N                        | EV                  |
| Asclepias uncialis ssp. uncialis         | Dwarf milkweed            | 23      | 77    |        | 71            | 29     |        |       | N                | SI                     | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | N                         | N                      | Ν                            | N                               | N           | N                                 | N                        | EV                  |
| Astragalus anisus                        | Gunnison<br>milkvetch     | 100     |       | 45     | 55            |        |        |       | SI               | SI                     | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | SI                        | Ν                      | N                            | Ν                               | N           | N                                 | Inc                      | EV                  |
| Astragalus cronquistii                   | Cronquist<br>milkvetch    | 100     |       |        |               |        | 28     | 72    | N                | N                      | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus<br>debequaeus                 | DeBeque milkvetch         | 100     |       |        |               | 99     | 1      |       | Inc              | N                      | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | N                         | N                      | SD                           | U                               | N           | N                                 | Inc                      | EV                  |
| Astragalus deterior                      | Cliff-palace<br>milkvetch | 100     |       |        |               | 100    |        |       | Inc              | Inc-SI                 | N                         | Inc                | N                        | Inc                         | Inc                           | Inc                              | N                         | N                      | SI                           | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus<br>equisolensis               | Horseshoe<br>milkvetch    | 100     |       |        |               | 100    |        |       | SI-N             | N                      | N                         | Inc                | N                        | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus humillimus                    | Mancos milkvetch          | 100     |       |        |               |        | 100    |       | Inc              | N                      | Inc                       | Inc                | N                        | Inc                         | GI                            | Inc                              | N                         | N                      | SI                           | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus iodopetalus                   | Violet milkvetch          | 41      | 59    |        | 59            | 41     |        |       | N                | SI                     | Inc                       | Inc                | N                        | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |

| NatureServe                                     |                            | Tempe<br>Scc |                  |               | Hamon AET:PET<br>Moisture Metric Scope |                           |                       |                      |              |        | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |
|---|----------------------------|--------------|------------------|---------------|--|---------------------------|-----------------------|----------------------|--------------|--------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|
| Species   | Common Name                | % >5.5F      | % 5.1 –<br>5.5 F | % <<br>-0.119 | -0.097<br>0.119                        | -0.074 <b>–</b><br>-0.096 | -0.051<br>-<br>-0.073 | -0.028<br>-<br>-0.05 |              |        | ס                         |                    | _                        | Ā                           | ¥                             | Phys                             | De                        |                        | Ы                            | Depe                            |             | Depe                              | )                        |                     |
| Astragalus<br>Ionchocarpus var.<br>hamiltonii   | Hamilton<br>milkvetch      | 100          |                  |               | 100                                    |                           |                       |                      | Inc          | SI     | N                         | Inc                | SD                       | N                           | GI                            | Inc                              | SI                        | N                      | Ν                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus<br>microcymbus                       | Skiff milkvetch            | 100          |                  | 97            | 3                                      |                           |                       |                      | SI-N         | SI-N   | Inc                       | Inc                | SD                       | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus<br>missouriensis var.<br>humistratus | Missouri milkvetch         |              | 100              |               | 100                                    |                           |                       |                      | Inc-SI       | N      | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | SI                        | N                      | SD                           | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus<br>naturitensis                      | Naturita milkvetch         | 100          |                  |               |  | 98                        | 2                     |                      | Inc-<br>SI-N | SI-N   | N                         | Inc                | SD                       | Inc                         | Inc                           | Inc                              | SI                        | N                      | SI                           | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus osterhoutii                          | Kremmling<br>milkvetch     | 100          |                  |               | 100                                    |                           |                       |                      | Inc-SI       | Inc-SI | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | N                        | EV                  |
| Astragalus piscator                             | Fisher Towers<br>milkvetch | 100          |                  |               |  | 100                       |                       |                      | N            | N      | Inc                       | Inc                | N                        | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus rafaelensis                          | San Rafael<br>milkvetch    | 100          |                  |               |  | 91                        | 9                     |                      | Inc          | N      | N                         | Inc                | N                        | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus schmolliae                           | Schmoll milkvetch          | 100          |                  |               |  | 100                       |                       |                      | Inc          | N      | N                         | Inc                | N                        | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Astragalus tortipes                             | Sleeping Ute<br>milkvetch  | 100          |                  |               |  |                           | 100                   |                      | Inc-SI       | Inc-SI | Inc                       | Inc                | N                        | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | Inc                      | EV                  |
| Boechera crandallii                             | Crandall's rock cress      | 100          |                  | 36            | 63                                     | 1                         |                       |                      | N            | N      | Inc                       | Inc                | SD                       | N                           | SI                            | Inc                              | SI                        | N                      | Ν                            | N                               | N           | N                                 | Z                        | EV                  |
