Colorado Wildlife Action Plan: Proposed Rare Plant Addendum



By Colorado Natural Heritage Program For The Colorado Rare Plant Conservation Initiative June 2011

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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);
- U.S. Forest Service species assessments (<u>http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml</u>);
- 4) the Colorado Rare Plant Field Guide (<u>http://www.cnhp.colostate.edu/</u>);
- 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 7 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 6). 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 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 4 and Tables 6 and 7 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 5 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 6 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 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).

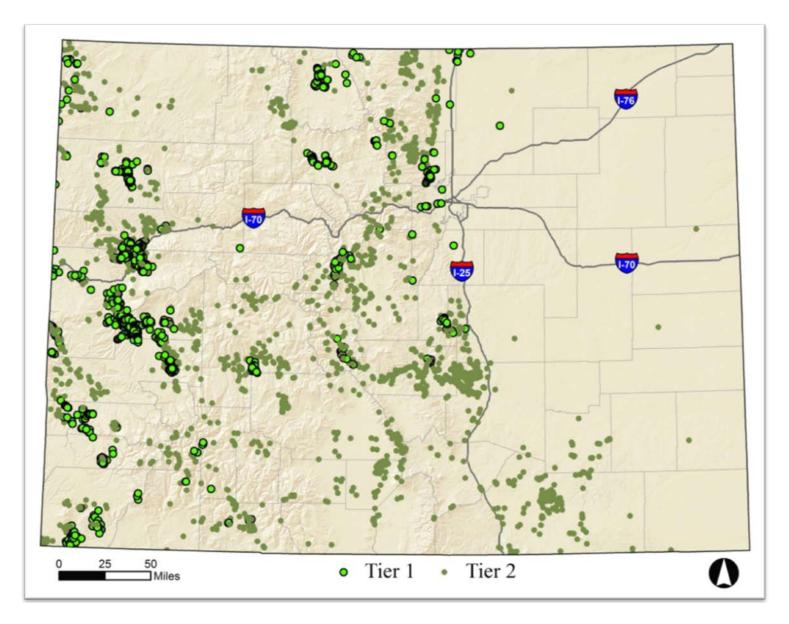


Figure 1. Distribution of Colorado's Plants of Greatest Conservation Need.

Scientific Name	Common Name	Species Priority	Global & State Status Ranks	Federal Agency Status	Percent of Range 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

Table 1. Plants of Greatest Conservation Need

Scientific Name	Common Name	Species Priority	Global & State Status Ranks	Federal Agency Status	Percent of Range 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, BLM/USFS	Endemic

Scientific Name	Common Name	Species Priority	Global & State Status Ranks	Federal Agency Status	Percent of Range 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 Priority	Global & State Status Ranks	Federal Agency Status	Percent of Range 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 alpine	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).

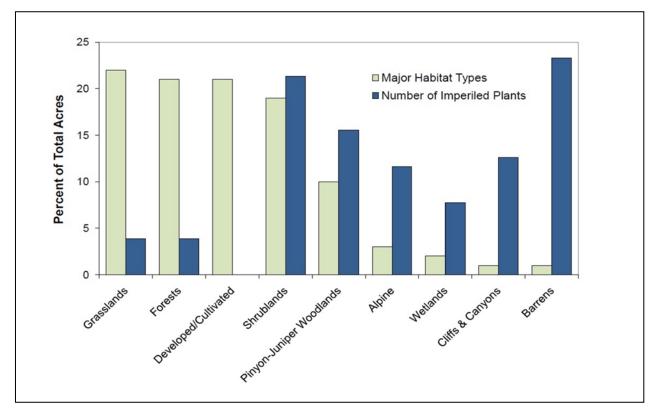


Figure 2. Key habitats as percentage of Colorado and number of PGCN.

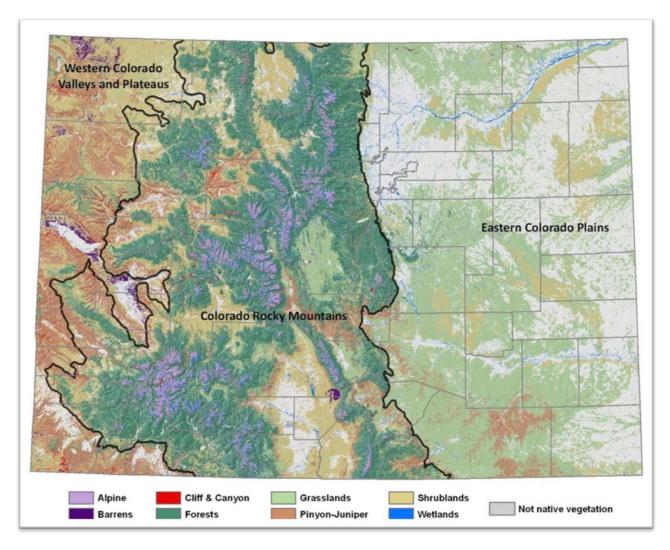


Figure 3. Distribution of major rare plant habitat types in Colorado.

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		
		Douglas Fir		
Madarata	Forests	Mixed Conifer		
Moderate		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 life-cycle 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 (<u>www.climatewizard.org</u>). 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

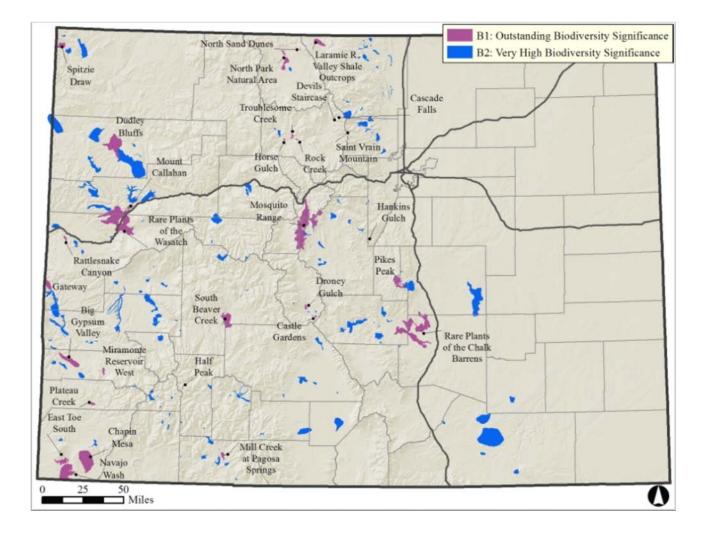


Figure 4. Important Plant Areas for PGCN. To improve map readability, only the B1 Important Plant Areas are labeled.

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 6: 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 (www.cnhp.colostate.edu).

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Aletes humilis	Population	n Status	Populatio	on Trend	Distribution	Туре	Habitat	Primary
	High	D	Stable	D	Southern Rocky Mountains	Р	Cliff and Canyon	
Larimer aletes							Ponderosa Pine	
Tier 2 Plants								
General Threat	Specific Th	nreat			General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerabili poor disper restriction	rsal capac	ity, and/or		Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shi climate cha		alteration d	lue to	Planning and Zoning	resp and	del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenologic of species i species uni	itself and/			Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Climate	Climate va alteration o e.g., drough	of normal	weather par		Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М
Natural Factors	Habitat is l	imited	· ·		Research and Monitoring		earch critical life history/habitat	М
Natural Factors	Habitat is l	imited			Research and Monitoring		nitor populations for early detection potential threats	М
	Recreation				Education and Communication	Pub	lish educational material/sponsor	L
Non-consumptive Disturbance	Recleation					edu	cational programs to raise public ureness	
	Population	n Status	Populatio	on Trend	Distribution	edu	cational programs to raise public	Primary
Non-consumptive Disturbance		n Status D	Populatio			edu awa	cational programs to raise public ureness Habitat Cliff and Canyon	Primary
	Population		•		Distribution	edu awa Type	cational programs to raise public areness Habitat	
Aletes latilobus	Population		•		Distribution	edu awa Type	cational programs to raise public ureness Habitat Cliff and Canyon	
Aletes latilobus	Population	D	•		Distribution	edu awa Type P	cational programs to raise public ureness Habitat Cliff and Canyon	
Aletes latilobus Canyonlands aletes Tier 1 Plants	Population Medium	D nreat ity due to rsal capac	Unknown movement ity, and/or	n barriers,	Distribution Colorado Plateau	edu awa Type P Spe See	cational programs to raise public ureness Habitat Cliff and Canyon Desert Shrub	
Aletes latilobus Canyonlands aletes Tier 1 Plants General Threat Climate	Population Medium Specific Th Vulnerabili poor disper	D nreat ity due to rsal capac to rare hal fting and	Unknown movement ity, and/or bitat feature	n barriers, es	Distribution Colorado Plateau General Conservation Action	edu awa Type P Spe See coll Mo resp and	Cational programs to raise public ureness Habitat Cliff and Canyon Desert Shrub cific Conservation Action d banking (incl. protocols,	Priority
Aletes latilobus Canyonlands aletes Tier 1 Plants General Threat Climate	Population Medium Specific Th Vulnerabili poor disper restriction Habitat shi climate cha	D nreat ity due to rsal capac to rare hal fting and unge al respon itself and/	Unknown movement ity, and/or bitat feature alteration d se to climat	h barriers, es lue to te change	Distribution Colorado Plateau General Conservation Action Ex-situ Conservation	edu awa Type P Spe Coll Mo resp and situ Cor and clim	cational programs to raise public ureness Habitat Cliff and Canyon Desert Shrub cific 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	Priority H
Aletes latilobus Canyonlands aletes Tier 1 Plants General Threat	Population Medium Specific TH Vulnerabili poor disper restriction Habitat shi climate cha Phenologic of species i	D nreat ity due to rsal capac to rare hal fting and unge al respon itself and/ cnown riability (i f normal	Unknown movement ity, and/or bitat feature alteration d se to climat 'or inter-dep intensificat weather pat	barriers, es lue to te change pendent ion or	Distribution Colorado Plateau General Conservation Action Ex-situ Conservation Planning and Zoning	edu awa Type P Spe Coll Mo resp and situ Cor and clim (dis Eng	cational programs to raise public treness Habitat Cliff and Canyon Desert Shrub cific 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 duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors	Priority H
Aletes latilobus Canyonlands aletes Tier 1 Plants General Threat Climate Climate Climate	Population Medium Specific Th Vulnerabili poor disper restriction 1 Habitat shi climate cha Phenologic of species in species unl Climate va alteration o	D nreat ity due to rsal capac to rare hal fting and unge al respon itself and/ cnown riability (i of normal hts, tornad	Unknown movement ity, and/or bitat feature alteration d se to climat /or inter-dep intensificat weather pai dos, etc.)	barriers, es lue to te change pendent ion or	Distribution Colorado Plateau General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Capacity Building and	edu awa Type P Spe See coll Mo resg and situ Cor and clim (dis Eng plan Mo	cational programs to raise public treness Habitat Cliff and Canyon Desert Shrub cific 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 duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) age in collaborative, proactive	Priority H H M

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

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Aletes macdougalii	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
ssp. breviradiatus	Low	D	Unknown	Colorado Plateau	Р	Pinyon-Juniper	
Mesa Verde aletes						Sandy Areas	
Tier 2 Plants							
General Threat	Specific Three	at		General Conservation Action	Spe	cific Conservation Action	Priority
Climate		due to l capaci		Ex-situ Conservation	See	d banking (incl. protocols, ection, and cultivation)	H
Climate	Habitat shiftir climate chang	0	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		elf and/o	se to climate change or inter-dependent	Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of knowledge	Complete dist unknown	ributio	n in Colorado	Research and Monitoring		iduct field inventory to refine known ribution	Н
Climate		ormal	ntensification or weather patterns, los, etc.)	Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М
Lack of knowledge	Population sta	atus unl	known	Research and Monitoring	Mo	nitor population status	М
Non-consumptive Disturband	e Non-motorize	ed recre	ation	Education and Communication	edu	lish educational material/sponsor cational programs to raise public reness	М
Aliciella sedifolia	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
Incicia scarjona	Low	D	Unknown	Southern Rocky Mountains	P	Exposed Rock (alpine)	 Image: A start of the start of
Stonecrop gilia						Meadow Tundra	✓
					G		D · ··
General Threat	Specific Three		. 1	General Conservation Action	-	cific Conservation Action	Priority
General Threat	-	due to l capaci	ity, and/or	General Conservation Action Ex-situ Conservation	See	cific Conservation Action d banking (incl. protocols, ection, and cultivation)	Priority H
General Threat Climate	Vulnerability poor dispersal restriction to r	due to l capaci rare hat ng and a	ity, and/or		See coll Mo resp and	d banking (incl. protocols,	
General Threat Climate Climate	Vulnerability poor dispersal restriction to f Habitat shiftin climate chang Phenological	due to l capaci rare hab ng and a response elf and/o	ity, and/or bitat features alteration due to	Ex-situ Conservation	See coll Moo resp and situ Cor and clin	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	H
General Threat Climate Climate Climate Indirect Consumptive Use	Vulnerability poor dispersal restriction to f Habitat shiftin climate chang Phenological of species itse	due to l capaci rare hab ng and a re response elf and/o own	ity, and/or bitat features alteration due to se to climate change or inter-dependent	Ex-situ Conservation Planning and Zoning	See coll Moo resp and situ Cor and clin (dis Imp	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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	H
General Threat Climate Climate Climate Indirect Consumptive Use Mortality)	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological of species itse species unkno Grazing by do	due to l capaci rare hab ng and a response elf and/o own omestic nanagen	ity, and/or bitat features alteration due to se to climate change or inter-dependent	Ex-situ Conservation Planning and Zoning Research and Monitoring	See coll Moo resp and situ Cor and clim (dis Imp mar Res mar	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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 hate, and other vulnerability factors persal mechanisms, mutualisms) dement compatible grazing hagement earch species/habitat response to hagement or disturbance	H H H
General Threat Climate Climate Climate Climate Indirect Consumptive Use (Mortality) Lack of knowledge Natural Factors	Vulnerability poor dispersal restriction to 1 Habitat shiftin climate chang Phenological of species itse species unkno Grazing by do Response to n poorly unders Small populat	due to l capaci rare hat ng and a response elf and/o own omestic nanager tood cion size	ity, and/or bitat features alteration due to see to climate change or inter-dependent sheep ment/disturbance e	Ex-situ Conservation Planning and Zoning Research and Monitoring Compatible Resource Use	See coll Moor resp and situ Cor and clin (dis Imp mar Res mar Moo	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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) element compatible grazing nagement earch species/habitat response to nagement or disturbance nitor population status	H H H
General Threat Climate Climate Climate Climate Indirect Consumptive Use (Mortality) Lack of knowledge Natural Factors	Vulnerability poor dispersal restriction to 1 Habitat shiftin climate chang Phenological of species itse species unkno Grazing by do Response to n poorly unders Small populat	due to l capaci rare hat ng and a response elf and/o own omestic nanager tood cion size	ity, and/or bitat features alteration due to see to climate change or inter-dependent sheep ment/disturbance e	Ex-situ Conservation Planning and Zoning Research and Monitoring Compatible Resource Use Research and Monitoring	See coll Moo resp and situ Cor and clin (dis Imp mar Res mar Moo Pub edu awa	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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 hate, and other vulnerability factors persal mechanisms, mutualisms) element compatible grazing hagement earch species/habitat response to hagement or disturbance nitor population status lish educational material/sponsor cational programs to raise public reness	H H H H
Tier 1 Plants General Threat Climate Climate Climate Climate Indirect Consumptive Use (Mortality) Lack of knowledge Natural Factors Non-consumptive Disturbance	Vulnerability poor dispersal restriction to 1 Habitat shiftin climate chang Phenological of species itse species unkno Grazing by do Response to n poorly unders Small populat re Non-motorize	due to l capaci rare hat ng and a e response elf and/o own omestic nanagen tood cion size ed recre	ity, and/or bitat features alteration due to see to climate change or inter-dependent sheep ment/disturbance e ation eation	Ex-situ Conservation Planning and Zoning Research and Monitoring Compatible Resource Use Research and Monitoring Research and Monitoring	See coll Moo resp and situ Cor and clin (dis Imp mar Res mar Mor Pub edu awa Wri	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 induct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) olement compatible grazing nagement earch species/habitat response to nagement or disturbance nitor population status dish educational material/sponsor cational programs to raise public	H H H H H
General Threat Climate Climate Climate Climate Indirect Consumptive Use (Mortality) Lack of knowledge Natural Factors Non-consumptive Disturbanc	Vulnerability poor dispersal restriction to 1 Habitat shiftin climate chang Phenological of species itse species unkno Grazing by do Response to n poorly unders Small populat re Non-motorize Motor-powere Climate varial	due to l capaci rare hat ng and a e response elf and/o own omestic nanagen tood cion size ed recree bility (i normal v	ity, and/or bitat features alteration due to see to climate change or inter-dependent sheep ment/disturbance e ation eation ntensification or weather patterns,	Ex-situ Conservation Planning and Zoning Research and Monitoring Compatible Resource Use Research and Monitoring Research and Monitoring Education and Communication	See coll Moo resp and situ Cor and clin (dis Imp mar Res mar Mor Pub edu awa Wri mar Eng	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 induct primary research on rare plant pollinator responses to changing hate, and other vulnerability factors persal mechanisms, mutualisms) idement compatible grazing hagement earch species/habitat response to hagement or disturbance nitor population status lish educational material/sponsor cational programs to raise public reness te and implement travel	H H H H H H

Anticlea vaginatus	Population St	atus	Population Trend	Distribution	Туре	Habitat	Primary
-	Medium	D	Unknown	Utah-Wyoming Rocky Mountains	Р	Cliff and Canyon	\checkmark
Alcove death camas							
Tier 2 Plants							
General Threat	Specific Threa	ıt		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability of poor dispersal restriction to ra	capac	ity, and/or	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftin climate change	0	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		lf and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distr unknown	ributio	n in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Climate		ormal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population sta	tus un	known	Research and Monitoring	Mo	nitor population status	М
Habitat Degradation	Altered hydrol aquifer)	logical	regime (surface or	Maintain or Restore Natural Processes	Res	store natural hydrologic regime	L
Aquilegia chrysantha	Population St	atus	Population Trend	Distribution	Туре	Habitat	Primary
var. rydbergii	Low	D	Declining D	Southern Rocky Mountains	Р	Mountain Streams	
Golden columbine						Seeps and Springs Douglas Fir	
Tier 2 Plants							
General Threat	Specific Threa			General Conservation Action	-	ecific Conservation Action	Priority
Climate	Vulnerability of poor dispersal restriction to ra	capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftin climate change	0	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		lf and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Taxonomic sta	tus is	unclear	Research and Monitoring	Тах	konomic work is needed	Н
Natural Factors	Populations ar	e smal	ll and declining	Research and Monitoring	Mo	nitor population status	Н
Non-consumptive Disturbance	Recreation			Voluntary Standards	for	plement Best Management Practices recreation management	Н
Climate		ormal	intensification or weather patterns, los, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Housing, urban development	n, and	ex-urban	Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for pitat protection	М
Habitat Degradation	Fragmentation	L		Land Protection (Public, Private) Easements, and Resource Rights	hab	ablish legal designation to protect itat (e.g., wilderness, Research tural Area, Special Interest Area)	М
Invasive or Exotic Species	Invasive plants varieties that c			Invasive Species Control and Prevention	Co	ntrol non-natives	М
Lack of knowledge			pollination biology parameters unknown	Research and Monitoring		search critical life history/habitat	М

Asclepias uncialis ssp.	Population Status	s Population Tr	end	Distribution	Туре	Habitat	Primary
uncialis	Medium D	Declining	D	Central Shortgrass Prairie	Р	Shortgrass Prairie	
Dwarf milkweed				Southern Rocky Mountains	0	Pinyon-Juniper	
Tier 2 Plants							
General Threat	Specific Threat			General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due poor dispersal cap restriction to rare	acity, and/or	iers,	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 and	bdel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs	Н
Climate	Phenological resp of species itself ar species unknown			Research and Monitoring	anc clii	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Conversion	Conversion to cro	pland		Land Protection (Public, Private Easements, and Resource Rights		quire conservation easement for bitat protection	Н
Natural Factors	Population limited biological required			Research and Monitoring		search critical life history/habitat nponents	Н
Climate	Climate variability alteration of norm e.g., droughts, torn	al weather pattern		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Indirect Consumptive Use (Mortality)	Incompatible Graz	zing		Voluntary Standards		plement Best Management Practices livestock grazing	М
Non-consumptive Disturbance	Off-road vehicula	r travel		Compatible Resource Use		nage use to be compatible with diversity	М
Habitat Conversion	Energy Developm	lent		Voluntary Standards		plement Best Management Practices energy development and mining	L
Invasive or Exotic Species	Invasive plants			Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	L

Astragalus anisus	Population S	tatus	Population	Trend	Distribution	Туре	Habitat	Primary
U	Medium	D	Stable	D	Southern Rocky Mountains	Р	Sagebrush	\checkmark
Gunnison milkvetch								
Tier 2 Plants								
General Threat	Specific Thre	at			General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersa restriction to	l capac	ity, and/or	rriers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftin climate chang	0	alteration due	to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological of species itse species unkno	elf and			Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Roads				Voluntary Standards		plement Best Management Practices transportation projects	Н
Non-consumptive Disturbance	Motor-power	ed recr	eation		Voluntary Standards		plement Best Management Practices recreation management	Н
Climate	Climate varia alteration of r e.g., droughts	normal	weather patte		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Response to f unknown			ances	Research and Monitoring		search species/habitat response to nagement or disturbance	М
Lack of knowledge	Basic life cyc	le unki	nown		Research and Monitoring		Research critical life history/habitat components	
Habitat Degradation	Altered fire re increased fire			rass)	Invasive Species Control and Prevention	-	Implement integrated weed/pest management plan	
Indirect Consumptive Use (Mortality)	Grazing				Voluntary Standards		Implement Best Management Practices for livestock grazing	
Invasive or Exotic Species	Invasive plan	ts (esp	ecially cheatg	rass)	Invasive Species Control and Prevention	Implement integrated weed/pest management plan		L
A	Population S	totue	Population	Trand	Distribution	Туре	Habitat	Primary
Astragalus cronquistii	Low	D	Unknown	D	Colorado Plateau	P	Desert Shrub	
Cronquist milkvetch								
Tier 2 Plants								
General Threat Climate	poor dispersa	due to l capac	ity, and/or	rriers,	General Conservation Action Ex-situ Conservation	See	ecific Conservation Action ed banking (incl. protocols, lection, and cultivation)	Priority H
Climate	restriction to Habitat shiftin climate chang	ng and		to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological response to climate change of species itself and/or inter-dependent species unknown				Research and Monitoring	Co and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete dis unknown	tributio	on in Colorado)	Research and Monitoring		nduct field inventory to refine known tribution	Н
Climate	Climate varia alteration of r e.g., droughts	normal	weather patte		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
	e.g., urougins	, corna	uos, etc.)					
Habitat Degradation	Roads	, torna			Voluntary Standards		plement Best Management Practices transportation projects	М

Astragalus debequaeus	Population St	tatus	Population 7	Trend	Distribution	Туре	Habitat	Primary
0 1	Medium	D	Stable	D	Southern Rocky Mountains	Р	Barrens	
D-D					Utah High Plateau	Р	Pinyon-Juniper	
DeBeque milkvetch					Colorado Plateau	0	Desert Shrub	
Tier 2 Plants							Sagebrush	
General Threat	Specific Threa	at			General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersal restriction to r	capaci	ity, and/or	rriers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftin climate chang	-	alteration due	to	Planning and Zoning	res	bdel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs	Н
Climate	Phenological i of species itse species unkno	lf and/o		0	Research and Monitoring	and clir	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Resource Extraction	Oil and gas dr	illing			Voluntary Standards		plement Best Management Practices energy development and mining	Н
Climate	Climate variab alteration of n e.g., droughts,	ormal	weather patter		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Roads				Voluntary Standards		plement Best Management Practices transportation projects	М
Lack of knowledge	Complete dist unknown	ributio	n in Colorado		Research and Monitoring		nduct field inventory to refine knowr tribution	n M
Lack of knowledge	Biology and e	cology	poorly know	n	Research and Monitoring		search critical life history/habitat nponents	М

Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

Table 3. - Continued.

Astragalus deterior	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
<u> </u>	Low D All known occurrer	Unknown nces are historical.	Colorado Plateau	Р	Cliff and Canyon	✓
Cliff-palace milkvetch						
Tier 1 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
			Protected Area Management		nage public use to be compatible h biodiversity	Н
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	res and	del potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clii	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Population status un	known	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete distributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
			Education and Communication	edu	olish educational material/sponsor icational programs to raise public areness	М
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Response to disturba	ance unknown	Research and Monitoring		search species/habitat response to nagement or disturbance	М
Non-consumptive Disturbance	Non-motorized recre	eation	Voluntary Standards		plement Best Management Practices recreation management	L

Astragalus equisolensis	Populatio	on Status	Population Trend	Distribution	Туре	Habitat	Primary
	Low	D	Unknown	Colorado Plateau	Р	Pinyon-Juniper	\checkmark
Horseshoe milkvetch							
Tier 2 Plants							
General Threat	Specific T	Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
				Education and Communication	edu	blish educational material/sponsor acational programs to raise public areness	Н
Climate	poor dispe	ersal capac	movement barriers, eity, and/or bitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat sh climate ch	•	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	•	itself and	ise to climate change for inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation				Land Protection (Public, Private) Easements, and Resource Rights	, Exp	pand existing Palisade ACEC	Н
Non-consumptive Disturbance	Recreation	n		Voluntary Standards		plement Best Management Practices recreation management	Н
Climate		of normal	intensification or weather patterns, dos. etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population	-		Research and Monitoring	Mo	nitor population status	М
Astragalus humillimus	Populatio	on Status	Population Trend	Distribution	Туре	Habitat	Primary
Asirugulus numulimus	Low	D	Unknown	Colorado Plateau	Р	Cliff and Canyon	 Image: A start of the start of
Mancos milkvetch							
Tier 1 Plants							
General Threat	Specific T	Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	poor dispe	ersal capac	movement barriers, eity, and/or bitat features	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat sh climate ch	0	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		itself and	se to climate change /or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Population			Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete unknown	distributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Lack of knowledge	Threats ar	e poorly u	nderstood	Research and Monitoring	Mo	nitor population status	Н
Climate	alteration		intensification or weather patterns, dos. etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Astragalus iodopetalus	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
~ •	Medium	D	Unknown	Colorado Plateau	Р	Sagebrush	
Violet milkvetch				Southern Rocky Mountains	Р	Mixed Forest	
Tier 2 Plants							
General Threat	Specific Threa	at		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersal restriction to r	l capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftir climate chang	0	alteration due to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		lf and	ise to climate change /or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete dist unknown	ributic	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
				Education and Communication	edu	olish educational material/sponsor acational programs to raise public areness	М
Climate		ormal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population sta			Research and Monitoring	Mo	nitor population status	М
Non-consumptive Disturbance	Non-motorize	d recre	eation	Voluntary Standards	Imj for	М	
Astragalus	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
lonchocarpus	Low	D	Unknown	Utah-Wyoming Rocky	Р	Pinyon-Juniper	✓
var. hamiltonii Hamilton milkvetch				Mountains		Desert Shrub	
Tier 1 Plants							
General Threat	Specific Threa	at		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersal restriction to r	l capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftir climate chang	0	alteration due to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		lf and/	se to climate change /or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete dist unknown	ributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Lack of knowledge	Population sta			Research and Monitoring		nitor population status	Н
Climate		ormal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Non-consumptive Disturbance	Non-motorize	d recre	eation	Voluntary Standards		plement Best Management Practices recreation management	М
				Education and Communication		blish educational material/sponsor acational programs to raise public	L

Astragalus	Population S	Status	Population 7	Frend	Distribution	Туре	Habitat	Primary
microcymbus	Medium	D	Declining	D	Southern Rocky Mountains	Р	Sagebrush Pinyon-Juniper	
Skiff milkvetch							i mjon vamper	
Tier 1 Plants								
General Threat	Specific Three	at			General Conservation Action	-	cific Conservation Action	Priority
					Land Protection (Public, Private) Easements, and Resource Rights	hab	ablish legal designation to protect itat (e.g., Area of Critical /ironmental Concern)	Н
					Research and Monitoring	Mo	nitor population status	Н
Climate	Vulnerability poor dispersa restriction to	l capac	. .	rriers,	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifti climate chanş	-	alteration due	to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		elf and	nse to climate c /or inter-depen		Research and Monitoring	and clin	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Η
Natural Factors	Herbivory (e.	.g.,rabł	oits)		Research and Monitoring		earch species/habitat response to nagement or disturbance	Н
Climate		normal	(intensification weather patter dos, etc.)		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Non-consumptive Disturbance	Motor-power	ed reci	reation		Education and Communication	edu	lish educational material/sponsor cational programs to raise public areness	М
Non-consumptive Disturbance	Motor-power	ed reci	reation		Voluntary Standards		element Best Management Practices recreation management	М
Astragalus	Population S	Status	Population 7	Frend	Distribution	Туре	Habitat	Primary
missouriensis	Medium	D	Unknown		Southern Rocky Mountains	Р	Deciduous Oak	\checkmark
var. humistratus					-		Ponderosa Pine	\checkmark
Missouri milkvetch							Foothill/Mountain Grassland	
Tier 2 Plants	G 'C' TTI					G		D'''
General Threat	Specific Three			· · · ·	General Conservation Action	-	cific Conservation Action	Priority
Climate	poor dispersa restriction to	l capac		rriers,	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifti climate chanş		alteration due	to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	-	elf and	nse to climate c /or inter-depen		Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urb development		l ex-urban		Land Protection (Public, Private) Easements, and Resource Rights		uire conservation easement for itat protection	Н
Climate		normal	(intensification weather patter dos, etc.)		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population st				Research and Monitoring		nitor population status	М

Astragalus naturitensis	Population St	atus	Population Trend	Distribution	Туре	Habitat	Primary
0	Low	D	Unknown	Colorado Plateau	Р	Cliff and Canyon	
Naturita milkvetch				Southern Rocky Mountains	Р	Pinyon-Juniper	
				Utah High Plateau	0	Sagebrush	
Tier 2 Plants General Threat	Specific Threa			General Conservation Action	Sec	ecific Conservation Action	Duiouity
	1						Priority
Climate	Vulnerability poor dispersal restriction to r	capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftin climate change		alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		lf and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Resource Extraction	Oil and gas dr pipelines, dust	0	including roads,	Voluntary Standards		energy development and mining	Н
Climate		ormal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population sta	tus un	known	Research and Monitoring	Mo	nitor population status	М
Non-consumptive Disturbance	Motor-powere	d recre	eation	Voluntary Standards		blement Best Management Practices recreation management	М