| Boechera glareosa                               |                            | 100          |                  |               | 100                                    |                           |                       |                      | Inc          | N      | Inc                       | Inc                | N                        | N                           | GI                            | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Botrychium furcatum                             | Fork-leaved<br>moonwort    |              |                  |               |  |                           |                       |                      | Inc          | U      | N                         | Inc                | U                        | Inc                         | U                             | N                                | N                         | SI                     | N                            | N                               | N           | N                                 | U                        | IE                  |
| Botrychium lineare                              | Narrowleaf grape<br>fern   | 100          |                  | 7             |  | 93                        |                       |                      | Inc          | N      | SD                        | Inc                | N                        | N                           | SI                            | SI                               | SI                        | N                      | SD                           | N                               | N           | N                                 | U                        | HV                  |
| Caesalpinia repens                              | Creeping rush-pea          |              |                  |               |  |                           |                       |                      | U            | U      | U                         | Inc                | U                        | U                           | U                             | Inc                              | Ν                         | N                      | Ν                            | N                               | U           | U                                 | C                        | IE                  |
| Camissonia<br>eastwoodiae                       | Eastwood evening primrose  | 100          |                  |               |  | 42                        | 50                    | 8                    | N            | N      | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | U           | N                                 | U                        | EV                  |

| NatureServe                         |                              |         | Hamon AET:PET<br>Moisture Metric Scope |               |                 |                           |                       | Anthropogenic barriers | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |   |    |
|-------------------------------------|------------------------------|---------|--|---------------|-----------------|---------------------------|-----------------------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|---|----|
| Species                             | Common Name                  | % >5.5F | % 5.1 –<br>5.5 F                       | % <<br>-0.119 | -0.097<br>0.119 | -0.074 <b>–</b><br>-0.096 | -0.051<br>-<br>-0.073 | -0.028<br>-<br>-0.05   |                           | ,                  | כו                       |                             | 1                             | Чd                               | SIH                       | shyd                   | вQ                           | a                               | Ы           | )dəQ                              |                          | Depe                | ) |    |
| Carex stenoptila                    | Small-winged sedge           | 79      | 21                                     | 9             | 35              | 56                        |                       |                        | N                         | Ν                  | N                        | Inc                         | Ν                             | Ν                                | N                         | GI                     | N                            | Ν                               | SD          | Ν                                 | U                        | N                   | U | MV |
| Castilleja puberla                  | Downy Indian-<br>paintbrush  | 90      | 10                                     |               | 0.5             | 90                        | 8                     | 1.5                    | Inc                       | Ν                  | N                        | Inc                         | N                             | Inc                              | N                         | N                      | Ν                            | SI                              | Ν           | N                                 | U                        | N                   | U | EV |
| Cirsium perplexans                  | Adobe thistle                | 100     |  |               | 62              | 38                        |                       |                        | N                         | N                  | Inc                      | N                           | SD                            | N                                | SI                        | Inc                    | SI                           | N                               | N           | N                                 | N                        | N                   | N | HV |
| Cirsium scapanolepis                | Mountain-slope thistle       |         |  |               |                 |                           |                       |                        | U                         | U                  | SD                       | N                           | U                             | N                                | U                         | Inc                    | SI                           | N                               | SD          | N                                 | U                        | N                   | U | IE |
| Cleome multicaulis                  | Slender<br>spiderflower      | 2       | 98                                     |               |                 | 46                        | 54                    |                        | GI                        | N                  | Inc                      | Inc                         | SD                            | N                                | GI                        | GI                     | N                            | N                               | N           | N                                 | U                        | N                   | U | EV |
| Corispermum<br>navicula             | Boat-shaped bugseed          | 100     |  |               | 33              | 67                        |                       |                        | Inc                       | Ν                  | N                        | Inc                         | Ν                             | N                                | GI                        | Inc                    | N                            | Ν                               | Inc         | N                                 | U                        | N                   | U | EV |
| Cryptantha<br>gypsophila            | Gypsum Valley cat's-eye      | 100     |  |               | 8               | 84                        | 8                     |                        | Inc                       | Ν                  | Inc                      | Inc                         | Ν                             | N                                | Inc                       | Inc                    | SI                           | Ν                               | Inc         | N                                 | U                        | N                   | U | EV |
| Delphinium ramosum<br>var. alpestre | Colorado larkspur            | 94      | 6                                      | 3             | 46              | 48                        | 3                     |                        | Inc                       | N                  | N                        | Inc                         | N                             | Inc                              | SI                        | N                      | N                            | SI                              | N           | N                                 | U                        | N                   | U | EV |
| Delphinium robustum                 | Wahatoya Creek<br>larkspur   |         |  |               |                 |                           |                       |                        | Inc                       | U                  | U                        | Inc                         | U                             | Inc                              | U                         | Inc                    | Ν                            | N                               | SI          | N                                 | N                        | N                   | N | IE |
| Descurainia kenheilii               | Heil's tansy<br>mustard      | 100     |  |               |                 |                           | 100                   |                        | Inc                       | N                  | N                        | Inc                         | N                             | Inc                              | GI                        | N                      | N                            | SI                              | N           | N                                 | U                        | N                   | U | EV |
| Dicoria wetherillii                 | Wetherill's dicoria          |         |  |               |                 |                           |                       |                        | U                         | U                  | U                        | U                           | U                             | U                                | U                         | U                      | U                            | U                               | U           | U                                 | U                        | U                   | U | IE |
| Draba exunguiculata                 | Clawless draba               | 100     |  |               | 32              | 52                        | 16                    |                        | Inc                       | N                  | N                        | Inc                         | N                             | Inc                              | SI                        | N                      | N                            | SI                              | N           | N                                 | N                        | N                   | N | EV |
| Draba graminea                      | San Juan whitlow-<br>grass   | 100     |  |               |                 | 75                        | 25                    |                        | Inc                       | N                  | N                        | Inc                         | N                             | Inc                              | SI                        | GI                     | N                            | GI                              | N           | N                                 | N                        | N                   | N | EV |
| Draba grayana                       | Gray's Peak<br>whitlow-grass | 77      | 23                                     |               | 33              | 66                        | 1                     |                        | Inc                       | N                  | N                        | Inc                         | N                             | Inc                              | N                         | N                      | N                            | SI                              | N           | N                                 | N                        | N                   | N | EV |
| Draba malpighiacea                  | Whitlow-grass                | 100     |  |               |                 | 100                       |                       |                        | Inc                       | N                  | SD                       | Inc                         | N                             | N                                | Inc                       | Inc                    | SI                           | N                               | N           | N                                 | U                        | N                   | U | EV |
| Draba smithii                       | Smith Whitlow-<br>grass      | 54      | 46                                     | 1             | 26              | 35                        | 14                    | 24                     | Inc                       | N                  | Inc                      | Inc                         | N                             | Inc                              | N                         | Inc                    | N                            | N                               | SI          | N                                 | N                        | N                   | N | EV |
| Draba weberi                        | Weber's draba                | 100     |  |               |                 | 100                       |                       |                        | GI                        | Ν                  | N                        | Inc                         | N                             | Inc                              | GI                        | GI                     | Ν                            | SI                              | Ν           | N                                 | N                        | N                   | N | EV |

| NatureServe                         |                               | Sco     | erature<br>ope<br>% 5.1 – | %<     |       | non AET:Pi<br>re Metric S |        | Natural barriers | Anthropogenic barriers | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |    |
|-------------------------------------|-------------------------------|---------|---------------------------|--------|-------|---------------------------|--------|------------------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|----|
| Species                             | Common Name                   | % >5.5F | 5.5 F                     | -0.119 | 0.119 | -0.096                    | -0.073 | -0.05            |                        |                           |                    |                          |                             |                               |                                  | <u>.</u>                  |                        |                              |                                 |             |                                   | ă                        |                     |    |
| Erigeron kachinensis                | Kachina daisy                 | 100     |                           |        |       | 100                       |        |                  | Inc                    | SI                        | N                  | Inc                      | N                           | Inc                           | GI                               | GI                        | N                      | N                            | SI                              | N           | U                                 | N                        | U                   | EV |
| Erigeron wilkenii                   | Wilken fleabane               | 100     |                           |        | 100   |                           |        |                  | Inc                    | N                         | Ν                  | Inc                      | N                           | Inc                           | GI                               | Inc                       | N                      | N                            | SI                              | N           | N                                 | U                        | U                   | EV |
| Eriogonum brandegei                 | Brandegee wild buckwheat      | 100     |                           | 86     | 14    |                           |        |                  | Inc                    | N                         | N                  | SI-N                     | N                           | N                             | Inc                              | Inc                       | N                      | N                            | Inc                             | N           | N                                 | N                        | N                   | EV |
| Eriogonum<br>clavellatum            | Comb Wash<br>buckwheat        | 100     |                           |        |       |                           | 99.5   | 0.5              | N                      | SI                        | Inc                | Inc                      | N                           | N                             | GI                               | Inc                       | SI                     | N                            | N                               | N           | U                                 | N                        | U                   | EV |
| Eriogonum<br>coloradense            | Colorado wild<br>buckwheat    | 100     |                           | 33     | 27    | 15                        | 25     |                  | Inc                    | N                         | Ν                  | SI-N                     | N                           | Inc                           | N                                | Inc                       | N                      | SI                           | N                               | N           | N                                 | N                        | N                   | EV |