Astragal	us osterhoutii	Population S	Status	Population Trend	Distribution 7	Гуре	Habitat	Primary
0		Low	D	Unknown	Southern Rocky Mountains	Р	Sagebrush	\checkmark
Kremmling	milkvetch							
Tier 1	Plants							
General Three	eat	Specific Three	eat		General Conservation Action	Spe	cific Conservation Action	Priority
					Land Protection (Public, Private), Easements, and Resource Rights	hab Nat	ablish legal designation to protect itat (e.g., wilderness, Research ural Area, Acrea of Critical vironmental Concern))	Н
					Planning and Zoning	issu	mote consideration of biodiversity les in transportation and land use nning processes	Н
Climate		Vulnerability poor dispersa restriction to	al capac	ity, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat shifti climate chang	0	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate			elf and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Con	version	Housing, urb development		ex-urban	Land Protection (Public, Private), Easements, and Resource Rights		quire conservation easement for itat protection	Н
Habitat Deg	radation	Roads			Voluntary Standards		blement Best Management Practices transportation projects	Н
Lack of know	wledge	Population st	atus un	known	Research and Monitoring	Mo	nitor population status	Н
Non-consum	nptive Disturbance	Motor-power	red recr	eation	Education and Communication	edu	blish educational material/sponsor cational programs to raise public areness	Н
Non-consum	nptive Disturbance	Motor-power	red recr	eation	Voluntary Standards		plement Best Management Practices recreation management	Н
Resource Ex	traction	Oil and gas d	lrilling		Voluntary Standards		blement Best Management Practices energy development and mining	Н
Climate			normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Astragalus piscator	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
	Medium	D	Unknown	Colorado Plateau	Р	Sandy Areas	
Fisher Towers milkvetch						Desert Shrub	
Tier 2 Plants						Pinyon-Juniper	
General Threat	Specific Thre	at		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersa restriction to	l capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifti climate chang	0	alteration due to	Planning and Zoning	res and	bdel potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		elf and	ise to climate change /or inter-dependent	Research and Monitoring	and clii	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urb development		l ex-urban	Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for bitat protection	Н
Habitat Degradation				Land Protection (Public, Private) Easements, and Resource Rights	, Ex	pand existing Palisade ACEC	Н
Habitat Degradation	Roads or Rai	lroads		Voluntary Standards		plement Best Management Practices transportation projects	Н
Climate		normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population st			Research and Monitoring	Mo	onitor population status	М
Astragalus rafaelensis	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
	Low	D	Unknown	Colorado Plateau	Р	Pinyon-Juniper	\checkmark
San Rafael milkvetch							
Tier 2 Plants							
General Threat	Specific Thre	at		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersa restriction to	l capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifti climate chang		alteration due to	Planning and Zoning	res anc	bedel potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		elf and	ise to climate change /or inter-dependent	Research and Monitoring	anc clii	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	No threats do	cumen	ted	Research and Monitoring	De	termine threat status	Н
Climate		normal	intensification or weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
	e.g., droughts	s, torna	dos, etc.)				
Lack of knowledge	e.g., droughts Population st			Research and Monitoring	Mo	onitor population status	М

Astragalus schmolliae	Population Status Population Trend	Distribution	Туре	Habitat	Primary
U	Medium D Declining D Rapidly declining	Colorado Plateau	Р	Pinyon-Juniper	✓
Schmoll milkvetch	rapidly deenning				
Tier 1 Plants					
General Threat	Specific Threat	General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifting and alteration due to climate change	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological response to climate change of species itself and/or inter-dependent species unknown	Research and Monitoring	and clin	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Invasive or Exotic Species	Invasive plants	Invasive Species Control and Prevention		p weed infestations and sensitive no ay/no mow zones	Н
Invasive or Exotic Species	Invasive plants	Research and Monitoring		mine impact of post-fire nagement strategies	Н
Lack of knowledge	Population status in areas outside National Park is poorly understood	Research and Monitoring	Мо	nitor population status	Н
Climate	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М
Invasive or Exotic Species	Invasive plants - especially musk thistle and cheatgrass moving into burned areas	Invasive Species Control and Prevention		lement integrated weed/pest nagement plan	М
Lack of knowledge	Current threats are poorly understood on lands outside of the National Park	Research and Monitoring		earch species/habitat response to agement or disturbance	М
Habitat Degradation	Roads	Voluntary Standards		lement Best Management Practices transportation projects	L
Indirect Consumptive Use (Mortality)	Grazing	Compatible Resource Use		element compatible grazing	L

Astragalus tortipes	Population Sta	tus Popula	ation Trend	Distribution	Туре	Habitat	Primary
0	Medium	D Stable	D	Colorado Plateau	Р	Desert Shrub	
Sleeping Ute milkvetch							
Tier 1 Plants General Threat	Specific Threat			General Conservation Action	Spe	ecific Conservation Action	Priority
	Specific Tinea			Research and Monitoring		nitor population status	Н
Climate	Vulnerability du poor dispersal c restriction to rat	apacity, and/	or	Ex-situ Conservation	See	ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting climate change	and alteratio	n due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological re of species itself species unknow	and/or inter-		Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distri	bution in Col	orado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Non-consumptive Disturbance	Motor-powered	recreation		Education and Communication	edu	olish educational material/sponsor acational programs to raise public areness	Н
Non-consumptive Disturbance	Motor-powered	recreation		Voluntary Standards		plement Best Management Practices recreation management	Н
Climate	Climate variabil alteration of nor e.g., droughts, t	rmal weather	patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Conversion to c	ropland?		Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for pitat protection	М
Lack of knowledge	Response to dis	turbance		Research and Monitoring		search species/habitat response to nagement or disturbance	М

Boechera crandallii	Population Status	Population Trend	Distribution	Гуре	Habitat	Primary
	Unknown	Unknown	Southern Rocky Mountains	Р	Sagebrush	
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 poor dispersal capaci restriction to rare hat	ity, and/or	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifting and a climate change	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological response of species itself and/o species unknown		Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Habitat Degradation	Roads		Voluntary Standards		lement Best Management Practices transportation projects	Н
Lack of knowledge	Population status unl	known	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete distribution unknown	n in Colorado	Research and Monitoring		iduct field inventory to refine known ribution	Н
			Land Protection (Public, Private), Easements, and Resource Rights		ablish legal designation to protect itat (e.g., Special Interestl Area)	М
Climate	Climate variability (i alteration of normal e.g., droughts, tornac	weather patterns,	Capacity Building and Cooperation	Eng	age in collaborative, proactive ning and conservation programs	М
Boechera glareosa	Population Status	Population Trend			Habitat	Primary
0	Unknown	Unknown			Barrens	✓
NA						
Tier 1 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capaci		Ex-situ Conservation	-	d banking (incl. protocols,	н.
all		bitat features		coll	ection, and cultivation)	
Climate	Habitat shifting and a climate change	bitat features alteration due to	Planning and Zoning	Mo resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Habitat shifting and a climate change	alteration due to se to climate change	Planning and Zoning Research and Monitoring	Mo resp and situ Cor and clin	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	
Climate	Habitat shifting and a climate change Phenological response of species itself and/	alteration due to se to climate change or inter-dependent		Mo resp and situ Cor and clin (dis Res	del potential habitat/range shifts in oonse 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	
	Habitat shifting and a climate change Phenological response of species itself and/species unknown Threats and response	alteration due to se to climate change or inter-dependent e to change are	Research and Monitoring	Mo resp and situ Cor and clin (dis Res mar Res	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 nate, and other vulnerability factors persal mechanisms, mutualisms) earch species/habitat response to	Н
Climate Lack of knowledge	Habitat shifting and a climate change Phenological response of species itself and/ species unknown Threats and response poorly understood Biology, ecology, an	alteration due to se to climate change or inter-dependent e to change are ad detailed habitat	Research and Monitoring Research and Monitoring	Mo resp and situ Cor and clin (dis Res mar Res con Cor	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 nate, and other vulnerability factors persal mechanisms, mutualisms) earch species/habitat response to nagement or disturbance earch critical life history/habitat	H H H
Climate Lack of knowledge Lack of knowledge	Habitat shifting and a climate change Phenological response of species itself and/ species unknown Threats and response poorly understood Biology, ecology, an are poorly known Complete distributio	alteration due to se to climate change or inter-dependent e to change are ad detailed habitat n in Colorado	Research and Monitoring Research and Monitoring Research and Monitoring	Mo resp and situ Cor and clin (dis Res man Res con Cor dist	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 hate, and other vulnerability factors persal mechanisms, mutualisms) earch species/habitat response to hagement or disturbance earch critical life history/habitat aponents duct field inventory to refine known	H H H

Botrychium lineare	Population Status	Population Tren	d Distribution	Type Habitat	Primary
	Low D	Declining D	Southern Rocky Mountains	P Aspen Forest	
Narrowleaf grape fern				Foothill/Mountain Grassland Mixed Conifer	
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capa restriction to rare ha	city, and/or	s, Ex-situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	Н
Climate	Habitat shifting and climate change	l alteration due to	Planning and Zoning	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological responses of species itself and species unknown		ge Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distributi unknown	on in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
			Research and Monitoring	Monitor population status	М
Climate	Climate variability alteration of norma e.g., droughts, torna	l weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Habitat Degradation	Roads or Railroads		Voluntary Standards	Implement Best Management Practices for transportation projects	М
Lack of knowledge	Details of habitat u	nknown	Research and Monitoring	Determine habitat requirements	М
Botrychium tax. nov.	Population Status	Population Tren	d Distribution	Type Habitat	Primary
"furcatum"	Low X	Unknown	Southern Rocky Mountains	P Meadow Tundra	
•			·	Spruce-Fir	
Fork-leaved moonwort					
Tier 1 Plants					
Tier 1 Plants General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Tier 1 Plants	Specific Threat Vulnerability due to poor dispersal capa restriction to rare ha	city, and/or		Specific Conservation Action Seed banking (incl. protocols, collection, and cultivation)	Priority H
Tier 1 Plants General Threat Climate	Vulnerability due to poor dispersal capa	city, and/or abitat features		Seed banking (incl. protocols,	•
Tier 1 Plants General Threat Climate	Vulnerability due to poor dispersal capa restriction to rare ha Habitat shifting and climate change	city, and/or abitat features I alteration due to nse to climate chan	s, Ex-situ Conservation Planning and Zoning ge Research and Monitoring	Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in	H
Tier 1 Plants General Threat Climate Climate	Vulnerability due te poor dispersal capa restriction to rare he Habitat shifting and climate change Phenological respon of species itself and	city, and/or abitat features I alteration due to nse to climate chan	s, Ex-situ Conservation Planning and Zoning ge Research and Monitoring	Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors	H
Tier 1 Plants General Threat Climate Climate Climate Habitat Degradation	Vulnerability due te poor dispersal capa restriction to rare ha Habitat shifting and climate change Phenological respon of species itself and species unknown	city, and/or abitat features l alteration due to nse to climate chan l/or inter-dependen	s, Ex-situ Conservation Planning and Zoning ge Research and Monitoring t	Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Implement Best Management Practices	H H H
Tier 1 Plants General Threat Climate Climate	Vulnerability due te poor dispersal capa restriction to rare hi Habitat shifting and climate change Phenological respon of species itself and species unknown Roads Biology, ecology, a	city, and/or abitat features I alteration due to nse to climate chan I/or inter-dependen nd detailed habitat	s, Ex-situ Conservation Planning and Zoning ge Research and Monitoring t Voluntary Standards	Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Implement Best Management Practices for transportation projects Research critical life history/habitat	H H H H
Tier 1 Plants General Threat Climate Climate Climate Habitat Degradation Lack of knowledge	Vulnerability due te poor dispersal capa restriction to rare he Habitat shifting and climate change Phenological respon of species itself and species unknown Roads Biology, ecology, a are poorly known	city, and/or abitat features l alteration due to nse to climate chan l/or inter-dependen nd detailed habitat on in Colorado (intensification or l weather patterns,	s, Ex-situ Conservation Planning and Zoning ge Research and Monitoring Voluntary Standards Research and Monitoring	Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Implement Best Management Practices for transportation projects Research critical life history/habitat components Conduct field inventory to refine known	H H H H
Tier 1 Plants General Threat Climate Climate Climate Habitat Degradation Lack of knowledge Lack of knowledge	Vulnerability due te poor dispersal capa restriction to rare he Habitat shifting and climate change Phenological respon of species itself and species unknown Roads Biology, ecology, a are poorly known Complete distributi unknown Climate variability alteration of norma	city, and/or abitat features al alteration due to nse to climate chan l/or inter-dependen nd detailed habitat on in Colorado (intensification or l weather patterns, ados, etc.)	s, Ex-situ Conservation Planning and Zoning ge Research and Monitoring Voluntary Standards Research and Monitoring Research and Monitoring Capacity Building and	Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Implement Best Management Practices for transportation projects Research critical life history/habitat components Conduct field inventory to refine known distribution Engage in collaborative, proactive	H H H H H

Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

Table 3. - Continued.

Caesalpinia repens	Population Status	Population Trend		Habitat	Primary
	Unknown	Unknown		Sandy Areas	
Creeping rush-pea				Desert Shrub	
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	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 in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distributio	on in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Camissonia	Population Status	Population Trend	Distribution	Type Habitat	Primary
<i>eastwoodiae</i> Eastwood evening primrose	Low	Unknown	Colorado Plateau	P Saltbrush Fans and Flats Pinyon-Juniper	
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distributio unknown	on in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Habitat Degradation	Roads		Voluntary Standards	Implement Best Management Practices for transportation projects	М
Lack of knowledge	Population status un	known	Research and Monitoring	Monitor population status	М
Non-consumptive Disturbance	Motor-powered recr		Education and Communication	Publish educational material/sponsor educational programs to raise public awareness	М
Non-consumptive Disturbance	Motor-powered recre	eation	Voluntary Standards	Implement Best Management Practices for recreation management	М

Carex stenoptila	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
Small-winged sedge Tier 2 Plants	Medium D	Unknown	Southern Rocky Mountains	Р	Mountain Streams Shrub-dominated Wetlands Spruce-Fir Aspen Forest Exposed Rock Rocky Mtn Bristlecone Pine	
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	n in Colorado	Research and Monitoring		nduct field inventory to refine knowr ribution	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	М
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	М
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	М
Lack of knowledge	Population status un	known	Research and Monitoring	Mo	nitor population status	М
Non-consumptive Disturbance	Recreation?		Voluntary Standards	1	blement Best Management Practices recreation management	М

Castilleja puberula	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
	Medium D	Unknown	Southern Rocky Mountains	Р	Shrub Tundra	\checkmark
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 to poor dispersal capac restriction to rare ha	ity, and/or	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 ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown	U	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population status un	known	Research and Monitoring	Mo	nitor population status	М
Non-consumptive Disturbance	Recreation		Education and Communication	edu	olish educational material/sponsor icational programs to raise public areness	L
Non-consumptive Disturbance	Recreation		Voluntary Standards		element Best Management Practices recreation management	L

Cirsium	perplexans	Population St	tatus	Population	n Trend	Distribution	Туре	Habitat	Primary
		Low	D	Stable	D	Colorado Plateau	Р	Sagebrush	\checkmark
A J - 1 - 41-1-41	L-					Southern Rocky Mountains	Р	Saltbrush Fans and Flats	
Adobe thist						Utah High Plateau	Р		
Tier 2	Plants	~				~	~		
General Thr	reat	Specific Threa				General Conservation Action	-	ecific Conservation Action	Priority
Climate		Habitat shiftin climate change	e			Planning and Zoning	res	bdel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs	H
Climate		Phenological r of species itsel species unkno	lf and/o			Research and Monitoring	and clii	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Η
Lack of kno	wledge	Most occurren very few in na unknown				Research and Monitoring		search species/habitat response to nagement or disturbance	Н
						Education and Communication	edu	blish educational material/sponsor acational programs to raise public areness	М
						Education and Communicatio	tho	ucate land owners, managers, and see engaged in weed control about biding impacts to native thistles	М
Climate		Climate variab alteration of ne e.g., droughts,	ormal w	eather patte		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Invasive or	Exotic Species	Bio-control of species	non-na	tive Cirsiur	n	Invasive Species Control and Prevention	nat mit	sign weed control activites to avoid ive thistles and develop methods for tigating impacts from bio-control ents such as introduced weevils	М
Lack of kno	wledge	Complete distr unknown	ribution	in Colorad	lo	Research and Monitoring		nduct field inventory to refine know tribution of natural occurrences	n M
Lack of kno	wledge	Biology and e	cology a	are poorly l	known	Research and Monitoring		search critical life history/habitat nponents	М
Habitat Deg	radation	Roads				Voluntary Standards		plement Best Management Practices transportation projects	L
Indirect Cor (Mortality)	nsumptive Use	Grazing				Compatible Resource Use		plement compatible grazing nagement	L
Resource Ex	xtraction	Oil and gas dr	illing			Voluntary Standards		plement Best Management Practices energy development and mining	L

Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

Table 3. - Continued.

	Population Status Population Trend		Habitat	Primary
Cirsium scapanolepis			Mixed Conifer	
	Unknown Unknown		Foothill/Mountain Grassland	
Mountain-slope thistle			Mixed Forest	
Tier 1 Plants				
General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
Climate	Habitat shifting and alteration due to climate change	Planning and Zoning	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological response to climate change of species itself and/or inter-dependent species unknown	Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Invasive or Exotic Species	Bio-control of non-native Cirsium species	Invasive Species Control and Prevention	Educate land owners, managers, and those engaged in weed control about avoiding impacts to native thistles	Н
Invasive or Exotic Species	Bio-control of non-native Cirsium species	Invasive Species Control and Prevention	Design weed control activites to avoid native thistles and develop methods for mitigating impacts from bio-control agents such as introduced weevils	Н
Lack of knowledge	Taxonomy	Research and Monitoring	Taxonomic work	Н
Lack of knowledge	Complete distribution in Colorado unknown	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Climate	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Invasive or Exotic Species	Bio-control of non-native Cirsium species	Invasive Species Control and Prevention	Map weed infestations and sensitive no spray/no mow zones	М
Cleome multicaulis	Population Status Population Trend	Distribution T	'ype Habitat	Primary
	Medium D Declining D	Southern Rocky Mountains	P Grass/Forb Dominated Wetlands Playas	
Slender spiderflower			i nyus	
Tier 2 Plants General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
	Specific fineat	Land Protection (Public, Private), Easements, and Resource Rights	Establish legal designation to protect habitat (e.g., Area of Critical Environmental Concern)	H
Climate		Land Protection (Public, Private), Easements, and Resource Rights	Acquire conservation easement for habitat protection	Н
	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	Easements, and Resource Rights	Acquire conservation easement for	H H
Climate	poor dispersal capacity, and/or	Easements, and Resource Rights	Acquire conservation easement for habitat protection Seed banking (incl. protocols,	
Climate	poor dispersal capacity, and/or restriction to rare habitat features Habitat shifting and alteration due to	Easements, and Resource Rights Ex-situ Conservation Planning and Zoning	Acquire conservation easement for habitat protection Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in	Н
	poor dispersal capacity, and/or restriction to rare habitat features Habitat shifting and alteration due to climate change Phenological response to climate change of species itself and/or inter-dependent species unknown	Easements, and Resource Rights Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring	Acquire conservation easement for habitat protection Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Monitor population status	H
	poor dispersal capacity, and/or restriction to rare habitat features Habitat shifting and alteration due to climate change Phenological response to climate change of species itself and/or inter-dependent	Easements, and Resource Rights Ex-situ Conservation Planning and Zoning Research and Monitoring	Acquire conservation easement for habitat protection Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H H H
Climate	poor dispersal capacity, and/or restriction to rare habitat features Habitat shifting and alteration due to climate change Phenological response to climate change of species itself and/or inter-dependent species unknown Climate variability (intensification or alteration of normal weather patterns,	Easements, and Resource Rights Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and	Acquire conservation easement for habitat protection Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Monitor population status Engage in collaborative, proactive	H H H

Corispermum navicula	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
-	Medium	D	Unknown	Southern Rocky Mountains	Р	Barrens Sandy Areas	
Boat-shaped bugseed						Sundy Thous	
Tier 1 Plants							
General Threat	Specific Three	at		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispersal restriction to r	l capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftir climate chang	0	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	U	elf and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Taxonomic w	ork is 1	needed	Research and Monitoring	Тах	konomy	Н
Lack of knowledge	Complete dist unknown	ributio	n in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	n H
Non-consumptive Disturbance	Motor-power	ed recro	eation	Education and Communication	edu	olish educational material/sponsor icational programs to raise public areness	Н
Non-consumptive Disturbance	Motor-powere	ed recro	eation	Voluntary Standards		plement Best Management Practices recreation management	Н
Climate		ormal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population sta	atus un	known	Research and Monitoring	Mo	nitor population status	М

Cryptantha gypsophila	Population S	Status	Population Trend	Distribution	Type	Habitat	Primary
Стурианна дурзорниа	Medium	D	Unknown	Colorado Plateau	P	Barrens	 Image: A start of the start of
Current Valley act's ave				Southern Rocky Mountains	0	Pinyon-Juniper	\checkmark
Gypsum Valley cat's- eye							
Tier 1 Plants General Threat	Specific Thre	at		General Conservation Action	Sn	ecific Conservation Action	Priorit
	Specific Time			Land Protection (Public, Private) Easements, and Resource Rights	, Est hat	ablish legal designation to protect bitat (e.g., Area of Critical vironmental Concern)	Н
Climate	Vulnerability poor dispersa restriction to	l capac	•	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifti climate chang		alteration due to	Planning and Zoning	res and	odel potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	-	elf and	ise to climate change /or inter-dependent	Research and Monitoring	and clin	nduct primary research on rare plant l pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Oil and gas p	ipeline	s, roads, dust, etc.	Voluntary Standards		plement Best Management Practices energy development and mining	Н
Non-consumptive Disturbance	Motor-power	ed recr	reation	Compatible Resource Use	Su	pport off-road travel restrictions on blic land	Н
Resource Extraction	Oil and gas d	rilling	and uranium mining	Voluntary Standards		plement Best Management Practices energy development and mining	Н
Climate		normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population st			Research and Monitoring	Mo	onitor population status	М
Delphinium ramosum	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
-	Population S Medium	Status D	Population Trend Unknown	Distribution Southern Rocky Mountains	Type P	Habitat Meadow Tundra	Primary
var. alpestre	•		•				
var. alpestre Colorado larkspur	•		•				
var. alpestre Colorado larkspur Tier 2 Plants	•	D	•		Р		Primary Priorit
Delphinium ramosum var. alpestre Colorado larkspur Tier 2 Plants General Threat Climate	Medium Specific Three	D eat due to il capac	Unknown movement barriers, city, and/or	Southern Rocky Mountains General Conservation Action	P Spo Sec	Meadow Tundra	
var. alpestre Colorado larkspur Tier 2 Plants General Threat Climate	Medium Specific Three Vulnerability poor dispersa restriction to	D eat due to d capace rare ha ng and	Unknown movement barriers, city, and/or	Southern Rocky Mountains General Conservation Action	P Sec col Mo res and	Meadow Tundra ecific Conservation Action ed banking (incl. protocols,	Priorit H
var. alpestre Colorado larkspur Tier 2 Plants General Threat Climate	Medium Specific Three Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological	D eat due to dl capac rare ha ng and ge respon elf and/	Unknown movement barriers, city, and/or bitat features alteration due to	Southern Rocky Mountains General Conservation Action Ex-situ Conservation	P Sec col Mc res and situ Co and clin	Meadow Tundra ecific Conservation Action ed banking (incl. protocols, lection, and cultivation) odel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in	Priorit H H
var. alpestre Colorado larkspur Tier 2 Plants General Threat Climate Climate	Medium Specific Three Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its species unknow	D eat due to al capace rare ha ng and ge respon elf and/ own	Unknown movement barriers, eity, and/or bitat features alteration due to ase to climate change	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning	P Speccol Md res and situ Co and clin (di Co	Meadow Tundra ecific Conservation Action ed banking (incl. protocols, lection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in and ex situ conservation needs nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors	Prioriti H H
var. alpestre Colorado larkspur Tier 2 Plants General Threat Climate Climate Climate	Medium Specific Three Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its species unknow Complete dis unknown Climate varia	D eat due to d capace rare ha ng and ge respon elf and/ own tributio	Unknown o movement barriers, sity, and/or bitat features alteration due to asse to climate change /or inter-dependent on in Colorado	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring	P Spy Sec col Md res and situ Co and clin (di Co dis En	Meadow Tundra ecific Conservation Action ed banking (incl. protocols, lection, and cultivation) odel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known	Prioriti H H
var. alpestre Colorado larkspur Tier 2 Plants General Threat Climate Climate Lack of knowledge Climate	Medium Medium Specific Three Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its species unknown Complete dis unknown Climate varia alteration of the climate chang	D eat due to d capace rare ha ng and ge respon elf and/ own tributic ubility (normal s, torna	Unknown o movement barriers, city, and/or bitat features alteration due to ase to climate change /or inter-dependent on in Colorado intensification or weather patterns, dos, etc.)	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and	P Spr Sec col res and situ Co and clin (di (di Co dis En pla	Meadow Tundra ecific Conservation Action ed banking (incl. protocols, lection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known tribution gage in collaborative, proactive	Prioriti H H H
var. alpestre Colorado larkspur Tier 2 Plants General Threat	Medium Specific Three Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its species unknow Complete dis unknown Climate varia alteration of e.g., droughts	D eat due to d capace rare ha ng and ge respon elf and/ own tributic ubility (normal s, torna	Unknown o movement barriers, city, and/or bitat features alteration due to ase to climate change /or inter-dependent on in Colorado intensification or weather patterns, dos, etc.)	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and Cooperation	P Spr Sec col res and situ Co ann clir (di Co dis En pla Mo Pui edu	Meadow Tundra ecific Conservation Action ed banking (incl. protocols, lection, and cultivation) odel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known tribution gage in collaborative, proactive nning and conservation programs	Prioriti H H H M

Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

Table 3. - Continued.

Delphinium robustum	Population Status	Population Trend		Habitat	Primary
Deprimin roousium	Unknown	Unknown		Cliff and Canyon	✓
Wahatoya Creek larkspur				Aspen Forest	
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capaci restriction to rare hab	ity, 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 response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respons of species itself and/o species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distribution unknown	n in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Lack of knowledge	Population status unl	known	Research and Monitoring	Monitor population status	М
Lack of knowledge	Biology, ecology, an are poorly known	d detailed habitats	Research and Monitoring	Research critical life history/habitat components	М
Lack of knowledge	Threats unknown		Research and Monitoring	Research species/habitat response to management or disturbance	М
Descurainia kenheilii	Population Status	Population Trend	Distribution	Type Habitat	Primary
Descurainia kenheilii	Population Status Low X	Population Trend Unknown	Distribution Southern Rocky Mountains	TypeHabitatPMeadow Tundra	Primary ✓
Descurainia kenheilii Heil's tansy mustard	-	•		••	
	-	•		••	
Heil's tansy mustard	-	•		••	
Heil's tansy mustard Tier 1 Plants	Low X	Unknown movement barriers, ity, and/or	Southern Rocky Mountains	P Meadow Tundra	
Heil's tansy mustard Tier 1 Plants General Threat	Low X Specific Threat Vulnerability due to poor dispersal capaci	Unknown movement barriers, ity, and/or pitat features	Southern Rocky Mountains General Conservation Action	P Meadow Tundra Specific Conservation Action Seed banking (incl. protocols,	Priority
Heil's tansy mustard Tier 1 Plants General Threat Climate	Low X Specific Threat Vulnerability due to poor dispersal capaci restriction to rare hat Habitat shifting and a climate change	Unknown movement barriers, ity, and/or bitat features alteration due to se to climate change	Southern Rocky Mountains General Conservation Action Ex-situ Conservation	 P Meadow Tundra Specific Conservation Action Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in 	Priority H H
Heil's tansy mustard Tier 1 Plants General Threat Climate Climate	Low X Specific Threat Vulnerability due to poor dispersal capaci restriction to rare hat Habitat shifting and a climate change Phenological response of species itself and/o	Unknown movement barriers, ity, and/or bitat features alteration due to see to climate change or inter-dependent	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning	P Meadow Tundra Specific Conservation Action Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors	Priority H H
Heil's tansy mustard Tier 1 Plants General Threat Climate Climate	Low X Specific Threat Vulnerability due to poor dispersal capaci restriction to rare hal Habitat shifting and a climate change Phenological response of species itself and/a species unknown Threats and response	Unknown movement barriers, ity, and/or bitat features alteration due to se to climate change or inter-dependent e to change are	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring	P Meadow Tundra Specific Conservation Action Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Research species/habitat response to	Priority H H
Heil's tansy mustard Tier 1 Plants General Threat Climate Climate Climate Lack of knowledge	Low X Specific Threat Vulnerability due to poor dispersal capaci restriction to rare hal Habitat shifting and a climate change Phenological response of species itself and/a species unknown Threats and response poorly understood Biology, ecology, an	Unknown movement barriers, ity, and/or bitat features alteration due to se to climate change or inter-dependent e to change are d detailed habitat	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring	P Meadow Tundra Specific Conservation Action Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Research species/habitat response to management or disturbance Research critical life history/habitat	Priority H H H H
Heil's tansy mustard Tier 1 Plants General Threat Climate Climate Climate Lack of knowledge Lack of knowledge	Low X Specific Threat Vulnerability due to poor dispersal capaci restriction to rare hat Habitat shifting and a climate change Phenological response of species itself and/a species unknown Threats and response poorly understood Biology, ecology, an are poorly known Complete distribution	Unknown movement barriers, ity, and/or bitat features alteration due to se to climate change or inter-dependent e to change are d detailed habitat n in Colorado known	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Research and Monitoring	P Meadow Tundra Specific Conservation Action Seed banking (incl. protocols, collection, and cultivation) Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms) Research species/habitat response to management or disturbance Research critical life history/habitat components Conduct field inventory to refine known	Priority H H H H

Dicoria	wetherillii	Population Status	Population Trend		Habitat	Primary
		Unknown	Unknown	-	Unknown	
Wetherill's	s dicoria					
Tier 2	Plants					
General Th	hreat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate		Phenological respon of species itself and/ species unknown	U	Research and Monitoring	Conduct primary research on rare p and pollinator responses to changin climate, and other vulnerability fac (dispersal mechanisms, mutualisms)	ng tors
Lack of kn	nowledge	Distribution, status, biology/ecology, tax are all unknown	· · · · · · · · · · · · · · · · · · ·	Research and Monitoring	Basic research on all aspects of thi species' conservation are needed	s H
Draha e	exunguiculata	Population Status	Population Trend	Distribution	Type Habitat	Primary
21404		Low D	Stable D	Southern Rocky Mountains	P Exposed Rock (alpine) Meadow Tundra	
Clawless d	Iraba					
Tier 2	Plants					
General Th	hreat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate		Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	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 shift response to projected climate chan and prepare adaptation plan to defi situ and ex situ conservation needs	ges ne in
Climate		Phenological respon of species itself and/ species unknown		Research and Monitoring	Conduct primary research on rare p and pollinator responses to changin climate, and other vulnerability fac (dispersal mechanisms, mutualisms)	ng tors
Lack of kn	nowledge	Numbers and distrib known	ution are poorly	Research and Monitoring	Conduct field inventory to refine k distribution and abundance	nown H
Climate		Climate variability (alteration of normal e.g., droughts, tornal	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation program	M
Non-consu	Imptive Disturbance	Non-motorized recre	eation	Education and Communication	Publish educational material/spons educational programs to raise publ awareness	
Non-consu	imptive Disturbance	Non-motorized recre	eation	Voluntary Standards	Implement Best Management Pract for recreation management	tices M
Lack of kn	nowledge	Biology, ecology, an known	nd habitat are poorly	Research and Monitoring	Research critical life history/habita components	t L
Natural Fa	ctors	Trampling by mount	ain goats	Research and Monitoring	Research species/habitat response management or disturbance	to L