| Eriogonum<br>pelinophilum           | Clay-loving wild buckwheat    | 100     |                           |        |       | 48                        | 52     |                  | Inc                    | Inc-SI                    | Inc                | Inc                      | SD                          | N                             | Inc                              | Inc                       | SI                     | N                            | N                               | N           | U                                 | N                        | U                   | EV |
| Eutrema edwardsii<br>ssp. penlandii | Penland alpine fen<br>mustard | 100     |                           |        | 28    | 72                        |        |                  | Inc                    | N                         | N                  | Inc                      | N                           | Inc                           | N                                | GI                        | N                      | SI                           | N                               | N           | U                                 | N                        | U                   | EV |
| Gaura neomexicana ssp. coloradensis | Colorado butterfly plant      | 47      | 53                        |        | 47    | 53                        |        |                  | Inc                    | GI-<br>Inc                | N                  | Inc                      | N                           | N                             | Inc                              | GI                        | N                      | N                            | SD                              | N           | U                                 | N                        | U                   | EV |
| Gutierrezia elegans                 | Lone Mesa<br>snakeweed        | 100     |                           |        | 100   |                           |        |                  | Inc                    | SI                        | Inc                | Inc                      | N                           | N                             | GI                               | Inc                       | N                      | N                            | Inc                             | N           | U                                 | N                        | U                   | EV |
| Hackelia besseyi                    | Bessey's stickseed            |         |                           |        |       |                           |        |                  | U                      | U                         | SD                 | Inc                      | U                           | N                             | U                                | Inc                       | SI                     | N                            | N                               | N           | U                                 | N                        | U                   | IE |
| Hackelia gracilenta                 | Mesa Verde<br>stickseed       | 100     |                           |        |       | 100                       |        |                  | N                      | SI                        | N                  | Inc                      | N                           | N                             | Inc                              | Inc                       | SI                     | N                            | N                               | N           | U                                 | N                        | U                   | EV |
| Herrickia horrida                   | Canadian River spiny aster    |         | 100                       |        | 13    | 87                        |        |                  | SI-N                   | N                         | N                  | Inc                      | N                           | N                             | GI                               | Inc                       | SI                     | N                            | N                               | N           | U                                 | N                        | U                   | EV |
| Ipomopsis aggregata<br>ssp. Weberi  | Rabbit Ears gilia             | 100     |                           |        | 65    | 35                        |        |                  | N                      | N                         | SD                 | Inc                      | SD                          | N                             | N                                | Inc                       | N                      | N                            | N                               | N           | N                                 | N                        | N                   | PS |
| Ipomopsis globularis                | Globe gilia                   | 100     |                           |        | 45    | 55                        |        |                  | Inc                    | N                         | N                  | Inc                      | N                           | Inc                           | Inc                              | N                         | N                      | SI                           | Inc                             | N           | N                                 | N                        | U                   | EV |
| Ipomopsis polyantha                 | Pagosa skyrocket              |         | 100                       |        | 100   |                           |        |                  | Inc                    | Inc                       | Inc                | Inc                      | SD                          | N                             | GI                               | Inc                       | N                      | N                            | Inc                             | N           | N                                 | N                        | U                   | EV |
| Lepidium crenatum                   | Alkaline<br>pepperwort        | 100     |                           | 24     | 25    | 51                        |        |                  | SI                     | SI                        | Inc                | Inc                      | N                           | N                             | SI                               | Inc                       | SI                     | N                            | N                               | N           | U                                 | N                        | U                   | EV |
| Lesquerella calcicola               | Rocky Mountain bladderpod     | 17      | 83                        |        | 38    | 62                        |        |                  | Inc                    | SI                        | Inc                | Inc                      | N                           | N                             | Inc                              | Inc                       | N                      | N                            | Inc                             | N           | U                                 | N                        | U                   | EV |

| NatureServe                  |                                  |         | erature<br>ope   |               |                 | Natural barriers          | Anthropogenic barriers | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |      |   |    |
|------------------------------|----------------------------------|---------|------------------|---------------|-----------------|---------------------------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|------|---|----|
| Species                      | Common Name                      | % >5.5F | % 5.1 –<br>5.5 F | % <<br>-0.119 | -0.097<br>0.119 | -0.074 <b>–</b><br>-0.096 | -0.051<br>-<br>-0.073  | -0.028<br>-<br>-0.05      |                    |                          | ס                           |                               | _                                | 돝                         | 噐                      | Phys                         | De                              | Δ           | <u> </u>                          | Dере                     |                     | Depe |   |    |
| Lesquerella congesta         | Dudley Bluffs<br>bladderpod      | 100     |                  |               | 100             |                           |                        |                           | Inc                | Inc                      | Inc                         | Inc                           | N-SD                             | N                         | GI                     | Inc                          | Ν                               | Ν           | Inc                               | Ν                        | SI                  | N    | U | EV |