Draba graminea	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary	
	Medium	D	Unknown	Southern Rocky Mountains	Р	Exposed Rock (alpine) Shrub Tundra		
San Juan whitlow-grass						Siliub Tulidia		
Tier 2 Plants								
General Threat	Specific Three	at		General Conservation Action	Spe	cific Conservation Action	Priority	
Climate	Vulnerability poor dispersal restriction to r	l capac		Ex-situ Conservation		Seed banking (incl. protocols, collection, and cultivation)		
Climate	Habitat shiftir climate chang	0	alteration due to	Planning and Zoning	resp and	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs		
Climate		elf and/	se to climate change for inter-dependent	Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н	
Climate		ormal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М	
Lack of knowledge			on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	М	
Lack of knowledge	Population sta	atus un	known	Research and Monitoring	Mo	nitor population status	L	
Draba grayana	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary	
	Unknown		Unknown	Southern Rocky Mountains	Р	Exposed Rock (alpine)		
Gray's Peak whitlow-grass								
Tier 2 Plants	Specific Three	at		General Conservation Action	Spe	cific Conservation Action	Priority	
Gray's Peak whitlow-grass Tier 2 Plants General Threat	Specific Three	at	_	General Conservation Action Species Management	Mai	cific Conservation Action intain/update comprehensive species abase	Priority H	
Tier 2 Plants General Threat		due to l capac	ity, and/or		Mai data See	intain/update comprehensive species	•	
Tier 2 Plants General Threat Climate	Vulnerability poor dispersal restriction to	due to l capac rare hal	ity, and/or	Species Management	Mai data See coll Mo resp and	intain/update comprehensive species abase d banking (incl. protocols,	Н	
Tier 2 Plants General Threat Climate Climate	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological	due to l capac rare hai ng and ge respon elf and/	ity, and/or bitat features alteration due to	Species Management Ex-situ Conservation	Mai data See coll Mo resp and situ Cor and clin	intain/update comprehensive species abase d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	H H	
Tier 2 Plants General Threat Climate Climate	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological of species itse species unkno	due to l capac rare hal ng and ge respon elf and/ own	ity, and/or bitat features alteration due to se to climate change	Species Management Ex-situ Conservation Planning and Zoning	Mai data See coll Mo resp and situ Cor and clin (dis Cor	intain/update comprehensive species ibase 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 nate, and other vulnerability factors	H H H	
Tier 2 Plants General Threat Climate Climate Climate Lack of knowledge	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological of species itse species unkno Numbers and known Climate varial	due to l capac rare hal ng and ge respon elf and/ own distrib bility (inormal	ity, and/or bitat features alteration due to se to climate change /or inter-dependent ution are poorly intensification or weather patterns,	Species Management Ex-situ Conservation Planning and Zoning Research and Monitoring	Mai data See coll Mo resp and situ Cor and clin (dis Cor dist	intain/update comprehensive species abase 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 nate, and other vulnerability factors persal mechanisms, mutualisms) aduct field inventory to refine known	H H H	
Tier 2 Plants	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological of species itse species unkno Numbers and known Climate varial alteration of m	due to l capac rare hal ng and ge respon elf and/ own distrib bility (i normal , tornad	ity, and/or bitat features alteration due to se to climate change (or inter-dependent ution are poorly intensification or weather patterns, dos, etc.)	Species Management Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and	Mai data See coll Mo resp and situ Cor and clin (dis Cor dist Eng plar	intain/update comprehensive species ibase d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs induct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) induct field inventory to refine known ribution and abundance gage in collaborative, proactive	H H H H	
Tier 2 Plants General Threat Climate Climate Climate Lack of knowledge Climate	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological of species itse species unkno Numbers and known Climate varial alteration of m e.g., droughts	due to l capac rare hal ng and ge respon elf and/ own distrib bility (normal , tornac ed recre	ity, and/or bitat features alteration due to se to climate change (or inter-dependent ution are poorly intensification or weather patterns, dos, etc.) eation	Species Management Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and Cooperation	Mai data See coll Mo resp and situ Cor and clin (dis Cor dist Eng plar plar a u Pub edu awa Imp	intain/update comprehensive species ibase 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 induct primary research on rare plant pollinator responses to changing mate, and other vulnerability factors persal mechanisms, mutualisms) induct field inventory to refine known ribution and abundance gage in collaborative, proactive ming and conservation programs dish educational material/sponsor cational programs to raise public	H H H H H M	
Tier 2 Plants General Threat Climate Climate Climate Lack of knowledge Climate Non-consumptive Disturbance	Vulnerability poor dispersal restriction to n Habitat shiftin climate chang Phenological of species itse species unkno Numbers and known Climate varial alteration of m e.g., droughts Non-motorize	due to l capac rare hal ng and ge respon elf and/ own distrib bility (normal , tornac ed recree	ity, and/or bitat features alteration due to se to climate change (or inter-dependent ution are poorly intensification or weather patterns, dos, etc.) eation	Species Management Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and Cooperation Education and Communication	Mai data See coll Mo resp and situ Cor and clin (dis Cor dist Eng plan Pub edu awa Imp for Res	intain/update comprehensive species ibase 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 mate, and other vulnerability factors persal mechanisms, mutualisms) induct field inventory to refine known ribution and abundance gage in collaborative, proactive ming and conservation programs obish educational material/sponsor cational programs to raise public ureness blement Best Management Practices	H H H H M M	

Draba malpighiacea	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
	Unknown	Unknown	Southern Rocky Mountains		Aspen Forest Spruce-Fir	
Whitlow-grass					Sprace-1 II	
Tier 1 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to r poor dispersal capacit restriction to rare hab	ty, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and a climate change	lteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respons of species itself and/o species unknown	U	Research and Monitoring	and clin	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of knowledge	Threats and response poorly understood	to change are	Research and Monitoring		earch species/habitat response to nagement or disturbance	Н
Lack of knowledge	Biology, ecology, and are poorly known	d detailed habitat	Research and Monitoring		earch critical life history/habitat	Н
Lack of knowledge	Complete distribution unknown	1 in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Lack of knowledge	Population status unk	nown	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Taxonomic status is u	incertain	Research and Monitoring	Тах	conomic work is needed	Н
Climate	Climate variability (in alteration of normal v e.g., droughts, tornad	veather patterns,	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М

Draba smithii	Population Sta	tus Population Trend	Distribution	Туре	Habitat	Primary
	Medium	D Unknown	Southern Rocky Mountains	Р	Cliff and Canyon Aspen Forest	
Smith whitlow-grass					Mixed Forest	\square
Tier 2 Plants					Upland Shrub	
General Threat	Specific Threat	:	General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	poor dispersal of	ue to movement barriers, capacity, and/or re habitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting climate change	g and alteration due to	Planning and Zoning	res	bdel potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in a and ex situ conservation needs	Н
Climate		f and/or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Non-consumptive Disturbance	Non-motorized	recreation	Voluntary Standards		plement Best Management Practices recreation management	Н
			Education and Communication	edu	blish educational material/sponsor icational programs to raise public areness	М
Climate		lity (intensification or rmal weather patterns, tornados, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Roads		Voluntary Standards		plement Best Management Practices transportation projects	М
Lack of knowledge	Numbers and d known	istribution are poorly	Research and Monitoring		nduct field inventory to refine known tribution and abundance	М
Lack of knowledge	Biology, ecolog known	gy, and habitat are poorly	Research and Monitoring		search critical life history/habitat nponents	М

Draba weberi	Population	n Status	Population Trend	Distribution	Туре	Habitat	Primary
	Low	D	Unknown	Southern Rocky Mountains	Р	Mountain Streams	\checkmark
Weber's draba							
Tier 1 Plants							
General Threat	Specific Th	ireat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	poor disper	sal capac	movement barriers, city, and/or bitat features	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shit climate cha	U	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Η
Climate		tself and	nse to climate change /or inter-dependent	Research and Monitoring	and clim	duct primary research on rare plant pollinator responses to changing hate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of knowledge	Population	status ur	ıknown	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete d unknown	listributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Climate		f normal	(intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Natural sys (hydrologic		ification n construction	Education and Communication		cate dam operator about avoiding /or mitigating impacts	М
Lack of knowledge	Biology, ec known	ology, a	nd habitat are poorly	Research and Monitoring		earch critical life history/habitat	М
Non-consumptive Disturbance	Non-motor	ized recr	eation	Education and Communication		rk with land manager to post No	М
					Tres	spassing signage	
Erigeron kachinensis	Populatior	n Status	Population Trend	Distribution	Tres	Habitat	Primary
Erigeron kachinensis	Populatior High	n Status D	Population Trend Unknown	Distribution Colorado Plateau			Primary
Erigeron kachinensis Kachina daisy	-				Туре	Habitat	•
-	-				Туре	Habitat	•
Kachina daisy	-	D			Р	Habitat	•
Kachina daisy Tier 2 Plants	High Specific Th Vulnerabili poor disper	D areat ty due to sal capao	Unknown o movement barriers,	Colorado Plateau General Conservation Action	Type P Spe	Habitat Cliff and Canyon	
Kachina daisy Tier 2 Plants General Threat	High Specific Th Vulnerabili poor disper restriction t	D treat ty due to sal capao to rare ha fting and	Unknown o movement barriers, city, and/or	Colorado Plateau General Conservation Action	Type P Spe Coll Moo resp and	Habitat Cliff and Canyon cific Conservation Action d banking (incl. protocols,	Priority
Kachina daisy Tier 2 Plants General Threat Climate	High Specific Th Vulnerabili poor disper restriction t Habitat shit climate cha	D treat ty due to sal capac o rare ha fting and nge al resport tself and	Unknown o movement barriers, city, and/or ibitat features alteration due to	Colorado Plateau General Conservation Action Ex-situ Conservation	Type P Spe See coll Moo resp and situ Con and clim	Habitat Cliff and Canyon cific 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	Priority H
Kachina daisy Tier 2 Plants General Threat Climate Climate	High Specific Th Vulnerabili poor disper restriction t Habitat shif climate cha Phenologic of species i species unk	D areat ty due to sal capac o rare ha fting and nge al resport tself and mown	Unknown o movement barriers, city, and/or ibitat features alteration due to nse to climate change	Colorado Plateau General Conservation Action Ex-situ Conservation Planning and Zoning	Type P Spe See coll Moo resp and situ Con and clim (dis	Habitat Cliff and Canyon 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	Priority H
Kachina daisy Tier 2 Plants General Threat Climate Climate	High Specific Th Vulnerabili poor disper restriction t Habitat shif climate cha Phenologic of species i species unk Altered hyo aquifer) Climate van	D areat ty due to sal capac o rare ha fting and nge al respor tself and nown drologica	Unknown o movement barriers, city, and/or bitat features alteration due to ase to climate change /or inter-dependent l 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	Type P Spe See coll Moo resp and situ Con and clim (dis Mai	Habitat Cliff and Canyon 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 nate, and other vulnerability factors persal mechanisms, mutualisms)	Priority H H

Erigeron wilkenii	Populatio	n Status	Population Trend	Distribution	Туре	Habitat	Primary
0	Low	D	Unknown	Utah-Wyoming Rocky Mountains	Р	Cliff and Canyon	
Wilken fleabane						Pinyon-Juniper	
Tier 1 Plants							
General Threat	Specific T	hreat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	poor dispe	rsal capac	movement barriers, ity, and/or bitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shi climate ch	•	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		itself and/	se to climate change for inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Population	n status un	known	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete unknown	distributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Lack of knowledge	Threats po	orly know	/n	Research and Monitoring		search species/habitat response to nagement or disturbance	Н
Climate		of normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Eriogonum brandegeei	Populatio	n Status	Population Trend	Distribution	Туре	Habitat	Primary
Eriogonum brunuegeei	Low	D	Stable D	Southern Rocky Mountains	P	Barrens	 Image: A start of the start of
	Low	D	Stable D		-	Sagebrush	
Brandegee wild buckwheat							
Tier 1 Plants							
General Threat	Specific T	hreat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	poor dispe	rsal capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shi climate ch	•	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	0	itself and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Non-consumptive Disturbance	Motor-pow	vered recr	eation	Compliance and Enforcement	Ma	nage off-road travel	Н
Non-consumptive Disturbance	Motor-pow	vered recr	eation	Education and Communication	Infe	orm BLM travel management plan.	Н
Climate		of normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation	pla	gage in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Housing, u developme		ex-urban	Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for itat protection	М
Indirect Consumptive Use (Mortality)	Grazing			Compatible Resource Use		plement compatible grazing nagement	L

Eriogonum clavellatun	Population Sta	atus Population	Trend	Distribution	Туре	Habitat	Primary
Comb Wash buckwheat	Low	D Unknown		Colorado Plateau	Р	Desert Shrub Saltbrush Fans and Flats	
Tier 2 Plants							
General Threat	Specific Threat	t		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	poor dispersal	lue to movement b capacity, and/or are habitat features		Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifting climate change	g and alteration du	e to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Η
Climate		f and/or inter-depe		Research and Monitoring	and clin	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distr unknown	ibution in Colorad	0	Research and Monitoring		nduct field inventory to refine known ribution	Н
Lack of knowledge	Population stat	us unknown		Research and Monitoring	Mo	nitor population status	Н
Resource Extraction	Oil and gas dri	lling		Voluntary Standards		energy development and mining	Н
Climate		ility (intensificatio ormal weather patte tornados, etc.)		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Eriogonum	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
coloradense Colorado wild buckwheat Tier 2 Plants	Medium D	Unknown	Southern Rocky Mountains	Р	Foothill/Mountain Grassland Shrub Tundra Meadow Tundra	
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
			Education and Communication	edu	lish educational material/sponsor cational programs to raise public ureness	Н
Climate	Vulnerability due to poor dispersal capac 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	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of knowledge	Biology and ecology	are poorly known	Research and Monitoring		earch critical life history/habitat	Н
Lack of knowledge	Complete distributio unknown	n 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
Non-consumptive Disturbance	Non-motorized recre	ation	Voluntary Standards		blement Best Management Practices recreation management	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Roads		Voluntary Standards		blement Best Management Practices transportation projects	М
Indirect Consumptive Use (Mortality)	Incompatible grazing	g?	Compatible Resource Use	-	blement compatible grazing nagement	М

Eriogonum	Population Status	Population Tr	end	Distribution	Туре	Habitat	Primary
pelinophilum	Low D	Declining	D	Colorado Plateau	Р	Desert Shrub	✓
Clay-loving wild buckwheat	Rapidly declining						
Tier 1 Plants General Threat	Specific Threat			General Conservation Action	Sne	ecific Conservation Action	Priority
	Speeme Theat			Land Protection (Public, Private) Easements, and Resource Rights	, Est	ablish legal designation to protect itat (extend existing ACEC)	Н
Climate	Vulnerability due to n poor dispersal capacit restriction to rare habi	y, and/or	iers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and a climate change	lteration due to)	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological response of species itself and/o species unknown			Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Conversion	Conversion to croplan	ıd		Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for vitat protection	Н
Habitat Conversion	Housing, urban, and e development	x-urban		Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for vitat protection	Н
Habitat Degradation	Roads			Planning and Zoning	issı	mote consideration of biodiversity les in transportation and land use nning processes	Н
Climate	Climate variability (in alteration of normal w e.g., droughts, tornado	eather pattern		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Biology and ecology	poorly known		Research and Monitoring	req bet	termine minimum viable population uirements; transition probabilities ween different plant stages; and ble seed production	М
Lack of knowledge	Complete distribution unknown	in Colorado		Research and Monitoring		nduct field inventory to refine known rribution	L

Eutrema	edwardsii ssp.	Population S	status	Population	Trend	Distribution	Туре	Habitat	Primary
penlandii	-	Medium	D	Stable	D	Southern Rocky Mountains	Р	Meadow Tundra	✓
Penland alpir	ne fen mustard								
Tier 1	Plants	a				a 1a i i i i	~		
General Thre	at	Specific Three	at			General Conservation Action		cific Conservation Action	Priority
						Land Protection (Public, Private). Easements, and Resource Rights	hab	ablish legal designation to protect itat (e.g., state Natural Area)	Н
<u>au</u>						Research and Monitoring		nitor population status	Н
Climate		Vulnerability poor dispersa restriction to	l capac	ity, and/or	arriers,	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate		Habitat shifti climate chang	-	alteration due	e to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		Phenological of species its species unkno	elf and/			Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing hate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Climate		Climate varia alteration of r e.g., droughts	normal	weather patte		Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М
Habitat Degra	adation	Altered hydro aquifer)	ological	regime (surf	ace or	Maintain or Restore Natural Processes	Res	tore natural hydrologic regime	М
Resource Ext	raction	Mining				Voluntary Standards		lement Best Management Practices mining	М
C	•	Population S	tatue	Population	Trand	Distribution	Туре	Habitat	Primary
	omexicana adoresie	•		•		Central Shortgrass Prairie	P	Eastern Plains Streams	
ssp. color		Low	D	Declining	D	Front Range	1	Grass/Forb Dominated Wetlands	
Colorado but								Seeps and Springs	
Tier 1	Plants								
								Shrub-dominated Wetlands	
General Thre	at	Specific Three	at			General Conservation Action	Spe	Shrub-dominated Wetlands cific Conservation Action	Priority
	at	Specific Three Vulnerability poor dispersa restriction to	due to l capac	ity, and/or	arriers,	General Conservation Action Ex-situ Conservation	See		Priority H
Climate	at	Vulnerability poor dispersa	due to l capac rare hal ng and	ity, and/or bitat features			See coll Moo resp and	cific Conservation Action d banking (incl. protocols,	•
Climate Climate	at	Vulnerability poor dispersa restriction to Habitat shifti climate chanş	due to l capac rare hal ng and ge respon elf and/	ity, and/or bitat features alteration due se to climate	e to change	Ex-situ Conservation	See coll Moo resp and situ Cor and clin	cific 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	Н
Climate Climate Climate		Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its	due to l capac rare hal ng and ge respon elf and/ own	ity, and/or bitat features alteration due se to climate or inter-depe	e to change ndent	Ex-situ Conservation Planning and Zoning	See coll Moo resp and situ Cor and clin (dis	cific 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 nate, and other vulnerability factors	Н
Climate Climate Climate Habitat Degra		Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its species unkno Altered hydro	due to l capac rare hal ng and ge respon elf and/ own blogical	ity, and/or bitat features alteration due se to climate or inter-depe	e to change ndent	Ex-situ Conservation Planning and Zoning Research and Monitoring Maintain or Restore Natural	See coll Moo resp and situ Cor and clin (dis Res	cific 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 nate, and other vulnerability factors persal mechanisms, mutualisms)	H H H

Gutierre	zia elegans	Population	Status	Population Trend	Distribution	Туре	Habitat	Primary
	0	Low	D	Unknown	Colorado Plateau	Р	Barrens	
Lone Mesa s	snakeweed						Sagebrush	
Tier 1	Plants							
General Thr	eat	Specific Th	reat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate		poor disper	sal capac	movement barriers, city, and/or bitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat shif climate cha	-	alteration due to	Planning and Zoning	Mo res and situ	Н	
Climate			tself and	nse to climate change /or inter-dependent	Research and Monitoring	and clii	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of know	wledge	Complete d unknown	istributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Non-consum	nptive Disturbance	Infrastructu visitor use	re devel	opment for Park	Protected Area Management		sign public improvements to be npatible with biodiversity	Н
Resource Ex	straction	Oil and gas	drilling	and seismic testing	Voluntary Standards		plement Best Management Practices energy development and mining	Н
Climate			f normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Con	version	Water stora			Protected Area Management		nage public use to be compatible h biodiversity	М
Lack of know	wledge	Population	status ur	ıknown	Research and Monitoring	Mo	onitor population status	Μ
Non-consum	nptive Disturbance	Motor-pow	ered recr	reation	Compliance and Enforcement	Ma	nage off-road travel	L
Hackelia	ı bessevi	Population	Status	Population Trend	Distribution	Туре	Habitat	Primary
	, , , , , , , , , , , , , , , , , , ,	Unknown		Unknown	Southern Rocky Mountains	Р	Mixed Conifer	✓
Bessey's stic	ckseed							
Tier 2	Plants							
General Thr	eat	Specific Th	reat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate		poor disper	sal capac	movement barriers, city, and/or bitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat shif climate cha	0	alteration due to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs	Н
Climate			tself and	nse to climate change /or inter-dependent	Research and Monitoring	and clii	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of know	wledge	Biology, ec known	ology, ai	nd habitat poorly	Research and Monitoring		search critical life history/habitat nponents	Н
Lack of know	wledge	Complete d unknown	istributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Lack of know	wledge	Population	status ur	ıknown	Research and Monitoring	Mo	onitor population status	Н
Climate			f normal	(intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Hackelia gracilenta	Population	n Status	Populatio	on Trend	Distribution	Туре	Habitat	Primary
	Low	D	Stable	D	Colorado Plateau	Р	Pinyon-Juniper	
Mesa Verde stickseed							Mixed Forest	
Tier 1 Plants								
General Threat	Specific Th	nreat			General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerabili poor disper restriction	sal capac			Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shi climate cha	0	alteration d	lue to	Planning and Zoning	resj and	bdel potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenologic of species i species unl	itself and			Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete ounknown	listributio	on in Colora	ıdo	Research and Monitoring	Co	nduct field inventory to refine known tribution	Н
Climate	Climate va alteration c e.g., droug	of normal	weather par		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Non-consumptive Disturbance	Non-motor	ized recr	eation		Voluntary Standards		plement Best Management Practices recreation management	М
Non-consumptive Disturbance	Non-motor	ized recro	eation		Education and Communication	edu	blish educational material/sponsor acational programs to raise public areness	L
Herrickia horrida	Population	n Status	Populatio	on Trend	Distribution	Туре	Habitat	Primary
	Low	D	Unknow	n	Southern Rocky Mountains	Р	Pinyon-Juniper	
Canadian River spiny aster							Cliff and Canyon	
Tier 2 Plants								
General Threat	Specific Th	nreat			General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerabili poor disper restriction	rsal capac			Ex-situ Conservation	See	ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shi climate cha	-	alteration d	lue to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenologic of species i species unl	itself and			Research and Monitoring	Cor and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
	of species i species unl	itself and		pendent	Research and Monitoring Research and Monitoring	Con and clir (dis Con	l pollinator responses to changing nate, and other vulnerability factors	
	of species is species unl Complete of	itself and known listributic	/or inter-dep on in Colora	pendent		Con and clir (dis Con dist	l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known	
Lack of knowledge	of species is species unl Complete o unknown	itself and cnown listributic status un	/or inter-dep on in Colora iknown	pendent	Research and Monitoring	Con and clir (dis Con dist Mo Res	l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known tribution	Н

Ipomopsis aggregata	Population Status Population		Туре	Habitat	Primary
ssp. weberi	Low D Unknown	Southern Rocky Mountair	ns P	Mixed Conifer	\checkmark
Rabbit Ears gilia					
Tier 2 Plants					
General Threat	Specific Threat	General Conservation Activ	on Spe	cific Conservation Action	Priority
Lack of knowledge	Genetics of isolated populations understood	poorly Research and Monitoring	isol	netic studies to determine the ation and genetic diversity of parate occurrences	Н
Non-consumptive Disturbance	Non-motorized recreation	Education and Communica	edu	blish educational material/sponsor cational programs to raise public ureness	Н
Non-consumptive Disturbance	Recreation	Land Protection (Public, Pr Easements, and Resource F	Rights hab	ablish legal designation to protect itat (e.g., wilderness, Research ural Area)	Н
Non-consumptive Disturbance	Motor-powered recreation	Voluntary Standards		element Best Management Practices recreation management	Н
Indirect Consumptive Use (Mortality)	Grazing and trampling by native non-native ungulates	e and Compatible Resource Use		plement compatible grazing nagement	М
Lack of knowledge	Population status unknown	Research and Monitoring	Mo	nitor population status	М
Climate	Climate variability (intensification alteration of normal weather patt e.g., droughts, tornados, etc.)			gage in collaborative, proactive nning and conservation programs	L
Climate	Vulnerability due to movement b poor dispersal capacity, and/or restriction to rare habitat features			d banking (incl. protocols, ection, and cultivation)	L
Climate	Habitat shifting and alteration du climate change	ue to Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	L
Climate	Phenological response to climate of species itself and/or inter-depo species unknown	e change Research and Monitoring endent	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	L
Invasive or Exotic Species	Invasive plants	Invasive Species Control a Prevention		blement integrated weed/pest nagement plan	L
Lack of knowledge	Reproductive and/or pollination unknown	biology Research and Monitoring		earch critical life history/habitat	L
Lack of knowledge	Complete distribution in Colorac unknown	do Research and Monitoring		nduct field inventory to refine known ribution	ı L

Ipomopsis globularis	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
	Medium D	Unknown	Southern Rocky Mountains	Р	Meadow Tundra	
Globe gilia					Exposed Rock (alpine)	
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	-	ccific Conservation Action	Priority
Climate	Vulnerability due to a poor dispersal capaci restriction to rare hab	ty, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and a climate change	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respons of species itself and/o species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Η
Lack of knowledge	Complete distribution unknown	1 in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Non-consumptive Disturbance	Non-motorized recrea	ation	Education and Communication	edu	blish educational material/sponsor cational programs to raise public areness	Н
Non-consumptive Disturbance	Motor-powered recre	ation	Voluntary Standards		blement Best Management Practices recreation management	Н
Climate	Climate variability (in alteration of normal v e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		nitor occurrences for weed invasion control promptly	М
Lack of knowledge	Population status unk	nown	Research and Monitoring	Mo	nitor population status	М
Lack of knowledge	Response to change i	s poorly understood	Research and Monitoring		earch species/habitat response to nagement or disturbance	М
Lack of knowledge	Biology, ecologyk, an are poorly known	nd specific habitat	Research and Monitoring		earch critical life history/habitat	М
Resource Extraction	Mining					М

Ipomopsis polyantha	Population Status Population Trend	Distribution T	Гуре	Habitat	Primary
Pagosa skyrocket	Medium D Declining D Rapidly declining	Southern Rocky Mountains	Р	Barrens Ponderosa Pine	
Tier 1 Plants					
General Threat	Specific Threat	General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifting and alteration due to climate change	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological response to climate change of species itself and/or inter-dependent species unknown	Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Habitat Conversion	Commerical and industrial development	Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	Н
Habitat Conversion	Housing, urban, and ex-urban development	Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	Н
Habitat Degradation	Roads and Utilities	Voluntary Standards	for	lement Best Management Practices transportation and utility struction and maintenance	Н
Invasive or Exotic Species	Invasive plants	Invasive Species Control and Prevention		p weed infestations and sensitive no ay/no mow zones	Н
		Education and Communication	1	element landowner reach/education program	М
		Planning and Zoning	Pro issu	mote consideration of biodiversity les in transportation and land use ming processes	М
Climate	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М
Indirect Consumptive Use (Mortality)	Grazing	Compatible Resource Use		element compatible grazing	М
Lack of knowledge	Biology, ecology, and specific habitat is poorly known	Research and Monitoring		earch critical life history/habitat	М
Lack of knowledge	Complete distribution in Colorado unknown	Research and Monitoring		nduct field inventory to refine known ribution	М
Lack of knowledge		Species Management	See	d banking for future restoration work	хM

Lepidium crenatum	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
Alkaline pepperwort Tier 2 Plants	Medium D	Unknown	Colorado Plateau Southern Rocky Mountains Utah-Wyoming Rocky Mountains	P P P	Desert Shrub Sagebrush	
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capa restriction to rare ha		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	l alteration due to	Planning and Zoning	res	bdel potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological responses of species itself and species unknown	•	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distribution unknown	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Lack of knowledge	Population status un	nknown	Research and Monitoring	Mo	onitor population status	Н
Lack of knowledge	Threats poorly know	wn	Research and Monitoring		search species/habitat response to nagement or disturbance	Н
Climate	Climate variability alteration of normal e.g., droughts, torna	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Lesquerella calcicola	Population Status	Population Trend	Distribution	Гуре	Habitat	Primary
1	Low D	Unknown	Central Shortgrass Prairie	Р	Barrens	\checkmark
Rocky Mountain bladderpod Tier 2 Plants			Southern Rocky Mountains	0	Ponderosa Pine	
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Η
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urban, and development	ex-urban	Land Protection (Public, Private), Easements, and Resource Rights		quire conservation easement for itat protection	Н
Non-consumptive Disturbance	Motor-powered recre	eation	Education and Communication	edu	blish educational material/sponsor cational programs to raise public areness	Н
Resource Extraction	Mining (coal, sand/g	gravel, etc.)	Education and Communication	avo	acate development industries about iding and/or mitigating impacts to or sensitive species	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Overhead utility line	es and towers	Voluntary Standards		blement Best Management Practices urban development, landscaping, etc.	M
Habitat Degradation	Roads or Railroads		Voluntary Standards		blement Best Management Practices transportation projects	М
Indirect Consumptive Use (Mortality)	Grazing		Compatible Resource Use		blement compatible grazing nagement	L
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	L