| Lesquerella parviflora       | Piceance<br>bladderpod           | 100     |                  | 75            | 24              | 1                         |                        |                           | Inc                | N                        | Inc                         | Inc                           | N                                | N                         | Inc                    | Inc                          | N                               | N           | Inc                               | N                        | U                   | N    | U | EV |
| Lesquerella pruinosa         | Pagosa bladderpod                |         | 100              | 1             | 95              | 4                         |                        |                           | Inc                | SI                       | Inc                         | Inc                           | SD                               | N                         | Inc                    | Inc                          | N                               | N           | Inc                               | N                        | N                   | N    | N | EV |
| Lesquerella vicina           | Good-neighbor<br>bladderpod      | 100     |                  | 6             | 49              | 42                        | 3                      |                           | Inc                | Inc                      | N                           | Inc                           | N                                | N                         | Inc                    | Inc                          | SI                              | N           | N                                 | N                        | U                   | N    | U | EV |
| Limnorchis zothecina         | Alcove bog orchid                | 100     |                  |               | 100             |                           |                        |                           | Inc                | N                        | N                           | Inc                           | SD                               | Inc                       | GI                     | GI                           | N                               | N           | SI                                | N                        | U                   | N    | U | EV |
| Lomatium concinnum           | Coloado desert-<br>parsley       | 100     |                  | 42            | 9               | 49                        |                        |                           | SI                 | Inc-SI                   | Inc                         | Inc                           | N                                | N                         | Inc                    | Inc                          | SI                              | N           | N                                 | N                        | U                   | N    | U | EV |
| Lupinus crassus              | Payson lupine                    | 100     |                  | 3             |                 | 97                        |                        |                           | SI-N               | SI-N                     | N                           | Inc                           | SD                               | N                         | SI                     | Inc                          | SI                              | N           | N                                 | N                        | U                   | N    | U | HV |
| Lygodesmia<br>doloresensis   | Dolores River skeletonplant      | 100     |                  |               |                 | 98                        | 2                      |                           | SI                 | SI                       | N                           | Inc                           | SD                               | N                         | Inc                    | Inc                          | SI                              | N           | N                                 | N                        | U                   | N    | U | EV |
| Machaeranthera coloradoensis | Colorado tansy-<br>aster         | 99      | 1                | 3             | 17              | 52                        | 28                     |                           | Inc                | N                        | Inc                         | N                             | N                                | N                         | N                      | Inc                          | N                               | N           | N                                 | N                        | U                   | N    | U | HV |
| Mentzelia rhizomata          | Roan Cliffs blazing star         | 100     |                  | 2             | 93              | 5                         |                        |                           | Inc                | N                        | Inc                         | Inc                           | N                                | N                         | Inc                    | Inc                          | N                               | N           | Inc                               | N                        | U                   | N    | U | EV |
| Mertensia humilis            | Rocky Mountain bluebells         | 100     |                  |               | 76              | 24                        |                        |                           | Inc-<br>SI-N       | SI-N                     | Inc                         | Inc                           | N                                | N                         | SI                     | Inc                          | SI                              | Ν           | N                                 | Ν                        | U                   | N    | U | EV |
| Mimulus gemmiparus           | Budding monkey flower            | 100     |                  |               |                 | 71                        | 29                     |                           | Inc                | N                        | N                           | GI                            | N                                | Inc                       | SI                     | GI                           | N                               | N           | SI                                | N                        | N                   | N    | U | EV |
| Nuttallia chrysantha         | Golden blazing star              | 71      | 29               | 10            | 28              | 62                        |                        |                           | Inc                | SI-N                     | Inc                         | Inc-SI                        | N                                | N                         | Inc                    | Inc                          | N                               | Ν           | Inc                               | Ν                        | N                   | N    | U | EV |
| Nuttallia densa              | Arkansas Canyon stickleaf        | 100     |                  | 1.5           | 98.5            |                           |                        |                           | Inc-SI             | SI-N                     | N                           | Inc                           | N                                | N                         | Inc                    | Inc                          | SI                              | N           | N                                 | N                        | U                   | N    | U | EV |
| Oenothera acutissima         | Narrow-leaf evening primrose     | 100     |                  | 4             | 70              | 26                        |                        |                           | N                  | N                        | N                           | Inc                           | N                                | N                         | Inc                    | GI                           | N                               | N           | N                                 | N                        | U                   | N    | U | EV |
| Oenothera<br>harringtonii    | Arkansas Valley evening primrose | 1       | 99               |               | 17              | 83                        |                        |                           | Inc                | SI-N                     | Inc                         | Inc                           | SD                               | N                         | Inc                    | Inc                          | N                               | N           | Inc                               | N                        | Inc-N               | N    | U | EV |

| NatureServe                             |                            | Tempe<br>Sco |                  | e Hamon AET:PET<br>Moisture Metric Scope |                 |                    |                       |                      |        | Anthropogenic barriers | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |
|---|----------------------------|--------------|------------------|--|-----------------|--------------------|-----------------------|----------------------|--------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|
| Species                                 | Common Name                | % >5.5F      | % 5.1 –<br>5.5 F | % <<br>-0.119                            | -0.097<br>0.119 | -0.074 –<br>-0.096 | -0.051<br>-<br>-0.073 | -0.028<br>-<br>-0.05 |        |                        |                           |                    |                          | Ь                           | Ï                             | Phy                              | Ō                         | _                      |                              | Dep                             |             | Depe                              |                          |                     |
| Oonopsis foliosa var.<br>monocephala    | Rayless<br>goldenweed      |              | 100              |  | 80              | 20                 |                       |                      | N      | N                      | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | N                         | N                      | N                            | N                               | U           | N                                 | U                        | EV                  |
| Oonopsis puebloensis                    | Pueblo<br>goldenweed       | 1            | 99               |  | 5               | 95                 |                       |                      | Inc    | SI-N                   | Inc                       | Inc                | N                        | Ν                           | Inc                           | Inc                              | Ν                         | Ν                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Opuntia heacockiae                      | Heacock's prickly-<br>pear |              |                  |  |                 |                    |                       |                      | U      | U                      | N                         | Inc                | C                        | N                           | U                             | Inc                              | SI                        | N                      | N                            | N                               | U           | N                                 | U                        | IE                  |
| Oreocarya osterhoutii                   | Osterhout's cat's-<br>eye  | 100          |                  |  |                 | 61                 | 39                    |                      | Inc    | Inc-SI                 | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | Ν                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Oreoxis humilis                         | Pikes Peak spring parsely  | 100          |                  |  | 18              | 3                  | 79                    |                      | Inc    | N                      | N                         | Inc                | N                        | Inc                         | Inc                           | N                                | N                         | SI                     | N                            | N                               | N           | N                                 | U                        | EV                  |
| Oxybaphus<br>rotundifolius              | Round-leaf four o'clock    | 7            | 93               |  | 21              | 79                 |                       |                      | Inc    | SI-N                   | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Oxytropis besseyi var.<br>obnapiformis  | Bessey locoweed            | 100          |                  |  | 36              | 64                 |                       |                      | N      | N                      | Inc                       | Inc                | SD                       | N                           | SI                            | Inc                              | SI                        | N                      | N                            | N                               | U           | N                                 | U                        | EV                  |
| Pediocactus<br>knowltonii               | Knowlton cactus            |              |                  |  |                 |                    |                       |                      | U      | U                      | N                         | Inc                | J                        | N                           | U                             | Inc                              | SI                        | N                      | N                            | N                               | U           | N                                 | U                        | IE                  |
| Penstemon crandallii ssp. procumbens    | Crandall's beardtongue     |              |                  |  |                 |                    |                       |                      | U      | U                      | U                         | C                  | U                        | U                           | U                             | U                                | C                         | U                      | U                            | U                               | U           | U                                 | U                        | IE                  |
| Penstemon debilis                       | Parachute penstemon        | 100          |                  |  | 92              | 8                  |                       |                      | Inc    | N                      | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon degeneri                      | Degener<br>beardtongue     | 100          |                  | 29                                       | 71              |                    |                       |                      | N      | N                      | N                         | Inc                | N                        | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon fremontii<br>var. glabrescens | Fremont's beardtongue      | 100          |                  | 29                                       | 55              | 16                 |                       |                      | N      | N                      | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon gibbensii                     | Gibben's<br>beardtongue    | 100          |                  |  |                 | 100                |                       |                      | Inc    | N                      | Inc                       | Inc                | SD                       | N                           | GI                            | Inc                              | N                         | N                      | Inc                          | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon grahamii                      | Graham<br>beardtonuge      | 100          |                  |  |                 |                    | 100                   |                      | Inc    | N                      | Inc                       | Inc                | SD                       | N                           | GI                            | Inc                              | N                         | N                      | Inc                          | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon penlandii                     | Penland<br>penstemon       | 100          |                  |  | 100             |                    |                       |                      | Inc-SI | Inc-SI                 | Inc                       | Inc                | SD                       | N                           | GI                            | Inc                              | SI                        | N                      | N                            | N                               | SI          | N                                 | U                        | EV                  |

| NatureServe                            |                           |         | erature<br>ope   |               |                 | on AET:P                  | Scope                 |                      | Natural barriers | Anthropogenic barriers | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |
|--|---------------------------|---------|------------------|---------------|-----------------|---------------------------|-----------------------|----------------------|------------------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|