Lesquerella congesta	Population Sta	atus	Population Tre	nd Distribution	Туре	Habitat		Primary
	Medium	D	Unknown	Utah High Plateau	Р	Barrens		✓
Dudley Bluffs bladderpod								
Tier 1 Plants								
General Threat	Specific Threa	t		General Conservation A	ction S _I	ecific Conservation Act	ion	Priority
Climate	Vulnerability of poor dispersal restriction to ra	capac	•	rs, Ex-situ Conservation		ed banking (incl. protoco llection, and cultivation)		Н
Climate	Habitat shifting climate change	0	alteration due to	Planning and Zoning	re ar	odel potential habitat/rar sponse to projected clima d prepare adaptation plat u and ex situ conservatio	ate changes n to define in	Н
Climate		f and/	se to climate cha or inter-depende	nge Research and Monitorin It	an	onduct primary research d pollinator responses to mate, and other vulneral ispersal mechanisms, mu	o changing bility factors	Н
Habitat Degradation	Utility and pip	eline c	construction	Voluntary Standards		plement Best Managemer r energy development an		Н
Habitat Degradation	Roads			Voluntary Standards		plement Best Managemer r transportation projects	ent Practices	Н
Lack of knowledge	Population stat	tus unl	known	Research and Monitorin	ng M	onitor population status		Н
Lack of knowledge	Response to ch	nange		Research and Monitorin	of	vestigate how plants resp dust deposited during re traction		Н
Resource Extraction	Oil and gas dri	lling,	and oil shale mir	ing Voluntary Standards		nplement Best Managemer r energy development an		Н
Climate		ormal	intensification or weather patterns los, etc.)	1 1 0		ngage in collaborative, pranning and conservation	roactive	М
	alteration of no e.g., droughts,	ormal tornac	weather patterns, los, etc.)	Cooperation	pl	ngage in collaborative, pr anning and conservation	roactive programs	M Primary
Climate Lesquerella parviflora	alteration of no	ormal tornac	weather patterns, los, etc.) Population Tre	Cooperation		ngage in collaborative, pr anning and conservation	roactive programs	
	alteration of no e.g., droughts, Population Sta	ormal tornac atus	weather patterns, los, etc.) Population Tre	Cooperation nd Distribution	pl Type P	ngage in collaborative, pr anning and conservation Habitat	roactive programs	Primary
<i>Lesquerella parviflora</i> Piceance bladderpod	alteration of no e.g., droughts, Population Sta	ormal tornac atus	weather patterns, los, etc.) Population Tre	Cooperation nd Distribution) Utah High Plateau	pl Type P	ngage in collaborative, pr anning and conservation Habitat Barrens	roactive programs	Primary
<i>Lesquerella parviflora</i> Piceance bladderpod	alteration of no e.g., droughts, Population Sta	ormal tornac atus D	weather patterns, los, etc.) Population Tre	Cooperation nd Distribution) Utah High Plateau	pl Type P tains O	ngage in collaborative, pr anning and conservation Habitat Barrens	roactive programs	Primary
<i>Lesquerella parviflora</i> Piceance bladderpod Tier 2 Plants	alteration of no e.g., droughts, Population Sta Medium Specific Threa	atus D tornac	weather patterns, dos, etc.) Population Tre Stable I movement barrie ity, and/or	Cooperation nd Distribution) Utah High Plateau Southern Rocky Moun General Conservation A	pl Type P tains O Action Sp Se	ngage in collaborative, pr anning and conservation Habitat Barrens Cliff and Canyon	roactive programs ion ols,	Primary
<i>Lesquerella parviflora</i> Piceance bladderpod Tier 2 Plants General Threat	alteration of no e.g., droughts, Population Sta Medium Specific Threa Vulnerability of poor dispersal restriction to ra	atus D tornac atus D t lue to capac are hal g and	weather patterns, dos, etc.) Population Tre Stable I movement barrie ity, and/or	Cooperation nd Distribution) Utah High Plateau Southern Rocky Moun General Conservation A	Type Type tains O action Sp Second M re an	gage in collaborative, pr anning and conservation Habitat Barrens Cliff and Canyon pecific Conservation Actived banking (incl. protoco	ion ols,) nge shifts in ate changes n to define in	Primary Priority
<i>Lesquerella parviflora</i> Piceance bladderpod Tier 2 Plants General Threat Climate	alteration of no e.g., droughts, Population Sta Medium Specific Threa Vulnerability of poor dispersal restriction to ra Habitat shifting climate change	t tornacionali t ternacionali tornacionali t	weather patterns. dos, etc.) Population Tre Stable I movement barrie ity, and/or bitat features alteration due to	Cooperation Cooperation Distribution Utah High Plateau Southern Rocky Moun General Conservation A rs, Ex-situ Conservation Planning and Zoning nge Research and Monitorir	Type Type tains O action Sp Second Second M re an sin ag C an ch	gage in collaborative, pr anning and conservation Habitat Barrens Cliff and Canyon eccific Conservation Acti red banking (incl. protoco llection, and cultivation) odel potential habitat/rar sponse to projected clima d prepare adaptation pla	ion ols,) mage shifts in ate changes n to define in on needs on rare plant o changing bility factors	Primary Priority H H
<i>Lesquerella parviflora</i> Piceance bladderpod Tier 2 Plants General Threat Climate	alteration of no e.g., droughts, Population Sta Medium Specific Threa Vulnerability of poor dispersal restriction to ra Habitat shifting climate change Phenological ro of species itsel species unknow	t tornad atus D t turnad D t t due to capac are hal g and g and f and/ wn	weather patterns, dos, etc.) Population Tre Stable I movement barrie ity, and/or bitat features alteration due to se to climate cha or inter-depender	Cooperation Cooperation Distribution Utah High Plateau Southern Rocky Moun General Conservation A rs, Ex-situ Conservation Planning and Zoning nge Research and Monitorir	Type Type tains O section Sp Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector Sector S	gage in collaborative, pr anning and conservation Habitat Barrens Cliff and Canyon eccific Conservation Acti red banking (incl. protoco- llection, and cultivation) odel potential habitat/rar sponse to projected clima d prepare adaptation plas u and ex situ conservation onduct primary research d pollinator responses to imate, and other vulneral	ion ols,) mage shifts in ate changes n to define in on needs on rare plant o changing bility factors itualisms) ent Practices	Primary Priority H H
Lesquerella parviflora Piceance bladderpod Tier 2 Plants General Threat Climate Climate	alteration of no e.g., droughts, Population Sta Medium Specific Threa Vulnerability of poor dispersal restriction to ra Habitat shifting climate change Phenological rr of species itsel species unknow Oil and gas dri	t tornad atus D t turnad D t turnad t uue to capac are hal g and g and s espon: f and/ wn Illing, illity (i ormal	weather patterns, dos, etc.) Population Tre Stable I movement barrie ity, and/or bitat features alteration due to se to climate cha or inter-depender and oil shale mir intensification or weather patterns,	Cooperation Cooperation Distribution Utah High Plateau Southern Rocky Moun General Conservation A rs, Ex-situ Conservation Planning and Zoning Research and Monitorir ing Voluntary Standards Capacity Building and	Type Type tains O section Sp section Sp ccc M re arr sin sin ag CC arr cl (d (d) In fo Er	gage in collaborative, pr anning and conservation Habitat Barrens Cliff and Canyon eccific Conservation Acti red banking (incl. protoco- llection, and cultivation) odel potential habitat/rar sponse to projected clima d prepare adaptation pla u and ex situ conservatio poduct primary research d pollinator responses to imate, and other vulnerat ispersal mechanisms, mu aplement Best Manageme	ion ols,) mage shifts in ate changes n to define in on needs on rare plant o changing bility factors itualisms) ent Practices ad mining roactive	Primary Priority H H
Lesquerella parviflora Piceance bladderpod Tier 2 Plants General Threat Climate Climate Resource Extraction	alteration of no e.g., droughts, Population Sta Medium Specific Threa Vulnerability of poor dispersal restriction to ra Habitat shifting climate change Phenological ro of species itsel species unknow Oil and gas dri Climate variab alteration of no e.g., droughts,	t tornad atus D t turnad t turnad t turnad t turnad t turnad t turnad t turnad t tur	weather patterns, dos, etc.) Population Tre Stable I movement barrie ity, and/or bitat features alteration due to se to climate cha or inter-depender and oil shale mir intensification or weather patterns,	Cooperation Ind Distribution O Utah High Plateau Southern Rocky Moun General Conservation A rs, Ex-situ Conservation Planning and Zoning nge Research and Monitorina ing Voluntary Standards Capacity Building and Cooperation	Type Type tains O action Sp action S	gage in collaborative, pr anning and conservation Habitat Barrens Cliff and Canyon eccific Conservation Actived banking (incl. protocollection, and cultivation) odel potential habitat/rar sponse to projected clima d prepare adaptation plas u and ex situ conservation onduct primary research d pollinator responses to imate, and other vulnerative ispersal mechanisms, multiplement Best Managemer r energy development an agage in collaborative, pr	ion ols,) mage shifts in ate changes n to define in on needs on rare plant o changing bility factors itualisms) ent Practices id mining roactive programs	Primary Priority H H H

Lesquerella pruinosa	Population Status	Population Trend	Distribution T	Гуре	Habitat	Primary
	Medium D	Unknown	Southern Rocky Mountains	Р	Barrens	
Pagosa bladderpod Tier 2 Plants					Foothill/Mountain Grassland	
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare had	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 and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Housing, urban, and development	ex-urban	Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	М
Habitat Degradation	Roads		Voluntary Standards		lement Best Management Practices transportation projects	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		lement integrated weed/pest hagement plan	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		p weed infestations and sensitive no ay/no mow zones	М
Lack of knowledge	Complete distributio unknown	n in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	М
Lack of knowledge	Population status un	known	Research and Monitoring	Мо	nitor population status	М
Non-consumptive Disturbance	Motor-powered recro	eation	Education and Communication	edu	lish educational material/sponsor cational programs to raise public rreness	М
Resource Extraction	Oil and gas drilling		Voluntary Standards		lement Best Management Practices energy development and mining	М

Lesquerella vicina	Population	Status	Population Trend	Distribution	Туре	Habitat	Primary
-	Low	D	Unknown	Colorado Plateau	Р	Pinyon-Juniper	
Good-neighbor bladderpod				Southern Rocky Mountains	Р	Desert Shrub	
Tier 2 Plants							
General Threat	Specific Thr	eat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability poor dispers	y due to al capac	movement barriers, city, and/or bitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	H
Climate	Habitat shift climate chan	0	alteration due to	Planning and Zoning	res and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		self and	nse to climate change /or inter-dependent	Research and Monitoring	anc clir	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Roads			Voluntary Standards		plement Best Management Practices transportation projects	Н
Non-consumptive Disturbance	Recreation			Education and Communication	edu	blish educational material/sponsor icational programs to raise public areness	Н
Non-consumptive Disturbance	Recreation			Land Protection (Public, Private) Easements, and Resource Rights	hat	ablish legal designation to protect bitat (e.g., Area of Critical vironmental Concern)	Н
Climate		normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population s			Research and Monitoring	Mo	onitor population status	М
Lack of knowledge	Complete di unknown	stributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	М
Limnorchis zothecina	Population	Status	Population Trend	Distribution	Туре	Habitat	Primary
	Low	D	Unknown	Utah-Wyoming Rocky	Р	Cliff and Canyon	
Alcove bog orchid				Mountains		Seeps and Springs	
Tier 2 Plants							
General Threat	Specific Thr	eat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	poor dispers	al capac		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shift climate chan	-	alteration due to	Planning and Zoning	res and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		self and	nse to climate change /or inter-dependent	Research and Monitoring	anc clir	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete di unknown	stributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
		totuc un	ıknown	Research and Monitoring	Mo	onitor population status	Н
Lack of knowledge	Population s	tatus un			En	gage in collaborative, proactive	М
Lack of knowledge Climate	Climate vari	ability (normal	(intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		nning and conservation programs	

Lomatium concinnum	Population Star	tus	Population 7	Frend	Distribution	Туре	Habitat	Primary
	Medium	D	Declining	D	Colorado Plateau	Р	Sagebrush	✓
Colorado desert-parsley					Southern Rocky Mountains	0	Barrens	
Tier 2 Plants								
General Threat	Specific Threat				General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability du poor dispersal c restriction to rar	capaci	ty, and/or	riers,	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting climate change	; and a	lteration due	to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Η
Climate	Phenological re- of species itself species unknow	and/c		0	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Non-consumptive Disturbance	Recreation				Voluntary Standards	-	element Best Management Practices recreation management	Н
Climate	Climate variabil alteration of non e.g., droughts, to	rmal v	veather patter		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Complete distril unknown	butior	n in Colorado		Research and Monitoring		nduct field inventory to refine known ribution	L
Lupinus crassus	Population Star	tus	Population 7	Frend	Distribution	Туре	Habitat	Primary
-	Low	D	Unknown		Colorado Plateau	Р	Pinyon-Juniper	\checkmark
Payson lupine					Southern Rocky Mountains	Р	Barrens	
Tier 2 Plants								
General Threat	Specific Threat				General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability du poor dispersal c restriction to rar	apaci	ty, and/or	riers,	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting	and a	lteration due	to	Planning and Zoning		del potential habitat/range shifts in ponse to projected climate changes	Н
	climate change					and	prepare adaptation plan to define in and ex situ conservation needs	
Climate		and/c		0	Research and Monitoring	and situ Cor and clir		Н
Climate Lack of knowledge	Phenological read	and/c /n	or inter-depen	0	Research and Monitoring Research and Monitoring	and situ Cor and clir (dis	and ex situ conservation needs duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors	H
	Phenological re of species itself species unknow	and/c /n us unk lity (ii rmal v	or inter-depen mown ntensification weather patter	dent		and situ Cor and clir (dis Mo Eng	and ex situ conservation needs nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	

Lygodesmia	Population	n Status	Population Trend	Distribution	Туре	Habitat	Primary
doloresensis	Low	D	Unknown	Colorado Plateau	Р	Pinyon-Juniper	
Dolores River skeletonplant						Desert Shrub	
Tier 1 Plants							
General Threat	Specific Th	nreat		General Conservation Action	Spe	ecific Conservation Action	Priority
				Land Protection (Public, Private) Easements, and Resource Rights		band existing Palisade ACEC	Н
Climate	poor disper	rsal capac	movement barriers, ity, and/or bitat features	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Η
Climate	Habitat shi climate cha	0	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		itself and/	se to climate change for inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Roads			Voluntary Standards		blement Best Management Practices transportation projects	Н
Lack of knowledge	Complete o unknown	listributio	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
Climate		of normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Machaeranthera	Population	n Status	Population Trend	Distribution	Туре	Habitat	Primary
<i>coloradoensis</i> Colorado tansy-aster	Medium	D	Unknown	Southern Rocky Mountains	Р	Foothill/Mountain Grassland Exposed Rock	
Tier 2 Plants						Meadow Tundra	
General Threat	Specific Th	nreat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerabili poor disper	ity due to rsal capac	movement barriers, ity, and/or bitat features	Ex-situ Conservation	See	d banking (incl. protocols, lection, and cultivation)	H
Climate	Habitat shi climate cha		alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		itself and/	se to climate change or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Additional needed	informati	on 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		of normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge		d response	e to change are	Research and Monitoring		earch species/habitat response to nagement or disturbance	М
Lack of knowledge	Complete o unknown	listributic	on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	М
Non-consumptive Disturbance	Non-motor	ized recre	eation	Education and Communication	edu	blish educational material/sponsor cational programs to raise public areness	М

Mentzelia rhizoma	eta Populat	tion Sta	itus	Population Trend	Distribution 7	Гуре	Habitat	Primary
	Mediur	n	D	Unknown	Southern Rocky Mountains	Р	Barrens	\checkmark
Roan Cliffs blazing star					Utah High Plateau	Р		
Tier 2 Plants								
General Threat	Specific	Threat			General Conservation Action	Spec	cific Conservation Action	Priority
					Land Protection (Public, Private), Easements, and Resource Rights	habi	blish legal designation to protect itat (e.g., Area of Critical ironmental Concern, state Natural a)	Н
Climate	poor dis	persal o	capaci	movement barriers, ty, and/or vitat features	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat s climate o			alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in onse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		es itself	and/o	e to climate change or inter-dependent	Research and Monitoring	and clim	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Resource Extraction	Oil and	gas dril	ling, a	and oil shale mining	Voluntary Standards		lement Best Management Practices energy development and mining	Н
Climate		n of no	rmal v	ntensification or weather patterns, los, etc.)	Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М
Lack of knowledge		te distri		n in Colorado	Research and Monitoring		duct field inventory to refine known ribution	М
Lack of knowledge	Populati	on stat	us unk	known	Research and Monitoring	Mor	nitor population status	М
						-		D 1
Mertensia humilis	Populat	tion Sta	itus	Population Trend		• 1	Habitat	Primary
Mertensia humilis	Populat Low	tion Sta	itus D	Population Trend Unknown	Distribution 7 Southern Rocky Mountains	• 1	Habitat Sagebrush	Primary
	Low	tion Sta		•		• 1		
Rocky Mountain bluebells	Low	tion Sta		•		• 1		
Rocky Mountain bluebells	Low		D	•		P		
Rocky Mountain bluebells Tier 2 Plants General Threat	Low Specific Vulneral poor dis	Threat bility d persal o	D ue to capaci	•	Southern Rocky Mountains	P Spec	Sagebrush	
Rocky Mountain bluebells Tier 2 Plants General Threat Climate	Low Specific Vulneral poor dis restrictio	Threat bility d persal on to ra shifting	D ue to capaci re hab g and a	Unknown movement barriers, ty, and/or	Southern Rocky Mountains General Conservation Action	P Spec Seec collo Moc resp and	Sagebrush cific Conservation Action d banking (incl. protocols,	Priority
Rocky Mountain bluebells Tier 2 Plants General Threat Climate Climate	Low Specific Vulneral poor dis restrictic Habitat climate of Phenolo	Threat bility d persal c on to ra shifting change gical re es itself	D ue to capaci re hab g and a espons and/o	Unknown movement barriers, ty, and/or bitat features alteration due to	Southern Rocky Mountains General Conservation Action Ex-situ Conservation	P Spec Seec collo Moc resp and situ Con and clim	Sagebrush cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in onse to projected climate changes prepare adaptation plan to define in	Priority H H
Rocky Mountain bluebells Tier 2 Plants General Threat Climate Climate	Low Specific Vulneral poor dis restrictic Habitat climate of Phenolo of species of	Threat bility d persal c on to ra shifting change gical re es itself unknow and res	D ue to i capaci re hab g and a spons f and/o vn ponse	Unknown movement barriers, ty, and/or bitat features alteration due to se to climate change	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning	P Speed Seed colld Mod resp and situ Con and clim (disj Rese	Sagebrush cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in onse 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 H
Rocky Mountain bluebells Tier 2 Plants General Threat Climate Climate Climate Lack of knowledge	Low Specific Vulneral poor dis restrictic Habitat climate of Phenolo of species of Species of Threats poorly u	Threat bility d persal c on to ra shifting change gical re es itself unknow and res ndersto , ecolog	D ue to i capaci re hab g and a sspons c and/o //n ponse ood gy, an	Unknown movement barriers, ty, and/or bitat features alteration due to se to climate change or inter-dependent	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring	P Speec colle Moc resp and situ Con and clim (disj Resc man Resc	Sagebrush cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in onse 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) earch species/habitat response to	Priority H H
Rocky Mountain bluebells Tier 2 Plants General Threat Climate Climate Climate Lack of knowledge Lack of knowledge	Low Specific Vulneral poor dis restrictic Habitat climate of Phenolo of species of Species of Threats poorly u Biology, are poor	Threat bility d persal c on to ra shifting change gical re es itself unknow and res ndersto , ecolog ly know te distri	D ue to j capaci re hab g and a sponse j od gy, an vn	Unknown movement barriers, ty, and/or bitat features alteration due to ee to climate change or inter-dependent to change are	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring	P Speec colle Moc resp and situ Con and clim (disj Reso man Reso com Con	Sagebrush cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in onse 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 hate, and other vulnerability factors persal mechanisms, mutualisms) earch species/habitat response to lagement or disturbance earch critical life history/habitat	Priority H H H H
	Low Specific Vulneral poor dis restrictic Habitat s climate of Phenolo of species s Phenolo of species s Phenolo of species of Threats s poorly u Biology, are poor Complet unknow Populati	Threat bility d persal con to ra shifting change gical re es itself unknow and res ndersto , ecolog ly know te distri n on state	D ue to o capaci re hab g and a ssponse od gy, and vn bution bution us unk	Unknown movement barriers, ty, and/or bitat features alteration due to se to climate change or inter-dependent to change are d detailed habitat n in Colorado	Southern Rocky Mountains General Conservation Action Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Research and Monitoring	P Speec colle Moc resp and situ Con and clim (disj Rese com Con distr	Sagebrush cific Conservation Action d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in onse 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 hate, and other vulnerability factors persal mechanisms, mutualisms) earch species/habitat response to lagement or disturbance earch critical life history/habitat ponents duct field inventory to refine known	Priority H H H H

Mimulus gemmiparus	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
	Medium D	Unknown	Southern Rocky Mountains	Р	Cliff and Canyon Seeps and Springs	
Budding monkey flower					Grass/Forb Dominated Wetlands	
Tier 1 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha		Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respor of species itself and species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Population status ur	ıknown	Research and Monitoring	Mo	nitor population status	Н
Non-consumptive Disturbance	Non-motorized recr	eation	Voluntary Standards		blement Best Management Practices recreation management	Н
Climate	Climate variability (alteration of normal e.g., droughts, torna	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Complete distribution unknown	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	М
Non-consumptive Disturbance	Non-motorized recr	eation	Education and Communication	edu	olish educational material/sponsor icational programs to raise public areness	М
Lack of knowledge	Restoration technique understood	ues are poorly	Research and Monitoring		storation techniques (e.g., storage of pagules and reintroduction of plants)	L
Lack of knowledge	Threats and respons known	e to change are	Research and Monitoring		search species/habitat response to nagement or disturbance	L

Nuttallia	a chrysantha	Population St	tatus	Population	Trend	Distribution	Туре	Habitat	Primary
	-	Low	D	Declining	D	Central Shortgrass Prairie	Р	Barrens	\checkmark
Colden blog	ing stor					Southern Rocky Mountains	0	Pinyon-Juniper	
Golden blaz	C								
Tier 2	Plants								
General Thr	reat	Specific Threa				General Conservation Action		ecific Conservation Action	Priority
Climate		Vulnerability poor dispersal restriction to r	capaci	ty, and/or	arriers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat shiftin climate chang	0	lteration due	e to	Planning and Zoning	res and	bdel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs	Н
Climate		Phenological i of species itse species unkno	lf and/o			Research and Monitoring	and clin	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Η
Habitat Con	version	Housing, urba development	n, and o	ex-urban		Land Protection (Public, Private Easements, and Resource Right		quire conservation easement for pitat protection	Н
Lack of kno	wledge	Taxonomy is j	poorly	understood		Research and Monitoring	Ta	xonomic work	Н
Non-consur	nptive Disturbance	Motor-powere	ed recre	ation		Compliance and Enforcement	Ma	nage off-road travel	Н
Non-consur	nptive Disturbance	Motor-powere	ed recre	ation		Education and Communication	edu	blish educational material/sponsor acational programs to raise public areness	Н
Resource E	xtraction	Mining (coal,	sand/gı	avel, etc.)		Education and Communication	avo	ucate development industries about biding and/or mitigating impacts to e or sensitive species	Н
Climate		Climate variable alteration of n e.g., droughts,	ormal v	veather patte		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Deg	radation	Overhead utili	ity lines	and towers		Voluntary Standards		plement Best Management Practices urban development, landscaping, etc	M 2.
Habitat Deg	gradation	Roads or Rails	roads			Voluntary Standards		plement Best Management Practices transportation projects	М
Indirect Cor (Mortality)	nsumptive Use	Grazing				Compatible Resource Use		plement compatible grazing nagement	L
Invasive or	Exotic Species	Invasive plant	s			Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	L

Nuttallia densa	Population Status	Population Trend	Distribution	Гуре	Habitat	Primary
Arkansas Canyon stickleaf	Low D	Unknown	Southern Rocky Mountains	Р	Pinyon-Juniper Upland Shrub	
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spee	cific Conservation Action	Priority
			Land Protection (Public, Private), Easements, and Resource Rights	habi	blish legal designation to protect itat (e.g., Area of Critical ironmental Concern)	Н
Climate	Vulnerability due to poor dispersal capa restriction to rare h	city, and/or	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifting and climate change	l alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in onse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		nse to climate change l/or inter-dependent	Research and Monitoring	and clim	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urban, and development	d ex-urban	Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	Н
Lack of knowledge	Population status u	nknown	Research and Monitoring	Mor	nitor population status	Н
Non-consumptive Disturbance	Recreation		Voluntary Standards		lement Best Management Practices recreation management	Н
			Education and Communication	educ	lish educational material/sponsor cational programs to raise public reness	М
Climate	Climate variability alteration of norma e.g., droughts, torna	l weather patterns,	Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М
Habitat Conversion	Housing, urban, and development	d ex-urban	Education and Communication	-	lement landowner each/education program	М
Lack of knowledge	Complete distributi unknown	on in Colorado	Research and Monitoring		duct field inventory to refine known ribution	М
Lack of knowledge	Threats and respon- poorly understood	se to change are	Research and Monitoring		earch species/habitat response to agement or disturbance	М

Oenothera acutissima	Population Status Population Trend		Distribution	Туре	Habitat	Primary
Narrow-leaf evening primrose	Low D	Unknown	Utah-Wyoming Rocky Mountains Wyoming Basin	P O	Grass/Forb Dominated Wetlands Sagebrush	
Tier 2 Plants	~		~	~		
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Η
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Altered hydrological aquifer)	l regime (surface or	Maintain or Restore Natural Processes	Ma reg	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	nitor population status	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Oenothera harringtonii	Population Statu	s Population Trend	Distribution T	Гуре	Habitat	Primary
Arkansas Valley evening primrose	Medium D) Unknown	Central Shortgrass Prairie	Р	Barrens Shortgrass Prairie	✓ ✓
Tier 2 Plants				a		
General Threat	Specific Threat		General Conservation Action		cific Conservation Action	Priority
Climate	poor dispersal cap restriction to rare		Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate	Habitat shifting a climate change	nd alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		nd/or inter-dependent	Research and Monitoring	and clin	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urban, a development	nd ex-urban	Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	Н
Non-consumptive Disturbance	Motor-powered r	ecreation	Compliance and Enforcement	Ma	nage off-road travel	Н
Climate		y (intensification or nal weather patterns, nados, etc.)	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Housing, urban, a development	nd ex-urban	Education and Communication		lement landowner reach/education program	М
Habitat Conversion	Housing, urban, a development	nd ex-urban	Education and Communication	edu	lish educational material/sponsor cational programs to raise public reness	М
Habitat Degradation	Roads or Railroad	ds	Voluntary Standards		lement Best Management Practices transportation projects	М
Indirect Consumptive Use (Mortality)	Grazing		Compatible Resource Use		lement compatible grazing agement	М
Non-consumptive Disturbance	Motor-powered r road vehicular tra	ecreation or other off- wel	Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	М
Resource Extraction	Mining (coal, san	d/gravel, etc.)	Voluntary Standards		lement Best Management Practices energy development and mining	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		lement integrated weed/pest nagement plan	L

Oonopsis foliosa var.	Population Status	s Population Trend	Distribution	Туре	Habitat	Primary
monocephala	Medium D	Unknown	Central Shortgrass Prairie	Р	Shortgrass Prairie	\checkmark
Rayless goldenweed			Southern Rocky Mountains	0		
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due poor dispersal cap restriction to rare		Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting ar climate change	nd alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	0 1	onse to climate change nd/or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Population status	unknown	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete distribu unknown	tion in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Climate		y (intensification or nal weather patterns, nados, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Roads		Voluntary Standards		blement Best Management Practices transportation projects	М
Non-consumptive Disturbance	Motor-powered re road vehicular trav	ecreation or other off- vel	Compliance and Enforcement	Ma	nage off-road travel	М

Oonopsis puebloensis	Population Status	Population 7	Trend	Distribution T	Туре	Гуре Habitat	
Pueblo goldenweed	Medium D	Declining	D	Central Shortgrass Prairie	Р	Barrens Shortgrass Prairie	✓
Tier 2 Plants							
General Threat	Specific Threat			General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capa restriction to rare ha	city, and/or	rriers,	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	l alteration due	to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological responses of species itself and species unknown			Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urban, and development	d ex-urban		Education and Communication	-	blement landowner reach/education program	Н
Habitat Conversion	Housing, urban, and development	d ex-urban		Education and Communication	edu	olish educational material/sponsor cational programs to raise public areness	Н
Habitat Conversion	Housing, urban, and development	d ex-urban		Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for itat protection	Н
Non-consumptive Disturbance	Motor-powered rec	reation		Compliance and Enforcement	Ma	nage off-road travel	Н
Non-consumptive Disturbance	Motor-powered rec road vehicular trave		off-	Education and Communication	edu	blish educational material/sponsor cational programs to raise public areness	Н
Resource Extraction	Mining (limestone)			Education and Communication	avo	icate development industries about iding and/or mitigating impacts to e or sensitive species	Н
Climate	Climate variability alteration of normal e.g., droughts, torna	weather patter		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Overhead utility lin			Voluntary Standards		blement Best Management Practices urban development, landscaping, etc	. M
Habitat Degradation	Roads or Railroads			Voluntary Standards		blement Best Management Practices transportation projects	М
Indirect Consumptive Use (Mortality)	Grazing			Compatible Resource Use		plement compatible grazing nagement	L
Invasive or Exotic Species	Invasive plants			Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	L

Colorado Wildlife Action Plan: Proposed Rare Plant Addendum

Table 3. - Continued.

Opuntia heacockiae	Population Status	Population Trend		Habitat	Primary
	Unknown	Unknown		Pinyon-Juniper	\checkmark
Heacock's prickly-pear					
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ty, and/or	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 in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Taxonomy is poorly	understood	Research and Monitoring	Taxonomic work is needed	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	Complete distribution unknown	on in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Lack of knowledge	Population status un	known	Research and Monitoring	Monitor population status	Н
Climate	Climate variability (alteration of normal e.g., droughts, torna	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Oreocarya osterhoutii	Population Status	Population Trend	Distribution	Type Habitat	Primary
2	Low D	Stable D	Colorado Plateau	P Barrens	
Osterhout cat's-eye				Desert Shrub	
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac 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 in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown	U	Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distributio	on in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Climete	Climate variability (Capacity Building and	Engage in collaborative, proactive	М
Chimate	alteration of normal e.g., droughts, torna		Cooperation	planning and conservation programs	
Climate Non-consumptive Disturbance	alteration of normal	weather patterns, dos, etc.)		Publish educational material/sponsor educational programs to raise public awareness	М

Oreoxis humilis	Population Status	s Population Tr	rend	Distribution	Туре	Habitat	Primary
	High D	Stable	D	Southern Rocky Mountains	Р	Exposed Rock (alpine) Meadow Tundra	
Pikes Peak spring parsley							
Tier 1 Plants							
General Threat	Specific Threat			General Conservation Action		ecific Conservation Action	Priority
				Research and Monitoring		nitor population status	H
Climate	Vulnerability due poor dispersal cap restriction to rare	acity, and/or	iers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting ar climate change	nd alteration due to	0	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological resp of species itself ar species unknown			Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Roads or Railroad	s		Voluntary Standards	-	blement Best Management Practices transportation projects	Н
Lack of knowledge	Threats and respon- poorly understood			Research and Monitoring		search species/habitat response to nagement or disturbance	Н
				Education and Communication	edu	blish educational material/sponsor licational programs to raise public areness	М
Climate	Climate variability alteration of norm e.g., droughts, torn	al weather pattern		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Taxonomy is poor	ly understood		Research and Monitoring		sess taxonomic status and ationship to Oreoxis alpina	М
Lack of knowledge	Biology, ecology, are poorly known	and detailed habit	tat	Research and Monitoring		search critical life history/habitat nponents	М
Lack of knowledge	Complete distribu unknown	tion in Colorado		Research and Monitoring		nduct field inventory to refine known tribution	М
Non-consumptive Disturbance	Non-motorized re-	creation		Voluntary Standards		plement Best Management Practices recreation management	М

Oxybaph	us	Population St	tatus	Population	Trend	Distribution	Гуре	Habitat	Primary
rotundifo		Medium	D	Declining	D	Central Shortgrass Prairie	Р	Barrens	\checkmark
Round-leaf f	our o'clock								
Tier 2	Plants								
General Thre	eat	Specific Threa	at			General Conservation Action	Spe	cific Conservation Action	Priority
Climate		Vulnerability poor dispersal restriction to r	capaci	ity, and/or	rriers,	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat shiftin climate chang	0	alteration due	to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		Phenological 1 of species itse species unkno	lf and/			Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Habitat Conv	version	Housing, urba development	n, and	ex-urban		Education and Communication		plement landowner reach/education program	Н
Habitat Conv	version	Housing, urba development	n, and	ex-urban		Education and Communication	edu	olish educational material/sponsor cational programs to raise public ureness	Н
Habitat Conv	version	Housing, urba development	n, and	ex-urban		Land Protection (Public, Private), Easements, and Resource Rights		uire conservation easement for itat protection	Н
Non-consum	ptive Disturbance	Motor-powere	ed recre	eation		Compliance and Enforcement	Ma	nage off-road travel	Н
Non-consum	ptive Disturbance	Motor-powere road vehicular			r off-	Education and Communication	edu	lish educational material/sponsor cational programs to raise public ureness	Н
Resource Ex	traction	Mining (limes	tone)			Education and Communication	avo	icate development industries about iding and/or mitigating impacts to or sensitive species	Н
Climate		Climate varial alteration of n e.g., droughts,	ormal	weather patte		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degr	adation	Overhead utili	ty line	s and towers		Voluntary Standards		blement Best Management Practices urban development, landscaping, etc	. M
Habitat Degr	adation	Roads or Raili	roads			Voluntary Standards		blement Best Management Practices transportation projects	М
Indirect Cons (Mortality)	sumptive Use	Grazing				Compatible Resource Use		plement compatible grazing nagement	L
Invasive or E	Exotic Species	Invasive plant	s			Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	L

Oxytropis besseyi var.	Population Statu	s Population Trend	Distribution	Туре	Habitat	Primary
obnapiformis Bessey locoweed	Low D	Unknown	Wyoming Basin Utah High Plateau	Р	Sagebrush Pinyon-Juniper	
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due poor dispersal cap restriction to rare		Ex-situ Conservation	Seed banking (incl. protocols, collection, and cultivation)		Н
Climate	Habitat shifting a climate change	nd alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		oonse to climate change nd/or inter-dependent	Research and Monitoring	Con and clin (dis	Н	
Lack of knowledge	Population status	unknown	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete distribu unknown	tion in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Climate		y (intensification or nal weather patterns, nados, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Resource Extraction	Oil and gas drillin		Voluntary Standards		energy development and mining	М
Pediocactus knowltonii	Population Statu	s Population Trend	Distribution	Туре	Habitat	Primary
	Unknown	Unknown	Colorado Plateau	Р	Pinyon-Juniper	\checkmark
Knowlton cactus						
	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Tier 1 Plants	1		General Conservation Action Ex-situ Conservation	See	cific Conservation Action d banking (incl. protocols, lection, and cultivation)	Priority H
Tier 1 Plants General Threat Climate	Vulnerability due poor dispersal cap restriction to rare	pacity, and/or		See coll Mo resp and	d banking (incl. protocols,	•
Tier 1 Plants General Threat	Vulnerability due poor dispersal caj restriction to rare Habitat shifting a climate change Phenological resp	pacity, and/or habitat features nd alteration due to	Ex-situ Conservation	See coll Mo resp and situ Con and clir	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	H
Tier 1 Plants General Threat Climate	Vulnerability due poor dispersal cap restriction to rare Habitat shifting a climate change Phenological resp of species itself a	pacity, and/or habitat features nd alteration due to ponse to climate change nd/or inter-dependent	Ex-situ Conservation Planning and Zoning	See coll Mo resp and situ Con and clir (dis	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors	H
General Threat Climate Climate Climate Direct Consumptive Use	Vulnerability due poor dispersal caj restriction to rare Habitat shifting a climate change Phenological resp of species itself a species unknown	pacity, and/or habitat features nd alteration due to ponse to climate change nd/or inter-dependent ting	Ex-situ Conservation Planning and Zoning Research and Monitoring	See coll Mo resj and situ Con and clir (dis Enf	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	H H H

Table 3. - Continued.

Penstemon crandallii	Population Status	Population Trend	Distribution	Туре	
ssp. procumbens	Unknown	Unknown	Southern Rocky Mountains	Р	
Crandall's beardtongue					
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Phenological response of species itself and/o species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Taxonomy is poorly	understood	Research and Monitoring	Taxonomic work is needed	Н
Lack of knowledge	Threats and response poorly understood	to change are	Research and Monitoring	Research species/habitat response to management or disturbance	Н
Lack of knowledge	Biology, ecology, an are poorly known	d detailed habitat	Research and Monitoring	Research critical life history/habitat components	Н
Lack of knowledge	Complete distribution unknown	n in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Lack of knowledge	Population status unl		Research and Monitoring	Monitor population status	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Penstemon debilis	Population Status	Population Trend	Distribution	Type Habitat	Primary
I chstemon acoms	Medium D	Declining D	Southern Rocky Mountains	P Barrens	✓
Parachute penstemon			Utah High Plateau	Р	
Tier 1 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
			Research and Monitoring	Monitor population status	Н
Climate	Vulnerability due to poor dispersal capaci restriction to rare hal	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 response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological response of species itself and/o species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Resource Extraction	Oil and gas drilling		Voluntary Standards	Implement Best Management Practices for energy development and mining	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornac	weather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Lack of knowledge	Complete distribution	n in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	М
Lack of knowledge	Reproductive and/or unknown	pollination biology	Research and Monitoring	Research pollinator biology	L

Penstemon degeneri	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
Ū	Medium D	Unknown	Southern Rocky Mountains	Р	Pinyon-Juniper	
Degener beardtongue					Foothill/Mountain Grassland	
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare hal	ity, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological response of species itself and/ species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Non-consumptive Disturbance	Non-motorized recre	ation	Education and Communication	edu	blish educational material/sponsor cational programs to raise public areness	Н
Non-consumptive Disturbance	Motor-powered recre	eation	Voluntary Standards	1	blement Best Management Practices recreation management	Н
Climate	Climate variability (i alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		p weed infestations and sensitive no ay/no mow zones	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention	-	blement integrated weed/pest nagement plan	М
Lack of knowledge	Complete distributio unknown	n in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	М
Lack of knowledge	Threats and response poorly understood	e to change are	Research and Monitoring		earch species/habitat response to nagement or disturbance	М
Lack of knowledge	Biology, ecology, an are poorly known	d detailed habitat	Research and Monitoring	Res	search critical life history/habitat	М
Lack of knowledge	Population status un	known	Research and Monitoring	Mo	nitor population status	М

Penstemon fremontii	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
<i>var. glabrescens</i> Fremont's beardtongue	Low D	Unknown	Utah High Plateau Wyoming Basin	P O	Sagebrush	✓
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due t poor dispersal capa restriction to rare h		Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting an climate change	d alteration due to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	0 1	onse to climate change d/or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Complete distribut unknown	ion in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	ı H
Lack of knowledge	Population status u	inknown	Research and Monitoring	Mo	onitor population status	Н
Resource Extraction	Oil and gas drilling	5	Voluntary Standards		plement Best Management Practices energy development and mining	Н
Climate	Climate variability alteration of norma e.g., droughts, torm	d weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Degradation	Roads		Voluntary Standards		plement Best Management Practices transportation projects	М
Non-consumptive Disturbance	Motor-powered red	creation	Voluntary Standards		plement Best Management Practices recreation management	М

Penstem	on gibbensii	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
	8	Medium	D	Unknown	Wyoming Basin	Р	Barrens	\checkmark
Gibben's bea	ardtongue				Utah-Wyoming Rocky Mountains	0	Pinyon-Juniper	
Tier 1	Plants							
General Thre	eat	Specific Three	eat		General Conservation Action	Sp	ecific Conservation Action	Priority
					Land Protection (Public, Private) Easements, and Resource Rights	hal	tablish legal designation to protect bitat (e.g., Area of Critical vironmental Concern)	Н
Climate		Vulnerability poor dispersa restriction to	l capac	city, and/or	Ex-situ Conservation		ed banking (incl. protocols, llection, and cultivation)	Н
Climate		Habitat shifti climate chan		alteration due to	Planning and Zoning	res and	odel potential habitat/range shifts in sponse to projected climate changes d prepare adaptation plan to define in u and ex situ conservation needs	Н
Climate			elf and	nse to climate change /or inter-dependent	Research and Monitoring	and clin	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of know	wledge	Complete dis unknown	tributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known	n H
Non-consum	ptive Disturbance	Motor-power road vehicula			Voluntary Standards	for	plement Best Management Practices travel management	Н
					Education and Communication	edu	blish educational material/sponsor ucational programs to raise public vareness	М
Climate			normal	(intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive anning and conservation programs	М
Lack of know	wledge	Population st	atus ur	ıknown	Research and Monitoring	Mo	onitor population status	М
Penstem	on grahamii	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
	9	Low	D	Unknown	Wyoming Basin	Р	Barrens Pinyon-Juniper	
Graham beau	dtongue						i myön sumper	
Tier 2	Plants							
General Thre	eat	Specific Three	eat		General Conservation Action	Sp	ecific Conservation Action	Priority
Climate		Vulnerability poor dispersa restriction to	l capac		Ex-situ Conservation		ed banking (incl. protocols, llection, and cultivation)	Н
Climate		Habitat shifti climate chang		alteration due to	Planning and Zoning	res and	odel potential habitat/range shifts in sponse to projected climate changes d prepare adaptation plan to define in u and ex situ conservation needs	Н
Climate			elf and	nse to climate change /or inter-dependent	Research and Monitoring	and clin	nduct primary research on rare plant d pollinator responses to changing mate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degi	radation	Roads			Voluntary Standards		plement Best Management Practices transportation projects	Н
Lack of know	wledge	Complete dis unknown	tributio	on in Colorado	Research and Monitoring	Co	onduct field inventory to refine known	n H
Lack of know	wledge	Population st	atus ur	iknown	Research and Monitoring	Mo	onitor population status	Н
Resource Ex	traction	Oil and gas d exploration	rilling	and seismic	Voluntary Standards		plement Best Management Practices energy development and mining	Н
Climate				intensification or weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive anning and conservation programs	М

Penstemon penlandii	Population Stat	tus Populatio	n Trend	Distribution	Гуре	Habitat	Primary
-	Medium	D Stable	D	Southern Rocky Mountains	Р	Sagebrush Upland Shrub	
Penland penstemon							
Tier 1 Plants							
General Threat	Specific Threat			General Conservation Action	Spe	ecific Conservation Action	Priority
				Land Protection (Public, Private). Easements, and Resource Rights	hat Na	ablish legal designation to protect bitat (e.g., wilderness, Research tural Area, Acrea of Critical vironmental Concern))	Н
				Planning and Zoning	issu	mote consideration of biodiversity les in transportation and land use nning processes	Н
				Research and Monitoring	Mo	nitor population status	Н
Climate	Vulnerability du poor dispersal ca restriction to rar	apacity, and/or		Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting climate change	and alteration d	ue to	Planning and Zoning	res and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological res of species itself species unknow	and/or inter-dep		Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Η
Habitat Conversion	Housing, urban, development	, and ex-urban		Land Protection (Public, Private). Easements, and Resource Rights		quire conservation easement for itat protection	Н
Habitat Degradation	Roads			Voluntary Standards		blement Best Management Practices transportation projects	Н
Non-consumptive Disturbance	Motor-powered	recreation		Education and Communication	edu	plish educational material/sponsor icational programs to raise public areness	Н
Non-consumptive Disturbance	Motor-powered	recreation		Voluntary Standards		blement Best Management Practices recreation management	Н
Climate	Climate variabil alteration of nor e.g., droughts, to	mal weather pat		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Resource Extraction	Oil and gas drill	ling		Voluntary Standards		energy development and mining	М

Penstemon scariosus	Population Sta	tus Population Trer	d Distribution	Туре	Habitat	Primary
var. albifluvis	Low	D Unknown	Wyoming Basin	Р	Barrens	
White River penstemon			Utah High Plateau	0	Desert Shrub	
Tier 1 Plants						
General Threat	Specific Threat	:	General Conservation Action	Spe	cific Conservation Action	Priority
Climate	poor dispersal of	ue to movement barrier capacity, and/or re habitat features	s, Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting climate change	g and alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		f and/or inter-dependen	ge Research and Monitoring t	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Roads		Voluntary Standards		blement Best Management Practices transportation projects	Н
Lack of knowledge	Population stat	us unknown	Research and Monitoring	Mo	nitor population status	Н
Resource Extraction	Oil and gas dri	lling	Voluntary Standards		blement Best Management Practices energy development and mining	Н
Climate		lity (intensification or rmal weather patterns, tornados, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Penstemon scariosus	Population Sta	tus Population Trer	d Distribution	Туре	Habitat	Primary
var. cyanomontanus Plateau penstemon	Medium	D Stable D	Utah-Wyoming Rocky Mountains	Р	Pinyon-Juniper Desert Shrub	
•						
Tier 2 Plants General Threat	Specific Threat		General Conservation Action	Sne	cific Conservation Action	Priority
Climate	Vulnerability d poor dispersal o	ue to movement barrier capacity, and/or re habitat features		See	d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting climate change	g and alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological re		ge Research and Monitoring	Co	nduct primary research on rare plant pollinator responses to changing	Н
	of species itself species unknow	f and/or inter-dependen		clir	nate, and other vulnerability factors spersal mechanisms, mutualisms)	
Lack of knowledge	species unknov	f and/or inter-dependen		clin (dis Cor	nate, and other vulnerability factors	Н
Lack of knowledge	species unknov Complete distri	f and/or inter-dependen vn	t	clin (dis Cor dist	nate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known	H
Lack of knowledge Climate	species unknov Complete distri unknown Climate variabi	f and/or inter-dependen vn ibution in Colorado lity (intensification or rmal weather patterns,	t Research and Monitoring	clin (dis Con dist Mo Eng	nate, and other vulnerability factors spersal mechanisms, mutualisms) nduct field inventory to refine known ribution	

Penstemon teucrioides	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
	Unknown	Unknown	Southern Rocky Mountains	Р	Sagebrush	\checkmark
Germander beardtongue						
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due to a poor dispersal capaci restriction to rare hab	ty, and/or	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and a climate change	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respons of species itself and/o species unknown	U	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Taxonomy is poorly	understood	Research and Monitoring	Тах	conomic work is needed	Н
Lack of knowledge	Threats and response poorly understood	to change are	Research and Monitoring		earch species/habitat response to nagement or disturbance	Н
Lack of knowledge	Biology, ecology, and are poorly known	d detailed habitat	Research and Monitoring		search critical life history/habitat	Н
Lack of knowledge	Complete distribution unknown	n in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Lack of knowledge	Population status unk	known	Research and Monitoring	Mo	nitor population status	Н
Climate	Climate variability (in alteration of normal v e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М

Phacelia	formosula	Population S	Status	Populatio	on Trend	Distribution	Туре	Habitat	Primary
		Medium	D	Stable	D	Southern Rocky Mountains	Р	Barrens	\checkmark
North Park I	phacelia								
Tier 1	Plants								
General Thr	reat	Specific Three	eat			General Conservation Action	Spe	cific Conservation Action	Priority
					Education and Communication	edu	olish educational material/sponsor cational programs to raise public areness	Н	
						Land Protection (Public, Private). Easements, and Resource Rights		band existing ACECs and create new EC in Larimer County	Н
						Research and Monitoring	Mo	nitor population status	Н
Climate		Vulnerability poor dispersa restriction to	al capac	ity, and/or		Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat shifti climate chan	0	alteration d	ue to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		Phenological of species its species unkn	elf and			Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Con	version	Housing, urb development		l ex-urban		Land Protection (Public, Private). Easements, and Resource Rights	· · · · · ·	quire conservation easement for itat protection	Н
Lack of know	wledge	Taxonomy or population is			l	Research and Monitoring		conomic work is needed for Larimer unty population	Н
Non-consum	nptive Disturbance	Motor-power	red reci	reation		Voluntary Standards		blement Best Management Practices recreation management	Н
						Capacity Building and Cooperation	alig	ordinate with related agencies to an goals, policies, measures of cess, etc.	М
Climate		Climate varia alteration of e.g., drought	normal	weather pat		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Deg	radation	Roads and Po	owerlin	es		Voluntary Standards	for	plement Best Management Practices transportation and powerline ridors	М
Indirect Con (Mortality)	sumptive Use	Incompatible	e grazin	g?		Research and Monitoring		earch species/habitat response to nagement or disturbance	М
Resource Ex	straction	Oil and gas d	lrilling			Voluntary Standards		energy development and mining	М

Phacelia submutica	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
	Low	D	Unknown	Utah High Plateau	Р	Barrens	\checkmark
DeBeque phacelia				Southern Rocky Mountains	0		
Tier 1 Plants							
General Threat	Specific Three	at		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability poor dispersa restriction to	l capac		Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifti climate chang	0	alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Η
Climate		elf and	se to climate change for inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Roads			Voluntary Standards		blement Best Management Practices transportation projects	Н
Non-consumptive Disturbance	Motor-power	ed recr	eation	Voluntary Standards		blement Best Management Practices recreation management	Н
Resource Extraction	Oil and gas d	rilling		Voluntary Standards		blement Best Management Practices energy development and mining	Н
Climate		normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Complete dis unknown	tributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	М
Lack of knowledge	Population st	atus un	known	Research and Monitoring	Mo	nitor population status	М
Lack of knowledge	Population d to disturbanc	<i>,</i>	s and vulnerability oorly known	Research and Monitoring		earch species/habitat response to nagement or disturbance	М
Lack of knowledge	Biology and	ecology	y are poorly known	Research and Monitoring		nduct studies on demography and roductive biology	L

1 nysaru	a alpina	Population Status	Population Trend	Distribution 7	Гуре	Habitat	Primary
		Unknown	Unknown	Southern Rocky Mountains	Р	Exposed Rock (alpine)	
Avery Peak	twinpod						
Tier 2	Plants						
General Th	reat	Specific Threat		General Conservation Action	Spec	cific Conservation Action	Priority
Climate		Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation		l banking (incl. protocols, ection, and cultivation)	Н
Climate		Habitat shifting and climate change	alteration due to	Planning and Zoning	respondent	el potential habitat/range shifts in onse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		Phenological respon of species itself and/ species unknown		Research and Monitoring	and j	duct primary research on rare plant pollinator responses to changing ate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of kno	owledge	Threats and response poorly understood	e to change are	Research and Monitoring		earch species/habitat response to agement or disturbance	Н
Lack of kno	owledge	Biology, ecology, an are poorly known	nd detailed habitat	Research and Monitoring		earch critical life history/habitat ponents	Н
Lack of kno	owledge	Complete distributio unknown	n in Colorado	Research and Monitoring		duct field inventory to refine known ibution	Н
Lack of kno	owledge	Population status un	known	Research and Monitoring	Mon	itor population status	Н
Climate		Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		age in collaborative, proactive ning and conservation programs	М
Non-consur	mptive Disturbance	Motor-powered recr		Compliance and Enforcement	Man	age off-road travel	М
Physaria	a bellii	Population Status	Population Trend	Distribution T	Гуре	Habitat	Primary
		Medium D	Declining D	Central Shortgrass Prairie	Р	Barrens	\checkmark
Bell's twing	pod			Front Range	Р		
Den stwing							
-							
Tier 2	Plants	Specific Threat		General Conservation Action	Spec	rific Conservation Action	Priority
Tier 2 General Thr	Plants	Specific Threat	movement barriers	General Conservation Action	-	tific Conservation Action	Priority H
Tier 2	Plants	Specific Threat Vulnerability due to poor dispersal capac restriction to rare had	ity, and/or	General Conservation Action Ex-situ Conservation	Seed	cific Conservation Action l banking (incl. protocols, ection, and cultivation)	Priority H
Tier 2 General Thi Climate	Plants	Vulnerability due to poor dispersal capac	ity, and/or bitat features		Seed colle Mod respond	l banking (incl. protocols,	
Tier 2 General Thr	Plants	Vulnerability due to poor dispersal capac restriction to rare hal Habitat shifting and climate change	ity, and/or bitat features alteration due to se to climate change	Ex-situ Conservation	Seed colle Mod resp and situ and clim	l banking (incl. protocols, ection, and cultivation) lel potential habitat/range shifts in onse to projected climate changes prepare adaptation plan to define in	H H
Tier 2 General Thi Climate Climate Climate	Plants reat	Vulnerability due to poor dispersal capac restriction to rare ha Habitat shifting and climate change Phenological respon of species itself and/	ity, and/or bitat features alteration due to se to climate change or inter-dependent	Ex-situ Conservation Planning and Zoning	Seed collection model response and situa clim (disp	l banking (incl. protocols, ection, and cultivation) lel potential habitat/range shifts in onse 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	н Н
Tier 2 General Thi Climate Climate	Plants reat	Vulnerability due to poor dispersal capac restriction to rare hal Habitat shifting and climate change Phenological respon of species itself and/ species unknown Housing, urban, and	ity, and/or bitat features alteration due to se to climate change or inter-dependent	Ex-situ Conservation Planning and Zoning Research and Monitoring Land Protection (Public, Private),	Seed colle Mod resp and situ situ clim (disp habi Impl	l banking (incl. protocols, ection, and cultivation) lel potential habitat/range shifts in onse 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) uire conservation easement for	H H
Tier 2 General Thi Climate Climate Climate Habitat Cor	Plants reat nversion gradation	Vulnerability due to poor dispersal capac restriction to rare hai Habitat shifting and climate change Phenological respon of species itself and/ species unknown Housing, urban, and development	ity, and/or bitat features alteration due to se to climate change or inter-dependent ex-urban	Ex-situ Conservation Planning and Zoning Research and Monitoring Land Protection (Public, Private), Easements, and Resource Rights	Seed collection model and situation content and clim (disp habi Impl for t	l banking (incl. protocols, ection, and cultivation) lel potential habitat/range shifts in onse 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 bersal mechanisms, mutualisms) uire conservation easement for tat protection ement Best Management Practices	H H H H
Tier 2 General Thi Climate Climate Climate Habitat Cor Habitat Deg	Plants reat nversion gradation	Vulnerability due to poor dispersal capac restriction to rare hai Habitat shifting and climate change Phenological respon of species itself and/ species unknown Housing, urban, and development Roads or Railroads	ity, and/or bitat features alteration due to se to climate change 'or inter-dependent ex-urban n in Colorado intensification or weather patterns,	Ex-situ Conservation Planning and Zoning Research and Monitoring Land Protection (Public, Private), Easements, and Resource Rights Voluntary Standards	Seed collection of the second situation of the second clim (disp for the second for the second distriction Enga	l banking (incl. protocols, ection, and cultivation) lel potential habitat/range shifts in onse 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 bersal mechanisms, mutualisms) uire conservation easement for tat protection ement Best Management Practices ransportation projects duct field inventory to refine known	H H H H

Physaria obcorda	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
•	Medium D	Unknown	Utah High Plateau	Р	Barrens	\checkmark
Piceance twinpod						
Tier 1 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	ecific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capa 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	resj and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respon of species itself and species unknown		Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Utility and pipeline	construction	Voluntary Standards	-	energy development and mining	Н
Habitat Degradation	Roads		Voluntary Standards	-	plement Best Management Practices transportation projects	Н
Lack of knowledge	Population status un	ıknown	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Response to change		Research and Monitoring	of c	estigate how plants respond to layers lust deposited during resource raction	Н
Resource Extraction	Oil and gas drilling	, and oil shale mining	Voluntary Standards		energy development and mining	Н
Climate	Climate variability alteration of normal e.g., droughts, torna	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Complete distribution unknown	on in Colorado	Research and Monitoring		nduct field inventory to refine known rribution	L

Physaria	a pulvinata	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
1 1095010		Medium	D	Unknown	Southern Rocky Mountains	Р	Barrens	
Cushion bla	adderpod						Deciduous Oak	
Tier 1	Plants						Ponderosa Pine Sagebrush	
General Th		Specific Three	at		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	licat	•		movement barriers	Ex-situ Conservation	-	d banking (incl. protocols,	Н
Cilliate		poor dispersa restriction to	l capac	ity, and/or	Ex site Conservation		ection, and cultivation)	
Climate		Habitat shifti climate chang		alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate			elf and/	se to climate change /or inter-dependent	Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of kno	owledge	Complete dis unknown	tributic	on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution on private land	Н
Non-consu	mptive Disturbance	Motor-power	ed recr	eation	Compliance and Enforcement	Ma	nage off-road travel	Н
Non-consu	mptive Disturbance	Infrastructure visitor use at		opment for Park Mesa	Protected Area Management	con	ign public improvements to be npatible with biodiversity	Н
Resource E	Extraction			and seismic testing	Voluntary Standards		element Best Management Practices energy development and mining	Н
Climate			normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation	2	age in collaborative, proactive uning and conservation programs	М
Habitat Cor	nversion	Water storage	e		Protected Area Management		nage public use to be compatible 1 biodiversity	М
Lack of kno	owledge	Population st	atus un	known	Research and Monitoring	Mo	nitor population status	М
Physaria	a rollinsii	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary
. .		Low	D	Unknown	Southern Rocky Mountains	Р	Barrens	✓
Rollins twi	npod							
Tier 2	Plants							
General Th	reat	Specific Three	at		General Conservation Action	Spe	cific Conservation Action	Priority
Climate		Vulnerability poor dispersa restriction to	l capac	city, and/or	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate		Habitat shifti climate chang	-	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate			elf and	ise to climate change /or inter-dependent	Research and Monitoring	and clin	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
								Н
Lack of kno	owledge	Threats and r poorly under		e to change are	Research and Monitoring		earch species/habitat response to hagement or disturbance	
Lack of kno	_	poorly under	stood logy, ar	e to change are	Research and Monitoring Research and Monitoring	mar Res		Н
	owledge	poorly under Biology, eco are poorly kn	stood logy, ar lown	0		mar Res com Cor	agement or disturbance earch critical life history/habitat	Н
Lack of kno	owledge	poorly under Biology, eco are poorly kn Complete dis	stood logy, ar own tributic	nd detailed habitat	Research and Monitoring	mar Res com Cor dist	nagement or disturbance earch critical life history/habitat iponents induct field inventory to refine known	Н

	a comotiformer	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
1 nysaru	a scrotiformis	Unknown	Unknown	Southern Rocky Mountains	P	Barrens	
		UIKIIOWII	UIKIIOWII		•	Meadow Tundra	
West Silver						Spruce-Fir	
Tier 1	Plants			a 1a - 1 - 1	6		
General Thr	reat	Specific Threat	.1 .	General Conservation Action	-	cific Conservation Action	Priority
Climate		vulnerability due t poor dispersal capa restriction to rare h		Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Н
Climate		Habitat shifting an climate change	d alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate			onse to climate change d/or inter-dependent	Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of kno	owledge	Threats and respor poorly understood		Research and Monitoring		earch species/habitat response to hagement or disturbance	Н
Lack of kno	owledge	Biology, ecology, are poorly known	and detailed habitat	Research and Monitoring		earch critical life history/habitat ponents	Н
Lack of kno	owledge	Complete distribut unknown		Research and Monitoring		nduct field inventory to refine known ribution	Н
Lack of kno	owledge	Population status u		Research and Monitoring		nitor population status	Η
Climate		Climate variability alteration of norma e.g., droughts, torn	d weather patterns,	Capacity Building and Cooperation		age in collaborative, proactive nning and conservation programs	М
Potentill	la rupincola	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
Rocky Mou	intain cinquefoil	Medium D	Unknown	Southern Rocky Mountains	Р	Cliff and Canyon	
Tier 2	Plants						
General Thr	reat	Specific Threat					
Climate		opeenie inieut		General Conservation Action	Spe	cific Conservation Action	Priority
			acity, and/or	General Conservation Action Ex-situ Conservation	See	cific Conservation Action d banking (incl. protocols, ection, and cultivation)	Priority H
Climate		Vulnerability due t poor dispersal capa	acity, and/or abitat features		See coll Mo resp and	d banking (incl. protocols,	•
		Vulnerability due t poor dispersal capa restriction to rare h Habitat shifting an climate change Phenological respo	acity, and/or abitat features d alteration due to	Ex-situ Conservation	See coll Mo resp and situ Cor and clin	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	H H
Climate	owledge	Vulnerability due t poor dispersal cap restriction to rare h Habitat shifting an climate change Phenological respo of species itself an species unknown Population status u	acity, and/or habitat features d alteration due to onse to climate change d/or inter-dependent inknown	Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring	See coll Mo resp and situ Cor and clin (dis Mo	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 nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nitor population status	H H H
Climate Lack of kno	owledge	Vulnerability due t poor dispersal cap restriction to rare H Habitat shifting an climate change Phenological respo of species itself an species unknown	acity, and/or habitat features d alteration due to onse to climate change d/or inter-dependent inknown (intensification or al weather patterns,	Ex-situ Conservation Planning and Zoning Research and Monitoring	See coll Mo resp and situ Cor and clin (dis Mo Eng	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	H H H
Climate Lack of kno Climate		Vulnerability due t poor dispersal cap restriction to rare H Habitat shifting an climate change Phenological respo of species itself an species unknown Population status u Climate variability alteration of norma	acity, and/or habitat features d alteration due to onse to climate change d/or inter-dependent inknown (intensification or al weather patterns,	Ex-situ Conservation Planning and Zoning Research and Monitoring Research and Monitoring Capacity Building and	See coll Mo resp and situ Cor and clin (dis Mo Eng plar Jimp	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 nate, and other vulnerability factors persal mechanisms, mutualisms) nitor population status gage in collaborative, proactive	H H H
Climate Climate Lack of kno Climate Habitat Deg Lack of kno	gradation	Vulnerability due t poor dispersal cap restriction to rare f Habitat shifting an climate change Phenological respo of species itself an species unknown Population status u Climate variability alteration of norma e.g., droughts, torm	acity, and/or habitat features d alteration due to onse to climate change d/or inter-dependent inknown (intensification or il weather patterns, ados, etc.)	Ex-situ Conservation Planning and Zoning Research and Monitoring Capacity Building and Cooperation	See coll Mo resp and situ Cor and clin (dis Mo Eng plar Jimp for Cor dist	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nitor population status tage in collaborative, proactive ming and conservation programs element Best Management Practices transportation projects nduct field inventory to refine known ribution	H H H M M M
Climate Lack of kno Climate Habitat Deg Lack of kno	gradation	Vulnerability due t poor dispersal cap restriction to rare H Habitat shifting an climate change Phenological respo of species itself an species unknown Population status u Climate variability alteration of norma e.g., droughts, torm Roads	acity, and/or habitat features d alteration due to onse to climate change d/or inter-dependent inknown (intensification or il weather patterns, ados, etc.)	Ex-situ Conservation Planning and Zoning Research and Monitoring Capacity Building and Cooperation Voluntary Standards	See coll Mo resp and situ Cor and clin (dis Mo Eng plan Junp for Cor dist Maj spra	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 nate, and other vulnerability factors persal mechanisms, mutualisms) nitor population status gage in collaborative, proactive ming and conservation programs element Best Management Practices transportation projects aduct field inventory to refine known ribution p weed infestations and sensitive no ty/no mow zones	H H H M M L
Climate Lack of kno Climate Habitat Deg Lack of kno Invasive or	gradation owledge Exotic Species Exotic Species	Vulnerability due t poor dispersal cap restriction to rare H Habitat shifting an climate change Phenological respo of species itself an species unknown Population status u Climate variability alteration of norma e.g., droughts, torr Roads Complete distribut unknown	acity, and/or habitat features d alteration due to onse to climate change d/or inter-dependent inknown (intensification or ul weather patterns, ados, etc.) ion in Colorado	Ex-situ Conservation Ex-situ Conservation Planning and Zoning Research and Monitoring Capacity Building and Cooperation Voluntary Standards Research and Monitoring Invasive Species Control and	See coll Mo resp and situ Cor and clin (dis Mo Eng plan for Cor dist Maj spra Mo new	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 nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nitor population status tage in collaborative, proactive ming and conservation programs element Best Management Practices transportation projects nduct field inventory to refine known ribution p weed infestations and sensitive no	H H H M M L

Ptilagrostis porteri	Population Status	Population Tre	end	Distribution	Гуре	Habitat	Primary
0	Medium D	Declining I	D	Southern Rocky Mountains	Р	Grass/Forb Dominated Wetlands	\checkmark
Porter feathergrass							
Tier 2 Plants							
General Threat	Specific Threat			General Conservation Action	Spe	ecific Conservation Action	Priority
				Land Protection (Public, Private) Easements, and Resource Rights	hat	ablish legal designation to protect bitat (e.g., Research Natural Area, ecial Interest Area)	Н
Habitat Degradation	Altered hydrological aquifer)	l regime (surface	or	Land Protection (Public, Private) Easements, and Resource Rights	, Est	ablish in-stream flow rights	Н
Habitat Degradation	Altered hydrological aquifer)	l regime (surface	or	Maintain or Restore Natural Processes	Re	store natural hydrologic regime	Н
Resource Extraction	Mining (peat, placer)		Education and Communication		ucate miners about avoiding and/or igating impacts	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	ers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	М
Climate	Habitat shifting and climate change	alteration due to		Planning and Zoning	res and	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	М
Climate	Phenological respon of species itself and/ species unknown			Research and Monitoring	anc clii	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	М
Lack of knowledge	Response to change	is poorly underst	ood	Research and Monitoring		search species/habitat response to nagement or disturbance	М
Lack of knowledge	Complete distributio	on in Colorado		Research and Monitoring		nduct field inventory to refine known tribution	М
Lack of knowledge	Restoration methods understood	are poorly		Research and Monitoring		ed banking and identification of ective restoration methods	L

Puccinellia parishii	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary		
	Medium	D	Unknown	Southern Rocky Mountains	Р	Grass/Forb Dominated Wetlands	\checkmark		
Parish's alkali grass									
Tier 2 Plants									
General Threat	Specific Thre	at		General Conservation Action	Spe	ecific Conservation Action	Priority		
Climate	poor dispersa	l capac	o movement barriers, city, and/or abitat features	Ex-situ Conservation		Seed banking (incl. protocols, collection, and cultivation)			
Climate	Habitat shifti climate chanţ	0	alteration due to	Planning and Zoning	res and	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs			
Climate		elf and	nse to climate change /or inter-dependent	Research and Monitoring	and clii	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)			
Habitat Degradation	Altered hydro aquifer)	ologica	l regime (surface or	Maintain or Restore Natural Processes		aintain natural hydrologic regime	Н		
Climate		normal	(intensification or weather patterns, idos, etc.)	Capacity Building and Cooperation		Engage in collaborative, proactive planning and conservation programs			
Indirect Consumptive Use (Mortality)	Grazing			Compatible Resource Use		Implement compatible grazing management			
Invasive or Exotic Species	Invasive plan	its		Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	М		
Lack of knowledge	Population st	atus ur	hknown	Research and Monitoring Monitor population status					
Salix arizonica	Population S	Status	Population Trend	Distribution	Туре	Habitat	Primary		
	Low	D	Unknown	Southern Rocky Mountains	Р	Shrub-dominated Wetlands	\checkmark		
Arizona willow									
Tier 2 Plants									
General Threat	Specific Thre	at		General Conservation Action	Spe	ecific Conservation Action	Priority		
Climate	poor dispersa	l capac	o movement barriers, city, and/or abitat features	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н		
Climate	Habitat shifti climate chan		alteration due to	Planning and Zoning	res	bdel potential habitat/range shifts in ponse to projected climate changes d prepare adaptation plan to define in a and ex situ conservation needs	Н		
Climate		elf and	nse to climate change /or inter-dependent	Research and Monitoring	and clii	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)			
Indirect Consumptive Use (Mortality)	Incompatible	Graziı	ng	Compatible Resource Use		plement compatible grazing nagement	Н		
Lack of knowledge	Complete dis unknown	tributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н		
Lack of knowledge	Population st	atus ur	ıknown	Research and Monitoring	Mo	onitor population status	Н		
			(intensification or	Capacity Building and	г	gage in collaborative, proactive	М		