| Species                                | Common Name               | % >5.5F | % 5.1 –<br>5.5 F | % <<br>-0.119 | -0.097<br>0.119 | -0.074 <b>–</b><br>-0.096 | -0.051<br>-<br>-0.073 | -0.028<br>-<br>-0.05 |                  |                        | ō                         |                    |                          | ā                           | Ť                             | Phys                             | Ğ                         |                        | ۵                            | Dep                             |             | Depe                              |                          |                     |
| Penstemon scariosus var. albifluvis    | White River penstemon     | 100     |                  |               |                 |                           | 100                   |                      | Inc              | N                      | Inc                       | Inc                | SD                       | N                           | GI                            | Inc                              | N                         | N                      | Inc                          | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon scariosus var. cyanomontanus | Plateau<br>penstemon      | 100     |                  |               | 100             |                           |                       |                      | Inc              | N                      | N                         | Inc                | N                        | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | SI          | N                                 | U                        | EV                  |
| Penstemon teucrioides                  | Germander<br>beardtongue  |         |                  |               |                 |                           |                       |                      | U                | U                      | Inc                       | Inc                | U                        | N                           | U                             | Inc                              | SI                        | N                      | N                            | N                               | SI          | N                                 | U                        | IE                  |
| Phacelia formosula                     | North Park<br>phacelia    | 100     |                  |               | 99              | 1                         |                       |                      | Inc              | U                      | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Phacelia submutica                     | DeBeque phacelia          | 100     |                  |               | 4               | 95                        | 1                     |                      | Inc              | Inc-SI                 | Inc                       | Inc                | SD                       | N                           | GI                            | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Physaria alpina                        | Avery Peak<br>twinpod     | 100     |                  |               | 2               | 98                        |                       |                      | Inc              | N                      | N                         | Inc                | N                        | Inc                         | Inc                           | N                                | N                         | SI                     | N                            | N                               | U           | N                                 | U                        | EV                  |
| Physaria bellii                        | Bell's twinpod            | 42      | 58               |               |                 |                           | 100                   |                      | Inc              | SI                     | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Physaria obcordata                     | Piceance twinpod          | 100     |                  |               | 100             |                           |                       |                      | Inc              | N                      | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | N           | N                                 | U                        | EV                  |
| Physaria pulvinata                     | Cushion<br>bladderpod     | 100     |                  |               | 100             |                           |                       |                      | Inc              | SI-N                   | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Physaria rollinsii                     | Rollins twinpod           | 100     |                  | 22            | 34              | 37                        | 7                     |                      | Inc              | SI-N                   | Inc                       | Inc                | SD                       | N                           | SI                            | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Physaria scrotiformis                  | West Silver<br>bladderpod | 100     |                  |               |                 | 100                       |                       |                      | Inc              | N                      | Inc                       | Inc                | N                        | N                           | GI                            | Inc                              | N                         | N                      | SD                           | N                               | U           | N                                 | U                        | EV                  |
| Potentilla rupincola                   | Rocky Mountain cinquefoil | 93      | 7                |               |                 | 100                       |                       |                      | Inc              | N                      | SI-N                      | Inc                | N                        | Inc                         | N                             | Inc                              | N                         | N                      | SI                           | N                               | N           | N                                 | SI                       | EV                  |
| Ptilagrostis porteri                   | Porter's feathergrass     | 100     |                  | 7             | 45              | 44                        | 4                     |                      | Inc-SI           | N                      | N                         | N                  | N                        | N                           | N                             | GI                               | N                         | N                      | N                            | N                               | N           | N                                 | U                        | MV                  |
| Puccinellia parishii                   | Parish's alkali grass     | 100     |                  |               | 100             |                           |                       |                      | Inc              | SI                     | N                         | N                  | N                        | N                           | GI                            | GI                               | N                         | N                      | N                            | N                               | N           | N                                 | U                        | EV                  |
| Salix arizonica                        | Arizona willow            |         | 100              |               | 100             |                           |                       |                      | GI-<br>Inc       | N                      | N                         | Inc                | N                        | N                           | GI                            | GI                               | N                         | N                      | N                            | N                               | N           | N                                 | SI                       | EV                  |
| Saussurea weberi                       | Weber saussurea           | 100     |                  |               | 8               | 92                        |                       |                      | Inc              | N                      | N                         | Inc                | N                        | Inc                         | SI                            | N                                | N                         | SI                     | N                            | N                               | N           | N                                 | U                        | EV                  |