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

Saussurea weberi	Population Status	Population Trend	Distribution	Туре	Habitat	Primary
	Medium D	Unknown	Southern Rocky Mountains	Р	Meadow Tundra	\checkmark
Weber saussurea						
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action	Spe	cific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capa restriction to rare ha		Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting and climate change	l alteration due to	Planning and Zoning	resj and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		nse to climate change l/or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Lack of knowledge	Threats and response poorly understood	se to change are	Research and Monitoring		earch species/habitat response to nagement or disturbance	Н
Lack of knowledge	Biology, ecology, a are poorly known	nd detailed habitat	Research and Monitoring	spe	search critical life history (e.g., is cies rhizomatous?)/habitat nponents	Н
Lack of knowledge	Complete distributi unknown	on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	Н
Lack of knowledge	Population status un	nknown	Research and Monitoring	Mo	nitor population status	Н
Climate	Climate variability alteration of normal e.g., droughts, torna	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Non-consumptive Disturbance	Motor-powered rec	reation	Compliance and Enforcement	Ma	nage off-road travel	М
Resource Extraction	Mining		Voluntary Standards		blement Best Management Practices mining	М
Non-consumptive Disturbance	Non-motorized recr	reation	Education and Communication	edu	olish educational material/sponsor cational programs to raise public areness	L

Sclerocactus glaucus	Population St	atus Population Tr	end Distribution	Туре	Habitat	Primary
0	Low	D Unknown	Colorado Plateau	Р	Desert Shrub	\checkmark
Calana da ba abileza acatera			Utah High Plateau	Р		
Colorado hookless cactus			Southern Rocky Mountain	s O		
Tier 1 Plants						
General Threat	Specific Threa	t	General Conservation Actio	on Spe	ecific Conservation Action	Priority
Climate	poor dispersal	lue to movement barri capacity, and/or are habitat features	ers, Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shiftin climate change	g and alteration due to	Planning and Zoning	res	bdel potential habitat/range shi ponse to projected climate cha d prepare adaptation plan to de a and ex situ conservation need	nges fine in
Climate	U	f and/or inter-depende	ange Research and Monitoring ent	and clii	nduct primary research on rare d pollinator responses to chang mate, and other vulnerability fa spersal mechanisms, mutualisr	ging actors
Lack of knowledge	Complete distr unknown	ibution in Colorado	Research and Monitoring		nduct field inventory to refine tribution	known H
Lack of knowledge	Population sta	tus unknown	Research and Monitoring	Mo	onitor population status	Н
Resource Extraction	Oil and gas dri	illing	Voluntary Standards		plement Best Management Pra energy development and mini	
			Land Protection (Public, Pr. Easements, and Resource R	ights hat	ablish legal designation to pro bitat (e.g., Area of Critical vironmental Concern)	otect M
Climate		vility (intensification o ormal weather patterns tornados, etc.)			gage in collaborative, proactiv nning and conservation progra	
Habitat Degradation	Roads, powerl	ines, and pipelines	Voluntary Standards	for	plement Best Management Pra energy development and nsportation projects	ictices M

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

Sclerocactus mesae-	Population Statu	Is Population Trend	Distribution	Туре	Habitat	Primary
verdae Mesa Verde hookless cactus	Low I	D Unknown	Colorado Plateau	Р	Barrens Saltbrush Fans and Flats	
Tier 1 Plants General Threat	Specific Threat		General Conservation Action	Sp	ecific Conservation Action	Priority
Climate	1		Ex-situ Conservation	See	ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting a climate change	nd alteration due to	Planning and Zoning	res	del potential habitat/range shifts in ponse to projected climate changes l prepare adaptation plan to define in and ex situ conservation needs	Н
Climate		ind/or inter-dependent	Research and Monitoring	anc clii	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Direct Consumptive Use (Mortality)	Gathering/Collec	ting	Compliance and Enforcement	En	force collecting regulations	Н
Lack of knowledge	Complete distrib unknown	ution in Colorado	Research and Monitoring		nduct field inventory to refine knowr tribution	Н
Climate		ty (intensification or nal weather patterns, rnados, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Lack of knowledge	Population status	unknown	Research and Monitoring	Mo	nitor population status	М
Natural Factors	Insect herbivory		Research and Monitoring	Mo	nitor population status	М
Direct Consumptive Use (Mortality)	Gathering/Collec	ting	Education and Communication	edu	olish educational material/sponsor acational programs to raise public areness	L

Sisyrinchium pa	ıllidum	Populatio	on Status	Population Trend	Distribution 7	Гуре	Habitat	Primary
2 1		Low	D	Unknown	Southern Rocky Mountains	Р	Grass/Forb Dominated Wetlands	✓
Pale blue-eyed-grass								
Tier 2 Plants								
General Threat		Specific T	hreat		General Conservation Action	Spe	cific Conservation Action	Priority
					Land Protection (Public, Private), Easements, and Resource Rights	hab Res	ablish legal designation to protect itat (e.g., Special Interest Area, search Natural Area, Area of Critical vironmental Concern, state Natural ea)	Η
Climate		poor dispe	ersal capac	movement barriers, eity, and/or bitat features	Ex-situ Conservation		d banking (incl. protocols, lection, and cultivation)	Н
Climate		Habitat sh climate ch	U	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate			itself and	se to climate change /or inter-dependent	Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation		Altered hy aquifer)	/drologica	l regime (surface or	Maintain or Restore Natural Processes	Res	store natural hydrologic regime	Н
Resource Extraction		Peat minin	ng		Land Protection (Public, Private), Easements, and Resource Rights		quire conservation easement for itat protection	Н
Resource Extraction		Peat minin	ng		Voluntary Standards		blement Best Management Practices mining	Н
Climate			of normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Indirect Consumptive (Mortality)	Use	Grazing			Compatible Resource Use	-	plement compatible grazing nagement	М
Lack of knowledge		Threats ar poorly une		e to change are	Research and Monitoring		search species/habitat response to nagement or disturbance	М
Lack of knowledge		Complete unknown	distributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known ribution	М
Non-consumptive Dist	turbance	Recreation	n		Education and Communication	edu	olish educational material/sponsor cational programs to raise public areness	М

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

Spiranthes diluvialis	Population Statu	s Population 7	Frend	Distribution	Туре	Habitat	Primary
	Low D	Declining	D	Front Range	Р	Grass/Forb Dominated Wetlands	\checkmark
Ute ladies'-tresses				Southern Rocky Mountains	P		
Tier 1 Plants				Central Shortgrass Prairie	0		
Ther I Plants				Utah-Wyoming Rocky Mountains	0		
General Threat	Specific Threat			General Conservation Action	Spe	ecific Conservation Action	Priority
				Protected Area Management		nage public use to be compatible h biodiversity	Н
Climate	Vulnerability due poor dispersal cap restriction to rare	oacity, and/or	riers,	Ex-situ Conservation		ed banking (incl. protocols, lection, and cultivation)	Н
Climate	Habitat shifting a climate change	nd alteration due	to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological resp of species itself at species unknown			Research and Monitoring	and clir	nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors spersal mechanisms, mutualisms)	Н
Habitat Degradation	Altered hydrologi aquifer)	cal regime (surfa	ce or	Compliance and Enforcement	Enf	force 404 wetlands regulations	Н
Habitat Degradation	Altered hydrologi aquifer)	cal regime (surfa	ce or	Maintain or Restore Natural Processes	Res	store natural hydrologic regime	Н
				Research and Monitoring	Mo	nitor population status	М
Climate	Climate variabilit alteration of norm e.g., droughts, tor	al weather patter		Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Housing, urban, a development	nd ex-urban		Land Protection (Public, Private) Easements, and Resource Rights	·	quire conservation easement for itat protection	М
Lack of knowledge	Complete distribu unknown	tion in Colorado		Research and Monitoring		nduct field inventory to refine known rribution	М

1 elesoni.	x jamesii	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
		Medium	D	Unknown	Southern Rocky Mountains	Р	Cliff and Canyon	
James teleso	onix						Meadow Tundra	
Tier 2	Plants						Mixed Conifer	
General Thr		Specific Threa	at		General Conservation Action	Spe	cific Conservation Action	Priority
Climate		Vulnerability poor dispersal restriction to r	capac	•	Ex-situ Conservation	See coll	Н	
Climate		Habitat shiftir climate chang	0	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in oonse to projected climate changes prepare adaptation plan to define in and ex situ conservation needs	Н
Climate			lf and/	se to climate change or inter-dependent	Research and Monitoring	and clin	duct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms)	Н
Lack of kno	wledge	Threats and re poorly unders		e to change are	Research and Monitoring		earch species/habitat response to nagement or disturbance	Н
Lack of kno	wledge	Complete dist unknown	ributio	n in Colorado	Research and Monitoring	Cor	nduct field inventory to refine known ribution	Н
Lack of kno	wledge	Population sta	tus un	known	Research and Monitoring	Mo	nitor population status	Н
Climate			ormal	ntensification or weather patterns, los, etc.)	Capacity Building and Cooperation	Eng plai	М	
Non-consun	nptive Disturbance	Recreation			Education and Communication	edu	lish educational material/sponsor cational programs to raise public ireness	М
Thalictri	um	Population S	tatus	Population Trend	Distribution	Туре	Habitat	Primary
heliophil	lum	Medium	D	Stable D	Utah High Plateau	Р	Barrens	\checkmark
-		Medium	D	Stable D	Utah High Plateau Southern Rocky Mountains	P O	Barrens	
-		Medium	D	Stable D	•		Barrens	
Sun-loving 1 Tier 2	meadow rue Plants	Medium Specific Threa		Stable D	•	0	Barrens cific Conservation Action	Priority
Sun-loving 1 Tier 2	meadow rue Plants			Stable D	Southern Rocky Mountains	O Spe		
Sun-loving 1 Tier 2	meadow rue Plants	Specific Three	at due to capac	movement barriers, ity, and/or	Southern Rocky Mountains General Conservation Action	O Spe Mo See	cific Conservation Action	Priority
Sun-loving 1 Tier 2 General Thr	meadow rue Plants	Specific Three Vulnerability poor dispersal restriction to t	at due to capac: are hal	movement barriers, ity, and/or	Southern Rocky Mountains General Conservation Action Research and Monitoring	O Spe Mo See coll Mo resp and	cific Conservation Action nitor population status d banking (incl. protocols,	Priority H
Sun-loving I Tier 2 General Thr Climate Climate	meadow rue Plants	Specific Thread Vulnerability poor dispersal restriction to a Habitat shiftir climate chang Phenological	at due to l capac: are hal ng and a e respons	movement barriers, ity, and/or bitat features alteration due to	Southern Rocky Mountains General Conservation Action Research and Monitoring Ex-situ Conservation	O Spe Mo See coll Mo resp and situ Cor and clin	cific Conservation Action nitor population status d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	Priority H H
Sun-loving I Tier 2 General Thr Climate Climate Climate	meadow rue Plants	Specific Thread Vulnerability poor dispersal restriction to a Habitat shiftir climate chang Phenological of species itse	at due to capac: are hal ng and e response iff and/ own	movement barriers, ity, and/or bitat features alteration due to se to climate change	Southern Rocky Mountains General Conservation Action Research and Monitoring Ex-situ Conservation Planning and Zoning	O Spe Mo See coll Mo resp and situ Cor and clim (dis Mo wee	cific Conservation Action nitor population status 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 nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors	Priority H H
Sun-loving I Tier 2 General Thr Climate Climate	meadow rue Plants eat Exotic Species	Specific Thready Specif	at due to capac: are hal ng and e respons ilf and/ own	movement barriers, ity, and/or bitat features alteration due to se to climate change or inter-dependent	Southern Rocky Mountains General Conservation Action Research and Monitoring Ex-situ Conservation Planning and Zoning Research and Monitoring Invasive Species Control and	O Spe Mo See coll Mo resp and situ Cor and clin (dis Mo wee imn Imp	cific Conservation Action nitor population status 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 nate, and other vulnerability factors persal mechanisms, mutualisms) nitor for the presence of noxious eds and implement weed control	Priority H H H
Sun-loving I Tier 2 General Thr Climate Climate Climate	meadow rue Plants eat Exotic Species	Specific Thread Vulnerability poor dispersal restriction to a Habitat shiftir climate chang Phenological of species itse species unknow Invasive plant Oil and gas dr	at due to capac: are hal ng and e respons iff and/ own s s rilling, bility (i ormal	movement barriers, ity, and/or bitat features alteration due to se to climate change or inter-dependent and oil shale mining intensification or weather patterns,	Southern Rocky Mountains General Conservation Action Research and Monitoring Ex-situ Conservation Planning and Zoning Research and Monitoring Invasive Species Control and Prevention	O Spe Mo See coll Mo resp and situ Cor and clin (dis Mo wee imn for Eng	cific Conservation Action nitor population status 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 nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nitor for the presence of noxious eds and implement weed control nediately if detected blement Best Management Practices	Priority H H H
Sun-loving I Tier 2 General Thr Climate Climate Climate Invasive or I Resource Ex	meadow rue Plants eat Exotic Species	Specific Thread Vulnerability poor dispersal restriction to a Habitat shiftir climate chang Phenological of species itse species unknow Invasive plant Oil and gas dr Climate varial alteration of m e.g., droughts	at due to capac: rare hal ng and e respons ilf and/ own s s filling, bility (i ormal	movement barriers, ity, and/or bitat features alteration due to se to climate change or inter-dependent and oil shale mining intensification or weather patterns,	Southern Rocky Mountains General Conservation Action Research and Monitoring Ex-situ Conservation Planning and Zoning Research and Monitoring Invasive Species Control and Prevention Voluntary Standards Capacity Building and	O Spe Mo See coll Mo resp and situ Cor and clin (dis Mo wee imn Imp for Eng plar	cific Conservation Action nitor population status 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 nduct primary research on rare plant pollinator responses to changing nate, and other vulnerability factors persal mechanisms, mutualisms) nitor for the presence of noxious eds and implement weed control nediately if detected blement Best Management Practices energy development and mining tage in collaborative, proactive	Priority H H H H

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	Туре	Habitat	Primary
juniperorum	Unknown	Unknown	Colorado Plateau	Р	Pinyon-Juniper	\checkmark
· -			Southern Rocky Mountains	0	Sagebrush	
Juniper tumble mustard			Utah High Plateau	0		
Tier 2 Plants						
General Threat	Specific Threat		General Conservation Action		ecific Conservation Action	Priority
Climate	Vulnerability due to poor dispersal capac restriction to rare ha	ity, and/or	Ex-situ Conservation	See col	Н	
Climate	Habitat shifting and climate change	alteration due to	Planning and Zoning	resp and	del potential habitat/range shifts in ponse to projected climate changes I prepare adaptation plan to define in and ex situ conservation needs	Н
Climate	Phenological respon of species itself and/ species unknown		Research and Monitoring	and clir	nduct primary research on rare plant l pollinator responses to changing nate, and other vulnerability factors 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, ar are poorly known	nd detailed habitat	Research and Monitoring		search critical life history/habitat nponents	Н
Lack of knowledge	Population status un	known	Research and Monitoring	Mo	nitor population status	Н
Lack of knowledge	Complete distributio	on in Colorado	Research and Monitoring		nduct field inventory to refine known tribution	Н
Climate	Climate variability (alteration of normal e.g., droughts, tornad	weather patterns,	Capacity Building and Cooperation		gage in collaborative, proactive nning and conservation programs	М
Habitat Conversion	Housing, urban, and development	ex-urban	Land Protection (Public, Private) Easements, and Resource Rights		quire conservation easement for pitat protection	М
Indirect Consumptive Use (Mortality)	Grazing		Compatible Resource Use		plement compatible grazing nagement	М
Non-consumptive Disturbance	Motor-powered recr	eation	Compliance and Enforcement	Ma	nage off-road travel	М
Invasive or Exotic Species	Invasive plants		Invasive Species Control and Prevention		plement integrated weed/pest nagement plan	L
Resource Extraction	Oil and gas drilling		Voluntary Standards		plement Best Management Practices energy development and mining	L

Thelypodium	Population Status	Population Trend		Habitat	Primary
paniculatum	Unknown	Unknown		Grass/Forb Dominated Wetlands	\checkmark
Northwestern thelypody					
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to r poor dispersal capaci- 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	lteration due to	Planning and Zoning	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respons of species itself and/o species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Lack of knowledge	Threats and response poorly understood	-	Research and Monitoring	Research species/habitat response to management or disturbance	Н
Lack of knowledge	Biology, ecology, and are poorly known	l detailed habitat	Research and Monitoring	Research critical life history/habitat components	Н
Lack of knowledge	Complete distributior unknown	n in Colorado	Research and Monitoring	Conduct field inventory to refine known distribution	Н
Lack of knowledge	Population status unk	nown	Research and Monitoring	Monitor population status	Н
Climate	Climate variability (in alteration of normal v e.g., droughts, tornad	veather patterns,	Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Townsendia fendler	Population Status	Population Trend	Distribution 7	Type Habitat	Primary
	Low D	Unknown	Central Shortgrass Prairie	P Barrens	\checkmark
Fendler's townsend-daisy			Southern Rocky Mountains	Р	
Tier 2 Plants					
General Threat	Specific Threat		General Conservation Action	Specific Conservation Action	Priority
Climate	Vulnerability due to r poor dispersal capaci 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	lteration due to	Planning and Zoning	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	Н
Climate	Phenological respons of species itself and/o species unknown		Research and Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	Н
Habitat Conversion	Housing, urban, and o development	ex-urban	Land Protection (Public, Private), Easements, and Resource Rights	Acquire conservation easement for habitat protection	Н
Lack of knowledge	Population status unk	nown	Research and Monitoring	Monitor population status	Н
Climate	Population status unknown Climate variability (intensification or alteration of normal weather patterns,		Capacity Building and Cooperation	Engage in collaborative, proactive planning and conservation programs	М
Chinate	e.g., droughts, tornad	os, etc.)			
		os, etc.)	Invasive Species Control and Prevention	Map weed infestations and sensitive no spray/no mow zones	М
Invasive or Exotic Species	e.g., droughts, tornad	os, etc.)			M M
Invasive or Exotic Species Invasive or Exotic Species Non-consumptive Disturban	e.g., droughts, tornad Invasive plants Invasive plants		Prevention Invasive Species Control and	spray/no mow zones Implement integrated weed/pest	

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

Townsendia glabella	Population S	Status	Population Trend	Distribution	Гуре	Habitat	Primary	
U	Low	D	Unknown	Southern Rocky Mountains	P	Barrens	✓	
Gray's townsend-daisy				Colorado Plateau	0			
Tier 2 Plants								
General Threat	Specific Three	eat		General Conservation Action	Spe	cific Conservation Action	Priority	
Climate	Vulnerability poor dispersa restriction to	al capac	•	Ex-situ Conservation		d banking (incl. protocols, ection, and cultivation)	Η	
Climate	Habitat shifti climate chan	0	alteration due to	Planning and Zoning	resp and	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs		
Climate				Research and Monitoring	Cor and clin (dis	Н		
Habitat Conversion	development			Land Protection (Public, Private), Easements, and Resource Rights	, Acc	uire conservation easement for itat protection	Н	
Habitat Degradation	*			Voluntary Standards	Imp	lement Best Management Practices transportation projects	Н	
Lack of knowledge	Population st	tatus un	known	Research and Monitoring	Mo	nitor population status	Н	
Climate		normal	intensification or weather patterns, dos, etc.)	Capacity Building and Cooperation	-	age in collaborative, proactive ning and conservation programs	М	
Townsendia rothrockii	Population S	Status	Population Trend	Distribution	Гуре	Habitat	Primary	
Rothrock townsend-daisy	Medium	D	Unknown	Southern Rocky Mountains	Р	Meadow Tundra Spruce-Fir		
Tier 2 Plants								
General Threat	Specific Thre	eat		General Conservation Action	Spe	cific Conservation Action	Priority	
	Specific Three Vulnerability poor dispersa restriction to	/ due to al capac	•	General Conservation Action Ex-situ Conservation	See	cific Conservation Action d banking (incl. protocols, ection, and cultivation)	Priority H	
General Threat	Vulnerability poor dispersa restriction to	due to al capac rare ha	ity, and/or		See coll Mo resp and	d banking (incl. protocols,		
General Threat Climate Climate	Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological	/ due to al capac rare ha ing and ge respon elf and/	ity, and/or bitat features alteration due to	Ex-situ Conservation	See coll Mo resp and situ Cor and clin	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in ponse to projected climate changes prepare adaptation plan to define in	H H	
General Threat Climate Climate Climate	Vulnerability poor dispersa restriction to Habitat shifti climate chan Phenological of species its	/ due to al capac rare ha ing and ge respon elf and/ own	ity, and/or bitat features alteration due to se to climate change 'or inter-dependent	Ex-situ Conservation Planning and Zoning	See coll Mo resp and situ Cor and clin (dis	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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	H H	
General Threat Climate Climate Climate Non-consumptive Disturbance	Vulnerability poor dispersa restriction to Habitat shifti climate chan Phenological of species its species unkn Motor-power Climate varia	/ due to al capac rare ha ing and ge respon elf and/ own red recr ability (normal	ity, and/or bitat features alteration due to se to climate change 'or inter-dependent eation intensification or weather patterns,	Ex-situ Conservation Planning and Zoning Research and Monitoring	See coll Mo resp and situ Cor and clin (dis Man Eng	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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)	H H	
General Threat Climate	Vulnerability poor dispersa restriction to Habitat shifti climate chan Phenological of species its species unkn Motor-power Climate varia alteration of e.g., droughts	/ due to al capace rare ha ing and ge respon elf and/ own red recr ability (normal s, tornad	ity, and/or bitat features alteration due to se to climate change 'or inter-dependent eation intensification or weather patterns,	Ex-situ Conservation Planning and Zoning Research and Monitoring Compliance and Enforcement Capacity Building and	See coll Mo resp and situ Cor and clin (dis Eng plan Res	d banking (incl. protocols, ection, and cultivation) del potential habitat/range shifts in oonse 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) nage off-road travel gage in collaborative, proactive	H H H	
General Threat Climate Climate Climate Non-consumptive Disturbance Climate	Vulnerability poor dispersa restriction to Habitat shifti climate chang Phenological of species its species unkn Motor-power Climate varia alteration of e.g., droughts Threats and r poorly under	/ due to al capace rare ha ing and ge respon elf and/ own red recr ability (normal s, tornae response stood logy, ar	ity, and/or bitat features alteration due to se to climate change 'or inter-dependent eation intensification or weather patterns, dos, etc.)	Ex-situ Conservation Planning and Zoning Research and Monitoring Compliance and Enforcement Capacity Building and Cooperation	See coll Mo resp and situ Cor and clin (dis Eng plat Ress man Ress	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 induct 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	H H H M	
General Threat Climate Climate Climate Non-consumptive Disturbance Climate Lack of knowledge	Vulnerability poor dispersa restriction to Habitat shifti climate chan Phenological of species its species unkn Motor-power Climate varia alteration of e.g., drought Threats and r poorly under Biology, eco are poorly kr	/ due to al capace rare ha ing and ge respon elf and/ own red recr ability (normal s, tornae response stood logy, ar nown	ity, and/or bitat features alteration due to se to climate change 'or inter-dependent eation intensification or weather patterns, dos, etc.) e to change are	Ex-situ Conservation Planning and Zoning Research and Monitoring Compliance and Enforcement Capacity Building and Cooperation Research and Monitoring	See coll Mo resp and situ Cor and clin (dis Eng plar Resp man Resp con Cor	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 induct 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 nagement or disturbance earch critical life history/habitat	H H H M M M	

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

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

Very High Priority	<u>SI</u>	hrub T	undra				Alpine
,	Fier 1 Species				Tier	· 2 Species	
			Group	Species		Common Name	Primary
			Plants	Eriogonum coloradense		Colorado wild buckwheat	✓
			Plants	Castilleja p	uberula	Downy Indian-paintbrush	\checkmark
			Plants	Draba gram	ninea	San Juan whitlow-grass	
General Threat	Specific Threat	Genera	al Conserva	tion Action	Specifi	c Conservation Action	Priority
Climate	Habitat shifting and alteration due to climate change	Legisla Regula	ation, Polic ations	ies and	Reduce	CO2 emissions	Н
Climate	Habitat shifting and alteration due to climate change	Resear	rch and Mo	nitoring	respons and pre	potential habitat/range shifts in the to projected climate changes pare adaptation plan to define vation needs	

Very High Priority

Exposed Rock (alpine)

Alpine

Alpine

Tier 1 Species							
Group	Species	Common Name	Primary				
Plants	Oreoxis humilis	Pikes Peak spring parsley					
Plants	Aliciella sedifolia	Stonecrop gilia	\checkmark				

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					

Very High Priority

General Threat

Habitat Degradation

Climate

Climate

Meadow Tundra

Tier 1 Species Primary Group Species Common Name Plants Botrychium tax. nov. Fork-leaved moonwort ✓ "furcatum" ✓ Plants Descurainia kenheilii Heil's tansy mustard V Plants Eutrema edwardsii Penland alpine fen mustard ssp. penlandii Plants Oreoxis humilis Pikes Peak spring parsley ✓ Plants Aliciella sedifolia Stonecrop gilia Plants West Silver bladderpod Physaria scrotiformis

Specific Threat

climate change

climate change

Altered native vegetation

Habitat shifting and alteration due to

Habitat shifting and alteration due to

				-
		Tier	2 Species	
Group	Species		Common Name	Primary
Plants	Draba exung	guiculata	Clawless draba	
Plants	Delphinium var. alpestre		Colorado larkspur	\checkmark
Plants	Machaerantl coloradoens		Colorado tansy-aster	
Plants	Eriogonum coloradense		Colorado wild buckwheat	
Plants	Ipomopsis g	lobularis	Globe gilia	\checkmark
Plants	Telesonix ja	mesii	James telesonix	
Plants	Townsendia	rothrockii	Rothrock townsend-daisy	\checkmark
Plants	Saussurea w	eberi	Weber saussurea	\checkmark
ral Conserva	tion Action	Specific	Conservation Action	Priori
lation, Polic lations	ies and	Reduce C	CO2 emissions	Н
arch and Mo	nitoring	response and prepa	otential habitat/range shifts in to projected climate changes are adaptation plan to define tion needs	Н
eation Manag	gement		nt compatible recreation nent and trail network to avoid	L I

development of social trails and trampling of sensitive vegetation

Very High Priority

Barrens

Sparsely Vegetated

Primary

✓

✓

 \checkmark

 \checkmark

V

 \checkmark \checkmark

 \checkmark

✓

✓ ✓

 \checkmark

✓

 \checkmark

 \checkmark

 \checkmark

Н

Priority Н

very H	ngn i Horny		-	Dairy			Sparsely v
	Tier 1	Species				Tie	2 Species
Group	Species	Common Name	Primary	7	Group	Species	Common Name
Plants	Corispermum navicula	Boat-shaped bugseed	\checkmark	1	Plants	Oenothera harrington	ii Arkansas Valley evening
Plants	Eriogonum brandegeei	Brandegee wild buckwheat	\checkmark				primrose
Plants	Physaria pulvinata	Cushion bladderpod	\checkmark	1	Plants	Physaria bellii	Bell's twinpod
Plants	Phacelia submutica	DeBeque phacelia	\checkmark	1	Plants	Lomatium concinnui	n Colorado desert-parsley
Plants	Lesquerella congesta	Dudley Bluffs bladderpod	\checkmark	1	Plants	Astragalus debequae	us DeBeque milkvetch
Plants	Penstemon gibbensii	Gibben's beardtongue	\checkmark	1	Plants	Townsendia fendleri	Fendler's townsend-daisy
Plants	Cryptantha gypsophila	Gypsum Valley cat's- eye	\checkmark	1	Plants	Nuttallia chrysantha	Golden blazing star
Plants	Gutierrezia elegans	Lone Mesa snakeweed	\checkmark		Plants	Penstemon grahamii	Graham beardtongue
Plants	Sclerocactus mesae-	Mesa Verde	\checkmark	- 1	Plants	Townsendia glabella	Gray's townsend-daisy
	verdae	hookless cactus		1	Plants	Oreocarya osterhouti	i Osterhout cat's-eye
Plants	Boechera glareosa	NA	\checkmark	1	Plants	Lesquerella pruinosa	Pagosa bladderpod
Plants	Phacelia formosula	North Park phacelia	\checkmark	1	Plants	Lupinus crassus	Payson lupine
Plants	Ipomopsis polyantha	Pagosa skyrocket	\checkmark	1	Plants	Lesquerella parviflor	a Piceance bladderpod
Plants	Penstemon debilis	Parachute penstemon	\checkmark	1	Plants	Oonopsis puebloensi	s Pueblo goldenweed
Plants	Physaria obcordata	Piceance twinpod	\checkmark	1	Plants	Mentzelia rhizomata	Roan Cliffs blazing star
Plants	Physaria scrotiformis	West Silver bladderpod		1	Plants	Lesquerella calcicola	Rocky Mountain
Plants	Penstemon scariosus	White River penstemon	\checkmark				bladderpod
	var. albifluvis				Plants	Physaria rollinsii	Rollins twinpod
				1	Plants	Oxybaphus rotundifolius	Round-leaf four o'clock
				I	Plants	Thalictrum heliophilum	Sun-loving meadow rue
General Th	nreat Spec	cific Threat	(Genera	l Conservati	on Action Specifi	c Conservation Action
Habitat Co		sing, urban, and ex-urban			`	ublic, Private), Purcha	se habitat or Acquire

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action
Habitat Conversion	Housing, urban, and ex-urban development	Land Protection (Public, Private), Easements, and Resource Rights	Purchase habitat or Acquire conservation easement for conservation purpose
Habitat Degradation	Oil and gas development	Compatible Resource Use	Implement compatible mining practices

General Threat

Habitat Degradation

Habitat Conversion

Specific Threat

development

Altered fire regime

Housing, urban, and ex-urban

High Priority

Pinyon-Juniper

Forestlands

Priority

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	Tier	1 Species					Tier 2	2 Species	
Group	Species	Common Name	Prima	ry	Group	Species		Common Name	Primary
Plants	Lygodesmia	Dolores River skeletonplant	\checkmark		Plants	Nuttallia den	sa	Arkansas Canyon stickleaf	✓
Plants	doloresensis Penstemon gibbensii	Gibben's beardtongue		_	Plants	Oxytropis be obnapiformis		Bessey locoweed	
Plants		la Gypsum Valley cat's- eye	\checkmark		Plants	Herrickia ho		Canadian River spiny aster	✓
Plants	Astragalus	Hamilton milkvetch	\checkmark		Plants	Astragalus de	ebequaeus	DeBeque milkvetch	\checkmark
	lonchocarpus				Plants	Penstemon d	egeneri	Degener beardtongue	\checkmark
Plants	var. hamiltonii Pediocactus knowlton	nii Knowlton cactus	✓		Plants	Asclepias un uncialis	cialis ssp.	Dwarf milkweed	
Plants	Hackelia gracilenta	Mesa Verde stickseed	\checkmark		Plants	Camissonia		Eastwood evening primrose	
Plants	-	e Schmoll milkvetch	\checkmark		1 Iunto	eastwoodiae		Lastwood evening printose	
Plants	Astragalus	Skiff milkvetch			Plants	Astragalus pi	iscator	Fisher Towers milkvetch	
	microcymbus				Plants	Nuttallia chr	ysantha	Golden blazing star	
Plants	Erigeron wilkenii	Wilken fleabane			Plants	Lesquerella v	vicina	Good-neighbor bladderpod	\checkmark
					Plants	Penstemon g	rahamii	Graham beardtongue	
					Plants	Opuntia head	cockiae	Heacock's prickly-pear	✓
					Plants	Astragalus ed	quisolensis	Horseshoe milkvetch	✓
				Plants	Thelypodiop juniperorum	sis	Juniper tumble mustard	✓	
					Plants	Aletes macdo ssp. brevirad	U	Mesa Verde aletes	\checkmark
					Plants	Astragalus na	aturitensis	Naturita milkvetch	\checkmark
					Plants	Lupinus cras	sus	Payson lupine	\checkmark
					Plants	Penstemon se var. cyanomo		Plateau penstemon	\checkmark
					Plants	Astragalus ra		San Rafael milkvetch	\checkmark
General Threa	at Sp	ecific Threat		Gene	eral Conservatio	on Action	Specific	Conservation Action	Priori
Habitat Conv		ousing, urban, and ex-urban velopment		Planı	ning and Zoning	g		zoning that concentrates use exts habitat	М
Habitat Degra	de ch	tered native vegetation (ripariar forestation, woody encroachme aining sagebrush, seral stage balance, etc.)		Com	patible Resourc	e Use	Implemen managen	nt compatible grazing nent	М
Habitat Degra	adation Oi	l and gas development		Com	patible Resourc	e Use	Impleme	nt compatible mining practice	es M
Hig	gh Priority		D	oug	las Fir			Fore	estland
c	•	1 Species					Tier	2 Species	
					Group	Species		Common Name	Primary
					Plants	Aquilegia ch		Golden columbine	

Processes

var. rydbergii

Land Protection (Public, Private), Purchase habitat or Acquire

purpose

Specific Conservation Action

conservation easement for conservation

Restore natural fire regime

General Conservation Action

Maintain or Restore Natural

Easements, and Resource Rights

High Priority

Eastern Plains Streams

Riparian/Wetlands

Priority

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Primary

Tier 2 Species

Common Name

	Tie	er 1 Species			Tier 2 Species
Group	Species	Common Name	Primary	У	
Plants	Gaura neomexicar ssp. coloradensis	a Colorado butterfly plant	✓	_	
General Th	nreat	Specific Threat		General Conservation Action	Specific Conservation Action
Habitat De	gradation	Altered hydrological regime (aquit	· ·	Maintain or Restore Natural Processes	Reduce ground-water pumping
Habitat De	gradation	Altered hydrological regime (surface	· ·	Maintain or Restore Natural Processes	Adjust operation of dam
Habitat De	gradation	Decreased water quality		Maintain or Restore Natural Processes	Improve erosion and excess sedimentation conditions
Invasive or	Exotic Species	Invasive plants - tamarisk and Russ Olive		Invasive Species Control and Prevention	Implement integrated weed/pest management plan
Pollution		Herbicide/pesticide spraying or rur	noff	Voluntary Standards	Implement Best Management Practices for agricultural production
Pollution		Nutrient loads		Voluntary Standards	Implement Best Management Practices for agricultural production

Grass/Forb Dominated Wetlands

Group

Riparian/Wetlands

High Priority 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	✓

parus Budding monkey flower]	Plants	Oenothera acu	ıtissima	Narrow-leaf evening primrose	
ialis Ute ladies'-tresses		Plants	Thelypodium paniculatum		Northwestern thelypody	✓
		Plants	Sisyrinchium	pallidum	Pale blue-eyed-grass	\checkmark
]	Plants	Puccinellia pa	rishii	Parish's alkali grass	\checkmark
]	Plants	Ptilagrostis po	orteri	Porter feathergrass	✓
]	Plants	Cleome multi	caulis	Slender spiderflower	\checkmark
Specific Threat	Genera	al Conservation	n Action	Specific C	Conservation Action	Priority
Altered hydrological regime (surface or aquifer)	Mainta Proces	ain or Restore	Natural	Restore na	atural hydrological regime	Н
Invasive plants	Invasiv Preven	ve Species Cor tion		Implemen managem	t integrated weed/pest ent plan	Н
Incompatible grazing	Compa	atible Resource		Implemen managem	t compatible grazing ent	М

Species

High Priority

General Threat

Habitat Degradation

Invasive or Exotic Species

Indirect Consumptive Use

Mountain Streams

Riparian/Wetlands

Т		Tier 2 Species					
Species	Common Name	Primary	Group	Species		Common Name	Primary
Draba weberi	Weber's draba	✓	Plants	1 0	•	Golden columbine	\checkmark
			Plants	Carex sten	optila	Small-winged sedge	\checkmark
ireat	Specific Threat		General Conserv	ation Action	Specific	Conservation Action	Priority
Exotic Species	Invasive plants		1	Control and	1	U I	М
gradation	Altered hydrological regime (aquifer)			tore Natural	Adjust o	operation of dam and ditches	L
Exotic Species	Invasive animals		1	Control and	Control	non-native fish	L
	Species Draba weberi reat Exotic Species gradation	Draba weberi Weber's draba reat Specific Threat Exotic Species Invasive plants gradation Altered hydrological regime (aquifer)	Species Common Name Primary Draba weberi Weber's draba ✓ reat Specific Threat ✓ Exotic Species Invasive plants gradation Altered hydrological regime (surface or aquifer) Exotic Species Invasive animals	Species Common Name Primary Draba weberi Weber's draba Image: Common Name Primary Draba weberi Weber's draba Image: Common Name Primary Plants Plants Plants Plants reat Specific Threat General Conserver Exotic Species Invasive plants Invasive Species gradation Altered hydrological regime (surface or aquifer) Altered maintain or Reserver Processes	Species Common Name Primary Draba weberi Weber's draba Image: Common Name Primary Draba weberi Weber's draba Image: Common Name Primary Plants Aquilegia of var. rydber Var. rydber Plants Carex stem Plants Carex stem reat Specific Threat General Conservation Action Exotic Species Invasive plants Invasive Species Control and Prevention gradation Altered hydrological regime (surface or aquifer) Maintain or Restore Natural Processes Exotic Species Invasive animals Invasive Species Control and Processes	Species Common Name Primary Draba weberi Weber's draba Image: Species Plants Aquilegia chrysantha Var. rydbergii Plants Carex stenoptila reat Specific Threat General Conservation Action Specific Exotic Species Invasive plants Invasive Species Control and Implement Prevention Imanage gradation Altered hydrological regime (surface or aquifer) Maintain or Restore Natural Adjust or Processes Adjust or Processes Exotic Species Invasive animals Invasive Species Control and Control Control	Species Common Name Primary Draba weberi Weber's draba Image: Species in the

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High Priority Tier 1 Species		<u>Play</u>	yas			Riparian/We	etlands
					Tier	Tier 2 Species	
			Group	Species		Common Name	Primary
			Plants	Cleome mu	ılticaulis	Slender spiderflower	
General Threat	Specific Threat	Gener	al Conserva	ation Action	Specific	c Conservation Action	Priority
Habitat Conversion	Conversion to cropland	Maint	ain or Rest	ore Habitat	Restore	native prairie	Н
Lack of knowledge	Complete distribution in Colorado unknown	Resea	rch and Mo	onitoring	Conduc distribu	et field inventory to refine known	n H
Habitat Degradation	Replace ephemeral playa with longer- term water catchment	Maint	ain or Rest	ore Habitat	Restore	playa	М

High Priority

Shrub-dominated Wetlands

Riparian/Wetlands

		/0								
	Т	ier 1 Species			Tier 2 Species					
Group	Group Species Common Name			7	Group	Species		Common Name	Primary	
Plants	Gaura neomexic	cana Colorado butterfly plant			Plants	Salix arizon	nica	Arizona willow	\checkmark	
	ssp. coloradensi	8			Plants	Carex steno	ptila	Small-winged sedge	\checkmark	
General Threat Specific Threat		Specific Threat		Gener	ral Conserv	ation Action	Specific (Conservation Action	Priority	
Habitat De	gradation	Altered native vegetation (ripari deforestation, woody encroachn chaining sagebrush, seral stage imbalance, etc.)		Maint	tain or Rest	tore Habitat	0.0	grazing for compatible n height, structure, etc.	Н	
Invasive or	Exotic Species	Invasive plants - tamarisk			ive Species ntion	Control and	Implemer managem	nt integrated weed/pest ent plan	Н	
Habitat De	gradation	Altered hydrological regime (sur aquifer)			Iaintain or Restore Natural Adjust operation of dam and rocesses		peration of dam and ditches	М		
Invasive or Exotic Species Invasive plants		Invasive plants			ive Species ntion	Control and	Implemer managem	nt integrated weed/pest eent plan	М	

High Priority

Seeps and Springs

Riparian/Wetlands

	8						F		
	Г	Tier 1 Species					Tier 2 Species		
Group	Species	Common Name	Prima	y	Group	Species	Common Name	Primary	
Plants	Mimulus gemm	iparus Budding monkey flower	\checkmark		Plants	Limnorchis	zothecina Alcove bog orchid		
Plants	Gaura neomexic ssp. coloradensi	···· / / / / / / / / / / / / / / / / /			Plants	Aquilegia cl var. rydberg	5		
General Th	hreat	Specific Threat		Gene	ral Conserva	tion Action	Specific Conservation Action	Priority	
Habitat De	egradation	Invasive or exotic species			ive Species	Control and	Implement integrated weed/pest management plan	М	
Habitat De	egradation	Invasive or exotic species			ive Species	Control and	Map weed infestations and sensitive no spray/no mow zones) M	
Habitat De	egradation	Altered hydrological regime (sur aquifer)	face or	Main Proce	tain or Resto esses	ore Natural	Restore natural hydrological regime	М	

E	High Priority Sand D Tier 1 Species			Dunes Complex (Shrubland)ShrubTier 2 Species						
General Tł Habitat Co		cific Threat aversion to cropland		eneral Conserva aintain or Resto		Specific Co Re-seed nat	nservation Action ive species	Priority H		
H	ligh Priority Tier 1	Species	Dese	ert Shrub		Tier 2 S		rublands		
Group	Species	Common Name	Primary	Group	Species	С	ommon Name	Primary		
Plants	Aletes latilobus	Canyonlands aletes		Plants	Lepidium cr	enatum A	lkaline pepperwort			
Plants	Eriogonum	Clay-loving	\checkmark	Plants	Eriogonum o	lavellatum C	omb Wash buckwheat	\checkmark		
	pelinophilum	wild buckwheat		Plants	Caesalpinia	repens C	reeping rush-pea			
Plants	Sclerocactus glaucus	Colorado hookless cactus	✓	Plants	Astragalus c	ronquistii C	ronquist milkvetch	\checkmark		
Plants	Lygodesmia	Dolores River skeletonplant		Plants	Astragalus d	ebequaeus D	eBeque milkvetch			
N (doloresensis	TT 11. 111 . 1		Plants	Astragalus p	iscator Fi	isher Towers milkvetch			
Plants	Astragalus lonchocarpus	Hamilton milkvetch		Plants	Lesquerella	vicina G	ood-neighbor bladderp	od 🗌 bo		
	var. hamiltonii			Plants	Oreocarya os	sterhoutii O	sterhout cat's-eye			
Plants	Astragalus tortipes	Sleeping Ute milkvetch		Plants	Penstemon s	cariosus P	lateau penstemon			
Plants	Penstemon scariosus var. albifluvis	White River penstemon] [var. cyanom					
General Th	hreat Spe	cific Threat	G	eneral Conserva	tion Action	Specific Co	nservation Action	Priority		
Habitat Co		ising, urban, and ex-urban elopment		· · · · · · · · · · · · · · · · · · ·	Public, Private), esource Rights		bitat or Acquire n easement for conserva	M ation		

High Priority Sagebrush Shrublands **Tier 1 Species Tier 2 Species** Primary Group Common Name Primary Group Common Name Species Species **** Plants Plants Eriogonum brandegeei Brandegee wild buckwheat Cirsium perplexans Adobe thistle Plants Physaria pulvinata Cushion bladderpod Plants Lepidium crenatum Alkaline pepperwort \checkmark Plants \checkmark Plants Astragalus osterhoutii Kremmling milkvetch Oxytropis besseyi var. Bessey locoweed obnapiformis Gutierrezia elegans Lone Mesa snakeweed Plants ✓ Plants Lomatium concinnum Colorado desert-parsley ✓ Plants Penstemon penlandii Penland penstemon \checkmark Plants Boechera crandallii Crandall's rock-cress ✓ Plants Astragalus Skiff milkvetch Plants Astragalus debequaeus DeBeque milkvetch microcymbus ✓ Plants Penstemon fremontii Fremont's beardtongue var. glabrescens V Plants Penstemon teucrioides Germander beardtongue Plants Astragalus anisus Gunnison milkvetch V LΙ Plants Thelypodiopsis Juniper tumble mustard juniperorum Plants Oenothera acutissima Narrow-leaf evening primrose Plants Astragalus naturitensis Naturita milkvetch Plants Mertensia humilis Rocky Mountain bluebells \checkmark Plants Astragalus iodopetalus Violet milkvetch General Threat Specific Threat General Conservation Action Specific Conservation Action Priority Habitat Degradation Altered native vegetation (low forb and Restore Habitat Re-seed native species Η grass diversity) Habitat Degradation Altered native vegetation (low forb and Compatible Resource Use Implement compatible grazing Н grass diversity) management Habitat Degradation Oil and gas pipelines Planning and Zoning Promote consideration of biodiversity Н issues in transportation and land use planning processes Habitat Degradation Fragmentation Voluntary Standards Implement Best Management Practices Н for energy development and mining (reduce footprint and/or extend implementation timeline) Habitat Conversion Housing, urban, and ex-urban Land Protection (Public, Private), Purchase habitat or Acquire М development Easements, and Resource Rights conservation easement for conservation purpose Habitat Degradation Altered native vegetation (juniper Maintain or Restore Habitat Remove trees/shrubs Μ encroachment) Habitat Degradation Altered fire regime Maintain or Restore Natural Restore natural fire regime Μ Processes Habitat Degradation Overhead utility lines and towers Voluntary Standards Implement Best Management Practices Μ for energy development and mining (bury or consolidate lines)

High Priority

Upland Shrub

Shrublands

	Tie	r 1 Species			Tier 2 Species					
Group	Species	Common Name	Primary	Grou	ıp	Species	Common Name	Primary		
Plants	Penstemon penland	lii Penland penstemon		Plan	ts	Nuttallia den	Arkansas Canyon stickleaf			
				Plan	ts	Draba smithi	ii Smith whitlow-grass			
General Th	hreat	Specific Threat	G	eneral Co	nserv	vation Action	Specific Conservation Action	Priority		
Habitat Co		Housing, urban, and ex-urban levelopment				(Public, Private), Resource Rights	Purchase habitat or Acquire conservation easement for conservatio purpose	H		
Habitat De	egradation	Altered fire regime		laintain o ocesses	r Res	tore Natural	Restore natural fire regime	М		
Habitat De	egradation	Recreation	R	ecreation	Mana	agement	Implement compatible recreation management	М		

H	High Priority	<u>S</u>	Saltbrush F		Shrublands		
	Tier	1 Species				Tier 2 Species	
Group	Species	Common Name	Primary	Group	Species	Common Name	Primary
Plants	Sclerocactus mesae-	Mesa Verde		Plants	Cirsium perp	lexans Adobe thistle	
	verdae	hookless cactus		Plants	Eriogonum c	lavellatum Comb Wash buckwho	eat
				Plants	Camissonia eastwoodiae	Eastwood evening pr	imrose 🔽
General Th	hreat Sp	ecific Threat	Gen	neral Conservation	ation Action	Specific Conservation Action	Priority
Habitat Co		ousing, urban, and ex-urban velopment			(Public, Private), Resource Rights	Purchase habitat or Acquire conservation easement for conse purpose	M ervation

F	High Priority			<u>Deciduous Oak</u>					
	Tie	r 1 Species		Tier 2 Species					
Group	Species	Common Name	Primary	Group	Species	Common Name	Primary		
Plants	Physaria pulvinata	Cushion bladderpod		Plants	Astragalus missouriensi var. humistra				
General T	hreat	Specific Threat	Ge	eneral Conserva	ation Action	Specific Conservation Action	Priority		
Habitat Co		Housing, urban, and ex-urban development			(Public, Private), Resource Rights	Purchase habitat or Acquire conservation easement for conserva purpose	M ation		

High Priority			Cliff and Canyon			Sparsely Vegetated				
Tier	1 Species					Tier 2	2 Species			
Species	Common Name	Prima	ry	Group	Species		Common Name	Primary		
Mimulus gemmiparu	s Budding monkey flower	✓		Plants	Limnorchis z	othecina	Alcove bog orchid	✓		
Aletes latilobus	Canyonlands aletes	\checkmark		Plants	Anticlea vag	inatus	Alcove death camas	\checkmark		
Astragalus deterior	Cliff-palace milkvetch	\checkmark		Plants	Herrickia ho	rrida	Canadian River spiny aster			
Astragalus humillim	us Mancos milkvetch	\checkmark		Plants	Telesonix jar	nesii	James telesonix	\checkmark		
Erigeron wilkenii	Wilken fleabane	\checkmark		Plants	Erigeron kac	hinensis	Kachina daisy	\checkmark		
				Plants	Aletes humil	is	Larimer aletes	\checkmark		
				Plants	Astragalus na	aturitensis	Naturita milkvetch	\checkmark		
			Ī	Plants	Lesquerella p	arviflora	Piceance bladderpod			
			Ī	Plants	Potentilla ruj	oincola	Rocky Mountain cinquefoil	\checkmark		
			Ī	Plants	Draba smithi	i	Smith whitlow-grass	\checkmark		
				Plants	Delphinium	robustum	Wahatoya Creek larkspur	\checkmark		
reat SI	pecific Threat		Genera	al Conservatio	on Action	Specific	Conservation Action	Priority		
·		face or			Natural	Maintain regime	or restore natural hydrologica	l M		
	Tier Species Mimulus gemmiparu Aletes latilobus Astragalus deterior Astragalus humillim Erigeron wilkenii Erigeron wilkenii Species eat Species gradation A	Tier 1 Species Species Common Name Mimulus gemmiparus Budding monkey flower Aletes latilobus Canyonlands aletes Astragalus deterior Cliff-palace milkvetch Astragalus humillimus Mancos milkvetch Erigeron wilkenii Wilken fleabane	Tier 1 Species Species Common Name Prima Mimulus gemmiparus Budding monkey flower Image: Component of the symptotic of the symptot of the symptotic of the symptotic of the sym	Tier 1 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Canyonlands aletes Image: Canyonlands aletes <td>Tier 1 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Colspan="2">Plants Aletes latilobus Canyonlands aletes Image: Colspan="2">Plants Astragalus deterior Cliff-palace milkvetch Image: Colspan="2">Plants Astragalus humillimus Mancos milkvetch Image: Colspan="2">Plants Erigeron wilkenii Wilken fleabane Image: Plants Plants Plants Plants Plants Plants Plants Plants<td>Tier 1 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Plants Limnorchis z Aletes latilobus Canyonlands aletes Image: Species Plants Anticlea vagi Astragalus deterior Cliff-palace milkvetch Image: Species Plants Herrickia hor Astragalus humillimus Mancos milkvetch Image: Species Plants Herrickia hor Erigeron wilkenii Wilken fleabane Image: Species Plants Aletes humil Plants Aletes humil Plants Aletes humil Plants Aletes humil Plants Lesquerella p Plants Delphinium Plants Delphinium reat Specific Threat General Conservation Action gradation Altered hydrological regime (surface or Maintain or Restore Natural</td><td>Tier 1 Species Tier 2 Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Plants Limnorchis zothecina Aletes latilobus Canyonlands aletes Image: Species Plants Limnorchis zothecina Astragalus deterior Cliff-palace milkvetch Image: Species Plants Herrickia horrida Astragalus humillimus Mancos milkvetch Image: Species Plants Herrickia horrida Erigeron wilkenii Wilken fleabane Image: Species Plants Aletes humilis Plants Astragalus naturitensis Plants Aletes humilis Plants Lesquerella parviflora Plants Delphinium robustum eat Specific Threat General Conservation Action Specific radation Altered hydrological regime (surface or Maintain or Restore Natural Maintain</td><td>Tier 1 Species Tier 2 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Common Name Aletes latilobus Canyonlands aletes Image: Species Common Name Astragalus deterior Cliff-palace milkvetch Image: Species Canadian River spiny aster Astragalus humillimus Mancos milkvetch Image: Species Canadian River spiny aster Plants Herrickia horrida Canadian River spiny aster Plants Telesonix jamesii James telesonix Plants Frigeron kachinensis Kachina daisy Plants Aletes humilis Larimer aletes Plants Astragalus naturitensis Naturita milkvetch Plants Lesquerella parviflora Piceance bladderpod Plants Draba smithii Smith whitlow-grass Plants Draba smithii Smith whitlow-grass Plants Delphinium robustun Wahatoya Creek larkspur Plants Delphinium robustun Wahatoya Creek larkspur Plants Delphinium robustun Wahatoya Creek larkspur</td></td>	Tier 1 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Colspan="2">Plants Aletes latilobus Canyonlands aletes Image: Colspan="2">Plants Astragalus deterior Cliff-palace milkvetch Image: Colspan="2">Plants Astragalus humillimus Mancos milkvetch Image: Colspan="2">Plants Erigeron wilkenii Wilken fleabane Image: Plants Plants Plants Plants Plants Plants Plants Plants <td>Tier 1 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Plants Limnorchis z Aletes latilobus Canyonlands aletes Image: Species Plants Anticlea vagi Astragalus deterior Cliff-palace 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eat Specific Threat General Conservation Action Specific radation Altered hydrological regime (surface or Maintain or Restore Natural Maintain</td> <td>Tier 1 Species Tier 2 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Common Name Aletes latilobus Canyonlands aletes Image: Species Common Name Astragalus deterior Cliff-palace milkvetch Image: Species Canadian River spiny aster Astragalus humillimus Mancos milkvetch Image: Species Canadian River spiny aster Plants Herrickia horrida Canadian River spiny aster Plants Telesonix jamesii James telesonix Plants Frigeron kachinensis Kachina daisy Plants Aletes humilis Larimer aletes Plants Astragalus naturitensis Naturita milkvetch Plants Lesquerella parviflora Piceance bladderpod Plants Draba smithii Smith whitlow-grass Plants Draba smithii Smith whitlow-grass Plants Delphinium robustun Wahatoya Creek larkspur Plants Delphinium robustun Wahatoya Creek larkspur Plants Delphinium robustun Wahatoya Creek larkspur</td>	Tier 1 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Plants Limnorchis z Aletes latilobus Canyonlands aletes Image: Species Plants Anticlea vagi Astragalus deterior Cliff-palace milkvetch Image: Species Plants Herrickia hor Astragalus humillimus Mancos milkvetch Image: Species Plants Herrickia hor Erigeron wilkenii Wilken fleabane Image: Species Plants Aletes humil Plants Aletes humil Plants Aletes humil Plants Aletes humil Plants Lesquerella p Plants Delphinium Plants Delphinium reat Specific Threat General Conservation Action gradation Altered hydrological regime (surface or Maintain or Restore Natural	Tier 1 Species Tier 2 Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Plants Limnorchis zothecina Aletes latilobus Canyonlands aletes Image: Species Plants Limnorchis zothecina Astragalus deterior Cliff-palace milkvetch Image: Species Plants Herrickia horrida Astragalus humillimus Mancos milkvetch Image: Species Plants Herrickia horrida Erigeron wilkenii Wilken fleabane Image: Species Plants Aletes humilis Plants Astragalus naturitensis Plants Aletes humilis Plants Lesquerella parviflora Plants Delphinium robustum eat Specific Threat General Conservation Action Specific radation Altered hydrological regime (surface or Maintain or Restore Natural Maintain	Tier 1 Species Tier 2 Species Species Common Name Primary Mimulus gemmiparus Budding monkey flower Image: Species Common Name Aletes latilobus Canyonlands aletes Image: Species Common Name Astragalus deterior Cliff-palace milkvetch Image: Species Canadian River spiny aster Astragalus humillimus Mancos milkvetch Image: Species Canadian River spiny aster Plants Herrickia horrida Canadian River spiny aster Plants Telesonix jamesii James telesonix Plants Frigeron kachinensis Kachina daisy Plants Aletes humilis Larimer aletes Plants Astragalus naturitensis Naturita milkvetch Plants Lesquerella parviflora Piceance bladderpod Plants Draba smithii Smith whitlow-grass Plants Draba smithii Smith whitlow-grass Plants Delphinium robustun Wahatoya Creek larkspur Plants Delphinium robustun Wahatoya Creek larkspur Plants Delphinium robustun Wahatoya Creek larkspur		

High Priority		Exposed Rock			Sparsely Vegetated		
Ti	er 1 Species		Tier 2 Species				
			Group	Species	Common Name	Primary	
			Plants	Machaerant coloradoens			
			Plants	Carex stend	optila Small-winged sedge		
General Threat	Specific Threat	Genera	al Conserv	ation Action	Specific Conservation Action	Priority	
Habitat Degradation	Cave/mine closures	Comp	liance and	Enforcement	Manage recreation and/or permit activities (e.g., rock climing, gra leases)		
Non-consumptive Disturbance	Non-motorized recreation (including caving and climbing)	g Compl	liance and	Enforcement	Manage recreation and/or permit activities (e.g., rock climing, gra- leases)		

Med	ium Priority		Mixe	ed Forest			Forestlands
	Tier 1	Species			Tier	2 Species	
Group	Species	Common Name	Primary	Group	Species	Common Name	Primary
Plants	Hackelia gracilenta	Mesa Verde stickseed		Plants	Draba smithii	Smith whitlow-grass	
Plants	Cirsium scapanolepis	Mountain-slope thistle		Plants	Astragalus iodopetalus	Violet milkvetch	

Medium Priority	<u>Rocky M</u>	<u>Rocky Mtn Bristlecone Pine</u>					
Т	ier 1 Species				Tier 2 Species		
			Group	Species	Common Name	Primary	
			Plants	Carex stend	optila Small-winged sedge	e 🗌	
General Threat	Specific Threat	Gana	ral Conserva	tion Action	Specific Conservation Action	Priority	
Climate	Habitat shifting and alteration due to		lation, Polic		Reduce CO2 emissions	M	
Chinate	climate change	0	lations	ies and	Reduce CO2 emissions	101	
Climate	Habitat shifting and alteration due to climate change	Resea	arch and Mo	nitoring	Model potential habitat/range response to projected climate and prepare adaptation plan to conservation needs	changes	

Med	ium Priority		Mixe	d Conifer			Forestlands
	Tier 1	Species			Tie	r 2 Species	
Group	Species	Common Name	Primary	Group	Species	Common Name	Primary
Plants	Cirsium scapanolepis	Mountain-slope thistle	\checkmark	Plants	Hackelia besseyi	Bessey's stickseed	\checkmark
				Plants	Telesonix jamesii	James telesonix	

Plants

Plants

Botrychium lineare

Ipomopsis aggregata ssp. weberi Narrowleaf grape fern

Rabbit Ears gilia

✓

1	22	

Medi	ium Priority		Aspe	en Forest			Fore	estlands	
	Tie	r 1 Species				Tier	Fier 2 Species		
Group	Species	Common Name	Primary	Group	Species		Common Name	Primary	
Plants	Draba malpighiace	a Whitlow-grass		Plants	Botrychium	lineare	Narrowleaf grape fern	✓	
				Plants	Carex steno	ptila	Small-winged sedge		
				Plants	Draba smith	ii	Smith whitlow-grass		
			ļ	Plants	Delphinium	robustum	Wahatoya Creek larkspur		
General Th	nreat	Specific Threat	Ge	eneral Conservat	tion Action	Specific	Conservation Action	Priority	
Habitat De	Habitat Degradation Altered fire regime		Maintain or Restore Natural Processes			Restore r	natural fire regime	Н	
Natural Fa		Eradication of aspen sprouts by browsing animals		aintain or Resto ocesses	re Natural	Manage	natural herbivory	Н	
Disease	:	Sudden Aspen Death	Re	esearch and Mor	nitoring		e research on causes and nent options	М	
Disease	:	Sudden Aspen Death	Sp	ecies Managem	ent	burning,	e clone regeneration through cutting, or other methods ot systems become too weak	M to	

Medium Priority

Ponderosa Pine

Forestlands

<u>10144</u>									
	Tie	r 1 Species					Tier	2 Species	
Group	Species	Common Name	Prima	ry	Group	Species		Common Name	Primary
Plants	Physaria pulvinata	Cushion bladderpod			Plants	Aletes humil	is	Larimer aletes	
Plants	Ipomopsis polyant	ha Pagosa skyrocket			Plants	Astragalus missouriensi var. humistra	-	Missouri milkvetch	✓
					Plants	Lesquerella c	alcicola	Rocky Mountain bladderpod	
General Th	reat	Specific Threat		Gene	ral Conserva	ation Action	Specific	Conservation Action	Priority
Habitat Co		Housing, urban, and ex-urban development				Public, Private), Resource Rights		habitat or Acquire tion easement for conservatio	H n
Habitat Deg		Altered native vegetation (increased density)	sed tree	Main	tain or Resto	ore Habitat	Remove	trees/shrubs	Н
Habitat Deg	gradation	Altered fire regime		Main Proce	tain or Resto esses	ore Natural	Restore r	natural fire regime	Н
Habitat Co		Housing, urban, and ex-urban development				Public, Private), Resource Rights	Develop	nt Purchase/Transfer ment Rights program for rotection	М
Habitat Deg	gradation	Fragmentation		Planr	ing and Zor	ning		zoning that concentrates use ects habitat	М
Habitat Deg	gradation	Roads or Railroads			ive Species	Control and	1	nt integrated weed/pest nent plan	L

<u>Spruce-Fir</u>

Forestlands

Mediu	Medium Priority			oruc	<u>e-Fir</u>			Foi	estlands
	Tier 1	l Species					Tier	2 Species	
Group	Species	Common Name	Primary	r	Group	Species		Common Name	Primary
Plants	Botrychium tax. nov.	Fork-leaved moonwort			Plants	Townsendi	a rothrocki	i Rothrock townsend-daisy	
	"furcatum"				Plants	Carex sten	optila	Small-winged sedge	\checkmark
Plants	Physaria scrotiformis	West Silver bladderpod							
Plants	Draba malpighiacea	Whitlow-grass							
General Three	at Spe	ecific Threat		Gener	ral Conserva	tion Action	Specific	Conservation Action	Priority
Climate		bitat shifting and alteration of mate change		0	lation, Polic lations	ies and	Reduce	CO2 emissions	М
Climate		bitat shifting and alteration of mate change	lue to	Resea	urch and Mo	nitoring	response and prep	otential habitat/range shifts e to projected climate change pare adaptation plan to defin ation needs	es