| Sclerocactus glaucus                   | Colorado hookless cactus  | 100     |                  | 0.5           | 1               | 12                        | 86.5                  |                      | Inc-SI           | SI-N                   | Inc                       | Inc                | SD                       | N                           | Inc                           | Inc                              | SI                        | N                      | N                            | N                               | SI          | N                                 | U                        | EV                  |

| NatureServe                 |                               | Tempe<br>Scc |                  |               | Hamon AET:PET<br>Moisture Metric Scope |                           |                       |                      |            |                        | Climate Change mitigation | Dispersal/Movement | Historical thermal niche | Physiological thermal niche | Historical hydrological niche | Physiological hydrological niche | Dependence on disturbance | Dependence on Ice/snow | Physical habitat specificity | Depend on other spp for habitat | Pollinators | Depend on other spp for dispersal | Other spp interaction(s) | Vulnerability Score |
|-----------------------------|-------------------------------|--------------|------------------|---------------|--|---------------------------|-----------------------|----------------------|------------|------------------------|---------------------------|--------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|---------------------------|------------------------|------------------------------|---------------------------------|-------------|-----------------------------------|--------------------------|---------------------|
| Species                     | Common Name                   | % >5.5F      | % 5.1 –<br>5.5 F | % <<br>-0.119 | -0.097<br>0.119                        | -0.074 <b>–</b><br>-0.096 | -0.051<br>-<br>-0.073 | -0.028<br>-<br>-0.05 |            | Anthropogenic barriers | ij                        |                    |                          | Ph                          | His                           | Physi                            | Del                       | ă                      | 됩                            | Depe                            |             | Deper                             | 0                        |                     |
| Sclerocactus mesa-<br>verde | Mesa Verde<br>hookless cactus | 100          |                  |               |  |                           | 100                   |                      | Inc        | N                      | Inc                       | Inc                | N                        | N                           | GI                            | Inc                              | N                         | N                      | Inc                          | N                               | SI          | N                                 | U                        | EV                  |
| Sisyrinchium pallidum       | Pale blue-eyed grass          | 100          |                  | 26            | 74                                     |                           |                       |                      | Inc        | N                      | N                         | Inc                | N                        | N                           | N                             | GI                               | N                         | N                      | N                            | N                               | U           | N                                 | U                        | EV                  |
| Spiranthes diluvialis       | Ute ladies' tresses           | 88           | 12               |               | 67                                     | 33                        |                       |                      | GI-<br>Inc | GI-<br>Inc             | N                         | Inc                | SD                       | N                           | SI                            | GI                               | SI                        | N                      | N                            | N                               | U           | N                                 | U                        | EV                  |
| Telesonix jamesii           | James telesonix               | 100          |                  |               | 23                                     | 53                        | 24                    |                      | Inc        | N                      | N                         | Inc                | N                        | Inc                         | SI                            | Inc                              | N                         | N                      | SD                           | N                               | N           | N                                 | U                        | EV                  |
| Thalictrum<br>heliophilum   | Sun-loving<br>meadow rue      | 100          |                  | 72            | 28                                     |                           |                       |                      | Inc        | N                      | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | N           | N                                 | U                        | EV                  |
| Thelypodiopsis juniperorum  | Juniper tumble<br>mustard     | 100          |                  |               | 83                                     | 17                        |                       |                      | Inc-SI     | SI-N                   | N                         | Inc                | N                        | N                           | SI                            | Inc                              | SI                        | N                      | N                            | N                               | N           | N                                 | N                        | EV                  |
| Thelypodium paniculatum     | Northwestern thelypody        |              |                  |               |  |                           |                       |                      | U          | U                      | N                         | Inc                | U                        | N                           | U                             | GI                               | N                         | N                      | N                            | N                               | U           | N                                 | U                        | IE                  |
| Townsendia fendleri         | Fendler's<br>townsend-daisy   | 100          |                  | 25            | 73                                     | 2                         |                       |                      | Inc        | N                      | Inc                       | Inc                | N                        | N                           | Inc                           | Inc                              | N                         | N                      | Inc                          | N                               | U           | N                                 | U                        | EV                  |
| Townsendia glabella         | Gray's townsend-<br>daisy     | 47           | 53               |               | 77                                     | 23                        |                       |                      | Inc        | SI-N                   | Inc                       | Inc                | SD                       | N                           | SI                            | Inc                              | N                         | N                      | Inc                          | N                               | N           | N                                 | U                        | EV                  |
| Townsendia rothrockii       | Rothrock<br>townsend-daisy    | 100          |                  | 16            | 42                                     | 31                        | 11                    |                      | Inc        | N                      | N                         | Inc                | N                        | Inc                         | N                             | N                                | N                         | SI                     | N                            | N                               | N           | N                                 | U                        | EV                  |

# Colorado Natural Heritage Program

Campus Delivery 1474, Colorado State University, Fort Collins, CO 80523; <a href="www.cnhp.colostate.edu">www.cnhp.colostate.edu</a>

### Colorado Natural Areas Program

Colorado State Parks, 1313 Sherman Street, Denver, CO 80203; www.parks.state.co.us

### **The Nature Conservancy**

2424 Spruce Street, Boulder, CO 80302; www.tnc.org



*Ipomopsis polyantha*, Pagosa skyrocket. David G. Anderson