Medium Priority <u>Shor</u>		rtgrass Prairie			Gras	slands
Т	ier 1 Species			Tier 2	2 Species	
		Group	Species		Common Name	Primary
		Plants	Oenothera ha	arringtonii	Arkansas Valley evening primrose	V
		Plants	Asclepias un uncialis	cialis ssp.	Dwarf milkweed	✓
		Plants	Oonopsis pu	ebloensis	Pueblo goldenweed	\checkmark
		Plants	Oonopsis fol monocephala		Rayless goldenweed	✓
General Threat	Specific Threat	General Conservation	on Action	Specific (Conservation Action	Priorit
Climate	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	Legislation, Policies Regulations	s and	Reduce C	O2 emissions	Н
Habitat Conversion	Housing, urban, and ex-urban development	Easements, and Resource Rights co			habitat or Acquire ion easement for conservation	Н
Habitat Conversion	Conversion to cropland	native		native ha	struction of large tracts of bitat (e.g., ski area ent, sod-busting)	Н
Habitat Degradation	Altered animal community (loss of herbivores, esp. BTPD complexes, predators, pollintors, etc.)				nt landowner education program	Н
Habitat Degradation	Roads or Railroads (super slab)	-		Research managem	habitat response to ent	Н
Indirect Consumptive Use	Grazing	Maintain or Restore Habitat Mai		Maintain habitat m	appropriate patch size and osaic	Н
Habitat Degradation	Altered native vegetation (woody encroachment, seral stage imbalance, etc.)	Compatible Resource Use		Implemer managem	nt compatible grazing ent	М
Habitat Conversion	Conversion to cropland	Maintain or Restore Habitat		Restore native prairie		L
Habitat Degradation	Natural system modification (terrestrial) - windbreaks, agricultural methods such as tilling, pitting	Maintain or Restore Habitat Discourage planting		ge 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		transportation and land use	L	
Invasive or Exotic Species	Invasive plants	Invasive Species Co Prevention	ontrol and	Implemen	nt integrated weed/pest ent plan	L

Medium Priority

Foothill/Mountain Grassland

Grasslands

Tier 1 Species				Tier 2 Species					
Group	Species	Common Name	Primary	Group	Species		Common Name	Primary	
Plants	Cirsium scapanolepis	Mountain-slope thistle		Plants	Machaerant		Colorado tansy-aster		
				Plants	Eriogonum coloradense		Colorado wild buckwheat	\checkmark	
				Plants	Penstemon	degeneri	Degener beardtongue		
				Plants	Astragalus missouriens var. humist		Missouri milkvetch		
				Plants	Botrychium	lineare	Narrowleaf grape fern	\checkmark	
				Plants	Lesquerella	pruinosa	Pagosa bladderpod		
General Th	reat Spe	cific Threat	Ge	eneral Conserva	ation Action	Specific	Conservation Action	Priority	
Habitat Deg	gradation Alte	red native vegetation	Co	ompatible Reso	urce Use	0	grazing to maintain full suite o assland species	f M	
Habitat Deg	gradation Inva	sive or exotic species		vasive Species evention	Control and	-	nt integrated weed/pest nent plan	М	

Medium Priority		Sandy Areas			Sparsely Vegetated			
	Т	ier 1 Species				Tier	2 Species	
Group	Species	Common Name	Primary	Group	Species		Common Name	Primary
Plants	Corispermum na	vicula Boat-shaped bugseed		Plants	Boechera c	andallii	Crandall's rock-cress	
				Plants	Caesalpinia	repens	Creeping rush-pea	\checkmark
				Plants	Astragalus	piscator	Fisher Towers milkvetch	\checkmark
				Plants	Aletes mace ssp. brevira	U	Mesa Verde aletes	
General Th	nreat	Specific Threat	Gen	eral Conserva	tion Action	Specific	c Conservation Action	Priority
Habitat De	egradation	Recreation (motorized)	Rec	reation Manag	gement	Implem manage	ent compatible recreation ment	М

Part 7: 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
- Clay-loving wild buckwheat (*Eriogonum pelinophilum*): Bureau of Land Management, Colorado Natural Heritage Program, Colorado Natural Areas Program
- 7. Colorado butterfly plant (*Gaura neomexicana*ssp. *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
- 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 8: 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

General Threat	Specific Threat
Olimate	Habitat shifting and alteration due to climate change
Climate	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)
	Hunting, trapping, fishing
Direct Consumptive	Poisoning
Use (Mortality)	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

Table A1. Threat taxonomy for species

General Threat	Specific Threat
Indirect Consumptive	Forest and woodland management
Use (Mortality)	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
	Phenological response to climate change of species itself and/or inter- 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	eral 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 Use	Implement compatible logging practices			
	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			
Economic incentives	Increase efficiency of water use			
	Provide economic assistance for private land habitat improvements and/or species conservation			
	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	Implement landowner outreach/education program
Communication, cont.	Educate development industries about avoiding and/or mitigating impacts to rare or sensitive species
	Create captive breeding program
Ex-situ Conservation	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
<u><u><u></u></u></u>	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
Planning and Zoning	Promote zoning that concentrates use and protects habitat
	Promote consideration of biodiversity issues in transportation and land use planning processes
	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 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, cont.	Implement Best Management Practices for agricultural production
	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 Conversion	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 or Exotic Species	Invasive plants - tamarisk
	Invasive animals
	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
	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	y for habitats
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General Action	Specific Action
	Develop partnerships among agencies, NGOs, and stakeholders
Capacity Building and Cooperation	Coordinate with related agencies to align goals, policies, measures of success, etc.
	Engage in collaborative, proactive planning and conservation programs
	Develop collaborative management agreements
Compatible Resource Lies	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), 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)
Logislation Deligion 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

General Action	Specific Action
	Manage natural herbivory
Maintain or Restore Natural Processes, cont.	Improve erosion and excess sedimentation conditions
	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.

Section A – Exposure to Local Climate Change

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>

Exposure to sea level rise: not applicable to Colorado. We rated all species 'Neutral.'
 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 Increase Vulnerability:	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. <i>Examples for natural barriers:</i> 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-water areas if the present occupied habitat became too warm as a result of climate change. <i>Examples for anthropogenic barriers:</i> 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 (<i>Euphydryas editha quino</i>), 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 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.
- an or dominy -	<i>Examples for anthropogenic barriers:</i> 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.

Somewhat Increase	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. <i>Examples for natural barriers:</i> certain lowland plant or small mammal species whose ranges are partially but not mostly bordered by high mountains or a large lake.
Vulnerability:	<i>Examples for anthropogenic barriers:</i> 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:	<i>Examples of species in this category:</i> 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:

	The natural history/requirements of the species are known to be incompatible with
Increase Vulnerability:	 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 Increase Vulnerability:	The natural history/requirements of the species are known to be incompatible with mitigation-related land use changes that <i>may possibly</i> occur within its current and/or potential future range, including any of 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 Decrease 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 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 Increase 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 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 Increase 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 Decrease 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 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.

Greatly Increase Vulnerability:	Considering the mean seasonal temperature variation for occupied cells, the species has experienced very small (< 37° F/20.8° C) temperature variation in the past 50 years. Includes cave obligates and species occurring in thermally stable groundwater habitats.
Increase Vulnerability:	Considering the mean seasonal temperature variation for occupied cells, the species has experienced small (37 - 47° F/20.8 - 26.3° C) temperature variation in the past 50 years.
Somewhat Increase Vulnerability:	Considering the mean seasonal temperature variation for occupied cells, the species has experienced slightly lower than average (47.1 - 57° F/26.3 - 31.8° C) temperature variation in the past 50 years.
Neutral:	Considering the mean seasonal temperature variation for occupied cells, the species has experienced average (57.1 - 77° F/31.8 - 44.0° C) temperature variation in the past 50 years.
Somewhat Decrease Vulnerability:	Considering the mean seasonal temperature variation for occupied cells, the species has experienced greater than average (> 77° F/43.0° C) 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	relatively cool or cold environments that may be lost or reduced in the assessment area
Vulnerability:	as a result of climate change.
Increase 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	Species is somewhat (10-50% of occurrences or range) restricted to relatively cool or
Increase	cold environments that may be lost or reduced in the assessment area as a result of
Vulnerability:	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	
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 Vulnerability:	Considering the range of mean annual precipitation across occupied cells, the species has experienced small (4 - 10 inches/100 - 254 mm) precipitation variation in the past 50 years.
Somewhat Increase	Considering the range of mean annual precipitation across occupied cells, the species 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 Increase 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 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 Increase 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 Decrease 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 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 Increase 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 Decrease 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 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	Moderately dependent (50-80% of subpopulations or range) on ice- or snow-
Vulnerability:	associated habitats; or often found most abundantly on or near ice or snow but also
vunieraonity.	regularly occurs away from such areas.
	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
Somewhat	example, certain alpine plants are often associated with long-lasting snowbeds but
Increase	also commonly occur away from such areas; certain small mammals experience
Vulnerability:	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
iveuial.	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 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 Increase 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 clear preference 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 Decrease 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 Vulnerability:	Highly generalized 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 Vulnerability:	Required habitat generated primarily by one species, and that species is highly to extremely vulnerable to climate change within the assessment area.
Increase 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 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 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 Increase 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 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 Increase Vulnerability:	Completely or almost completely (roughly > 90%) dependent on a small number of species for propagule dispersal. For example, a freshwater mussel for which only a few species of fish can disperse larvae.
Neutral:	Disperses on its own (most animals) OR propagules can be dispersed by more than a 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 Vulnerability:	Requires an interaction with a single other species for persistence.
Somewhat Increase Vulnerability:	Requires an interaction with a one member of a small group of taxonomically related species for persistence. Could also include cases where specificity is not known for certain, but is suspected. Many Orchidaceae will be in this category because of their requirement for a specific fungal partner for germination (Tupac Otero and Flanagan 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.

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
	0.073	14
	0.05	1
	Unknown distribution	11
Natural Barriers	Greatly Increase	5
	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
	Neutral	75
	Somewhat Decrease	34
	Unknown	11
Physiological Thormal Nicho	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
Historical Hydrological Niche	Increase	48
	Somewhat Increase	17
	Neutral	12
	Somewhat Decrease	0
	Unknown	11
	Greatly Increase	19
	Increase	88
	Somewhat Increase	1
Physiological Hydrological Niche	Neutral	11
	Somewhat Decrease	0
	Unknown	2
	Increase	0
	Somewhat Increase	44
Disturbance Desire	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 Generate Habitat	Somewhat Increase	0
	Neutral	119
	Unknown	2
	Increase	1
Pollinator Versatility	Somewhat Increase	13
Folimator 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		Tempe Sco				on AET:Pl e 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	% 5.1 – 5.5 F	% < -0.119	-0.097 0.119	-0.074 – -0.096	-0.051 - -0.073	-0.028 - -0.05			ē		-	μ	His	Physi	Del	Ō	Ч	Depe		Deper	0	
Aletes humilis	Larimer Aletes	60	40			100			Inc	N	SD	Inc	N	Inc	Inc	Inc	N	N	SI	U	Ν	Ν	Ν	EV
Aletes latilobus	Canyonlands aletes	100					100		Inc	Inc	Inc	Inc	N	Inc	GI	Inc	N	N	SI	Ν	U	Ν	U	EV
Aletes macdougalii ssp. Breviradiatus	Mesa Verde aletes	100				100			N	SI-N	N	Inc	N	N	GI	Inc	SI	N	N	Ν	U	Ν	U	EV
Aliciella sedifolia	Stonecrop gilia	100				93	7		GI	N	N	Inc	N	Inc	GI	GI	N	SI	Ν	Ν	U	Ν	U	EV
Anticlea vaginatus	Alcove death camas	100			100				Inc	N	N	Inc	N	Inc	GI	GI	N	N	SI	Ν	U	Ν	U	EV
Aquilegia chrysantha var. rydbergii	Golden columbine	100			100				N	N	N	Inc	SI	N	Inc	GI	N	N	SD	Ν	SI	Ν	Ν	EV
Asclepias uncialis ssp. uncialis	Dwarf milkweed	23	77		71	29			N	SI	Inc	Inc	SD	N	Inc	Inc	N	N	N	Ν	Ν	Ν	Ν	EV
Astragalus anisus	Gunnison milkvetch	100		45	55				SI	SI	Inc	Inc	SD	N	Inc	Inc	SI	N	Ν	Ν	Ν	Ν	Inc	EV
Astragalus cronquistii	Cronquist milkvetch	100					28	72	N	N	Inc	Inc	N	N	Inc	Inc	SI	N	Ν	Ν	Ν	Ν	Inc	EV
Astragalus debequaeus	DeBeque milkvetch	100				99	1		Inc	N	Inc	Inc	SD	N	Inc	Inc	N	N	SD	U	Ν	Ν	Inc	EV
Astragalus deterior	Cliff-palace milkvetch	100				100			Inc	Inc-SI	Ν	Inc	N	Inc	Inc	Inc	N	N	SI	Ν	Ν	Ν	Inc	EV
Astragalus equisolensis	Horseshoe milkvetch	100				100			SI-N	N	N	Inc	N	N	Inc	Inc	SI	N	N	Ν	Ν	Ν	Inc	EV
5	Mancos milkvetch	100					100		Inc	Ν	Inc	Inc	Ν	Inc	GI	Inc	Ν	Ν	SI	Ν	Ν	Ν	Inc	EV
Astragalus iodopetalus	Violet milkvetch	41	59		59	41			Ν	SI	Inc	Inc	N	N	GI	Inc	SI	N	Ν	Ν	Ν	Ν	Inc	EV

NatureServe		Tempe Scc				ion AET:Pl 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	% 5.1 – 5.5 F	% < -0.119	-0.097 0.119	-0.074 — -0.096	-0.051 - -0.073	-0.028 - -0.05			Ū		-	R	His	Phys	De	Δ	P	Depe		Deper	0	
Astragalus Ionchocarpus var. hamiltonii	Hamilton milkvetch	100			100				Inc	SI	N	Inc	SD	N	GI	Inc	SI	N	Ν	Ν	Ν	Ν	Inc	EV
Astragalus microcymbus	Skiff milkvetch	100		97	3				SI-N	SI-N	Inc	Inc	SD	N	GI	Inc	SI	N	N	Ν	Ν	Ν	Inc	EV
Astragalus missouriensis var. humistratus	Missouri milkvetch		100		100				Inc-SI	N	Inc	Inc	SD	N	Inc	Inc	SI	N	SD	Ν	Ν	Ν	Inc	EV
Astragalus naturitensis	Naturita milkvetch	100				98	2		Inc- SI-N	SI-N	N	Inc	SD	Inc	Inc	Inc	SI	N	SI	Ν	Ν	Ν	Inc	EV
Astragalus osterhoutii	Kremmling milkvetch	100			100				Inc-SI	Inc-SI	Inc	Inc	SD	N	Inc	Inc	SI	N	N	Ν	Ν	Ν	Ν	EV
Astragalus piscator	Fisher Towers milkvetch	100				100			N	N	Inc	Inc	N	N	GI	Inc	SI	N	Ν	Ν	Ν	Ν	Inc	EV
Astragalus rafaelensis	San Rafael milkvetch	100				91	9		Inc	N	N	Inc	N	N	GI	Inc	SI	N	N	Ν	Ν	Ν	Inc	EV
Astragalus schmolliae	Schmoll milkvetch	100				100			Inc	Ν	Ν	Inc	Ν	Ν	Inc	Inc	SI	Ν	Ν	Ν	Ν	Ν	Inc	EV
Astragalus tortipes	Sleeping Ute milkvetch	100					100		Inc-SI	Inc-SI	Inc	Inc	N	N	GI	Inc	SI	N	N	Ν	Ν	Ν	Inc	EV
Boechera crandallii	Crandall's rock cress	100		36	63	1			N	N	Inc	Inc	SD	N	SI	Inc	SI	N	Ν	Ν	Ν	Ν	Ν	EV
Boechera glareosa		100			100				Inc	N	Inc	Inc	N	N	GI	Inc	N	N	Inc	Ν	U	Ν	U	EV
Botrychium furcatum	Fork-leaved moonwort								Inc	U	N	Inc	U	Inc	U	N	N	SI	N	Ν	Ν	Ν	U	IE
Botrychium lineare	Narrowleaf grape fern	100		7		93			Inc	N	SD	Inc	N	N	SI	SI	SI	N	SD	Ν	Ν	Ν	U	нν
Caesalpinia repens	Creeping rush-pea								U	U	U	Inc	U	U	U	Inc	N	N	N	Ν	U	U	U	IE
Camissonia eastwoodiae	Eastwood evening primrose	100				42	50	8	N	N	Inc	Inc	SD	N	Inc	Inc	SI	N	Ν	Ν	U	Ν	U	EV

NatureServe		Tempe Scc	erature ope			on AET:PI e 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
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Carex stenoptila	Small-winged sedge	79	21	9	35	56			N	N	N	Inc	N	N	N	GI	N	N	SD	Ν	U	Ν	U	мv
Castilleja puberla	Downy Indian- paintbrush	90	10		0.5	90	8	1.5	Inc	Ν	N	Inc	N	Inc	N	N	Ν	SI	N	Ν	U	Ν	U	EV
Cirsium perplexans	Adobe thistle	100			62	38			N	Ν	Inc	N	SD	Ν	SI	Inc	SI	Ν	Ν	Ν	Ν	Ν	Ν	ΗV
Cirsium scapanolepis	Mountain-slope thistle								U	U	SD	N	U	N	U	Inc	SI	N	SD	Ν	U	Ν	U	IE
Cleome multicaulis	Slender spiderflower	2	98			46	54		GI	Ν	Inc	Inc	SD	N	GI	GI	Ν	Ν	N	Ν	U	Ν	U	EV
Corispermum navicula	Boat-shaped bugseed	100			33	67			Inc	Ν	N	Inc	N	Ν	GI	Inc	Ν	Ν	Inc	Ν	U	Ν	U	EV
Cryptantha gypsophila	Gypsum Valley cat's-eye	100			8	84	8		Inc	Ν	Inc	Inc	N	N	Inc	Inc	SI	Ν	Inc	Ν	U	Ν	U	EV
Delphinium ramosum var. alpestre	Colorado larkspur	94	6	3	46	48	3		Inc	N	N	Inc	N	Inc	SI	N	Ν	SI	N	Ν	U	Ν	U	EV
Delphinium robustum	Wahatoya Creek larkspur								Inc	U	U	Inc	U	Inc	U	Inc	Ν	N	SI	Ν	Ν	Ν	Ν	IE
Descurainia kenheilii	Heil's tansy mustard	100					100		Inc	Ν	N	Inc	N	Inc	GI	Ν	Ν	SI	N	Ν	U	Ν	U	EV
Dicoria wetherillii	Wetherill's dicoria								U	U	U	U	U	U	U	U	U	U	U	U	U	U	С	IE
Draba exunguiculata	Clawless draba	100			32	52	16		Inc	Ν	Ν	Inc	N	Inc	SI	Ν	Ν	SI	Ν	Ν	Ν	Ν	Ν	EV
Draba graminea	San Juan whitlow- grass	100				75	25		Inc	Ν	N	Inc	N	Inc	SI	GI	Ν	GI	N	Ν	Ν	Ν	Ν	EV
Draba grayana	Gray's Peak whitlow-grass	77	23		33	66	1		Inc	Ν	N	Inc	N	Inc	N	N	N	SI	N	Ν	N	Ν	Ν	EV
Draba malpighiacea	Whitlow-grass	100				100			Inc	Ν	SD	Inc	N	N	Inc	Inc	SI	N	Ν	Ν	U	Ν	U	EV
Draba smithii	Smith Whitlow- grass	54	46	1	26	35	14	24	Inc	Ν	Inc	Inc	N	Inc	N	Inc	Ν	Ν	SI	Ν	Ν	Ν	Ν	EV
Draba weberi	Weber's draba	100				100			GI	Ν	Ν	Inc	Ν	Inc	GI	GI	Ν	SI	Ν	Ν	Ν	Ν	Ν	EV

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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	N	Inc	N	Inc	GI	Inc	Ν	N	SI	N	N	U	U	EV
Eriogonum brandegei	Brandegee wild buckwheat	100		86	14				Inc	N	N	SI-N	N	N	Inc	Inc	Ν	N	Inc	Ν	N	N	Ν	EV
Eriogonum clavellatum	Comb Wash buckwheat	100					99.5	0.5	N	SI	Inc	Inc	N	N	GI	Inc	SI	N	N	N	U	N	U	EV
Eriogonum coloradense	Colorado wild buckwheat	100		33	27	15	25		Inc	N	N	SI-N	N	Inc	Ν	Inc	N	SI	N	Ν	N	N	N	EV
Eriogonum pelinophilum	Clay-loving wild buckwheat	100				48	52		Inc	Inc-SI	Inc	Inc	SD	N	Inc	Inc	SI	N	N	Ν	U	N	U	EV
Eutrema edwardsii ssp. penlandii	Penland alpine fen mustard	100			28	72			Inc	N	N	Inc	N	Inc	Ν	GI	Ν	SI	N	N	U	N	U	EV
Gaura neomexicana ssp. coloradensis	Colorado butterfly plant	47	53		47	53			Inc	GI- Inc	N	Inc	N	N	Inc	GI	N	N	SD	N	U	N	U	EV
Gutierrezia elegans	Lone Mesa 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	Ν	U	Inc	SI	N	Ν	N	U	N	U	IE
Hackelia gracilenta	Mesa Verde stickseed	100				100			N	SI	N	Inc	N	N	Inc	Inc	SI	N	N	Ν	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	Ν	U	N	U	EV
lpomopsis aggregata ssp. Weberi	Rabbit Ears gilia	100			65	35			N	N	SD	Inc	SD	N	N	Inc	N	N	N	Ν	N	N	N	PS
Ipomopsis globularis	Globe gilia	100			45	55			Inc	N	N	Inc	N	Inc	Inc	N	N	SI	Inc	Ν	N	N	U	EV
Ipomopsis polyantha	Pagosa skyrocket		100		100				Inc	Inc	Inc	Inc	SD	N	GI	Inc	Ν	N	Inc	Ν	N	Ν	U	EV
Lepidium crenatum	Alkaline 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	Ν	Inc	Inc	Ν	N	Inc	Ν	U	N	U	EV

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Lesquerella congesta	Dudley Bluffs bladderpod	100			100				Inc	Inc	Inc	Inc	N-SD	N	GI	Inc	Ν	N	Inc	N	SI	Ν	U	EV
Lesquerella parviflora	Piceance bladderpod	100		75	24	1			Inc	Ν	Inc	Inc	N	N	Inc	Inc	Ν	N	Inc	N	U	Ν	U	EV
Lesquerella pruinosa	Pagosa bladderpod		100	1	95	4			Inc	SI	Inc	Inc	SD	Ν	Inc	Inc	Ν	Ν	Inc	Ν	Ν	Ν	Ν	EV
Lesquerella vicina	Good-neighbor bladderpod	100		6	49	42	3		Inc	Inc	N	Inc	N	Ν	Inc	Inc	SI	Ν	N	N	U	Ν	U	EV
Limnorchis zothecina	Alcove bog orchid	100			100				Inc	N	N	Inc	SD	Inc	GI	GI	Ν	N	SI	Ν	U	Ν	U	EV
Lomatium concinnum	Coloado desert- parsley	100		42	9	49			SI	Inc-SI	Inc	Inc	N	N	Inc	Inc	SI	N	N	N	U	Ν	U	EV
Lupinus crassus	Payson lupine	100		3		97			SI-N	SI-N	N	Inc	SD	N	SI	Inc	SI	N	Ν	Ν	U	Ν	U	HV
Lygodesmia doloresensis	Dolores River skeletonplant	100				98	2		SI	SI	N	Inc	SD	N	Inc	Inc	SI	N	N	N	U	Ν	U	EV
Machaeranthera coloradoensis	Colorado tansy- aster	99	1	3	17	52	28		Inc	N	Inc	N	Ν	N	Ν	Inc	Ν	N	Ν	N	U	Ν	U	ΗV
Mentzelia rhizomata	Roan Cliffs blazing star	100		2	93	5			Inc	N	Inc	Inc	N	N	Inc	Inc	Ν	N	Inc	N	U	Ν	U	EV
Mertensia humilis	Rocky Mountain bluebells	100			76	24			Inc- SI-N	SI-N	Inc	Inc	N	N	SI	Inc	SI	N	N	N	U	Ν	U	EV
Mimulus gemmiparus	Budding monkey flower	100				71	29		Inc	N	N	GI	N	Inc	SI	GI	N	N	SI	N	N	Ν	U	EV
Nuttallia chrysantha	Golden blazing star	71	29	10	28	62			Inc	SI-N	Inc	Inc-SI	Ν	Ν	Inc	Inc	Ν	Ν	Inc	Ν	Ν	Ν	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	Ν	U	EV
Oenothera acutissima	Narrow-leaf evening primrose	100		4	70	26			N	N	N	Inc	N	N	Inc	GI	Ν	N	N	N	U	Ν	U	EV
Oenothera harringtonii	Arkansas Valley evening primrose	1	99		17	83			Inc	SI-N	Inc	Inc	SD	N	Inc	Inc	Ν	N	Inc	Ν	Inc-N	Ν	U	EV

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Oonopsis foliosa var. monocephala	Rayless goldenweed		100		80	20			N	N	Inc	Inc	SD	N	Inc	Inc	N	N	N	Ν	U	N	U	EV
Oonopsis puebloensis	Pueblo goldenweed	1	99		5	95			Inc	SI-N	Inc	Inc	N	N	Inc	Inc	N	Ν	Inc	Ν	U	Ν	U	EV
Opuntia heacockiae	Heacock's prickly- pear								U	U	Ν	Inc	U	Ν	U	Inc	SI	Ν	Ν	Ν	U	Ν	U	IE
Oreocarya osterhoutii	Osterhout's cat's- eye	100				61	39		Inc	Inc-SI	Inc	Inc	SD	N	Inc	Inc	N	Ν	Inc	Ν	U	Ν	U	EV
Oreoxis humilis	Pikes Peak spring parsely	100			18	3	79		Inc	N	N	Inc	N	Inc	Inc	N	N	SI	N	Ν	Ν	Ν	U	EV
Oxybaphus rotundifolius	Round-leaf four o'clock	7	93		21	79			Inc	SI-N	Inc	Inc	N	N	Inc	Inc	N	N	Inc	Ν	U	Ν	U	EV
Oxytropis besseyi var. obnapiformis	Bessey locoweed	100			36	64			N	N	Inc	Inc	SD	N	SI	Inc	SI	N	N	Ν	U	N	U	EV
Pediocactus knowltonii	Knowlton cactus								U	U	N	Inc	U	N	U	Inc	SI	Ν	N	Ν	U	Ν	U	IE
Penstemon crandallii ssp. procumbens	Crandall's beardtongue								U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	IE
Penstemon debilis	Parachute penstemon	100			92	8			Inc	N	Inc	Inc	N	N	Inc	Inc	N	Ν	Inc	Ν	SI	Ν	U	EV
Penstemon degeneri	Degener beardtongue	100		29	71				N	N	N	Inc	N	N	Inc	Inc	SI	Ν	N	Ν	SI	Ν	U	EV
Penstemon fremontii var. glabrescens	Fremont's beardtongue	100		29	55	16			N	N	Inc	Inc	SD	N	Inc	Inc	SI	N	N	Ν	SI	N	U	EV
Penstemon gibbensii	Gibben's beardtongue	100				100			Inc	N	Inc	Inc	SD	N	GI	Inc	N	N	Inc	Ν	SI	N	U	EV
Penstemon grahamii	Graham beardtonuge	100					100		Inc	N	Inc	Inc	SD	N	GI	Inc	N	N	Inc	Ν	SI	N	U	EV
Penstemon penlandii	Penland penstemon	100			100				Inc-SI	Inc-SI	Inc	Inc	SD	N	GI	Inc	SI	Ν	Ν	Ν	SI	Ν	U	EV

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Penstemon scariosus var. albifluvis	White River penstemon	100					100		Inc	N	Inc	Inc	SD	N	GI	Inc	N	Ν	Inc	Ν	SI	N	U	EV
Penstemon scariosus var. cyanomontanus	Plateau penstemon	100			100				Inc	N	N	Inc	N	N	Inc	Inc	SI	Ν	N	Ν	SI	N	U	EV
Penstemon teucrioides	Germander beardtongue								U	U	Inc	Inc	U	N	U	Inc	SI	Ν	N	Ν	SI	N	U	IE
Phacelia formosula	North Park phacelia	100			99	1			Inc	U	Inc	Inc	N	N	Inc	Inc	N	Ν	Inc	Ν	U	N	U	EV
Phacelia submutica	DeBeque phacelia	100			4	95	1		Inc	Inc-SI	Inc	Inc	SD	N	GI	Inc	Ν	N	Inc	Ν	U	N	U	EV
Physaria alpina	Avery Peak twinpod	100			2	98			Inc	N	N	Inc	N	Inc	Inc	N	N	SI	N	Ν	U	N	U	EV
Physaria bellii	Bell's twinpod	42	58				100		Inc	SI	Inc	Inc	N	Ν	Inc	Inc	Ν	Ν	Inc	Ν	U	Ν	U	EV
Physaria obcordata	Piceance twinpod	100			100				Inc	N	Inc	Inc	SD	Ν	Inc	Inc	Ν	Ν	Inc	Ν	Ν	Ν	U	EV
Physaria pulvinata	Cushion bladderpod	100			100				Inc	SI-N	Inc	Inc	N	Ν	Inc	Inc	N	Ν	Inc	Ν	U	N	U	EV
Physaria rollinsii	Rollins twinpod	100		22	34	37	7		Inc	SI-N	Inc	Inc	SD	Ν	SI	Inc	Ν	Ν	Inc	Ν	U	Ν	U	EV
Physaria scrotiformis	West Silver bladderpod	100				100			Inc	N	Inc	Inc	N	N	GI	Inc	N	Ν	SD	Ν	U	N	U	EV
Potentilla rupincola	Rocky Mountain cinquefoil	93	7			100			Inc	N	SI-N	Inc	N	Inc	N	Inc	N	Ν	SI	Ν	Ν	N	SI	EV
Ptilagrostis porteri	Porter's feathergrass	100		7	45	44	4		Inc-SI	N	N	N	N	N	N	GI	N	Ν	Ν	Ν	Ν	N	U	MV
Puccinellia parishii	Parish's alkali grass	100			100				Inc	SI	N	N	N	N	GI	GI	N	Ν	Ν	Ν	Ν	N	U	EV
Salix arizonica	Arizona willow		100		100				Gl- Inc	N	N	Inc	N	N	GI	GI	N	N	Ν	Ν	Ν	N	SI	EV
Saussurea weberi	Weber saussurea	100			8	92			Inc	N	N	Inc	N	Inc	SI	N	N	SI	Ν	Ν	N	N	U	EV
Sclerocactus glaucus	Colorado hookless cactus	100		0.5	1	12	86.5		Inc-SI	SI-N	Inc	Inc	SD	Ν	Inc	Inc	SI	Ν	Ν	Ν	SI	Ν	U	EV

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Sclerocactus mesa- verde	Mesa Verde hookless cactus	100					100		Inc	N	Inc	Inc	N	N	GI	Inc	Ν	Ν	Inc	N	SI	Ν	U	EV
Sisyrinchium pallidum	Pale blue-eyed grass	100		26	74				Inc	N	N	Inc	N	N	N	GI	Ν	Ν	N	N	U	Ν	U	EV
Spiranthes diluvialis	Ute ladies' tresses	88	12		67	33			Gl- Inc	GI- Inc	N	Inc	SD	N	SI	GI	SI	Z	Ζ	N	U	Z	U	EV
Telesonix jamesii	James telesonix	100			23	53	24		Inc	Ν	Ν	Inc	N	Inc	SI	Inc	Ν	Ν	SD	Ν	Ν	Ν	U	EV
Thalictrum heliophilum	Sun-loving 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 mustard	100			83	17			Inc-SI	SI-N	N	Inc	N	N	SI	Inc	SI	Ν	N	N	N	Ν	Ν	EV
Thelypodium paniculatum	Northwestern thelypody								U	U	N	Inc	U	N	U	GI	Ν	Ν	N	N	U	Ν	U	IE
Townsendia fendleri	Fendler's 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- daisy	47	53		77	23			Inc	SI-N	Inc	Inc	SD	N	SI	Inc	Ν	Ν	Inc	N	Ν	Ν	U	EV
Townsendia rothrockii	Rothrock townsend-daisy	100		16	42	31	11		Inc	Ν	N	Inc	Ν	Inc	N	Ν	Ν	SI	Ν	N	Ν	Ν	U	EV

Colorado Natural Heritage Program

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

Colorado Natural Areas Program Colorado State Parks, 1313 Sherman Street, Denver, CO 80203; <u>www.parks.state.co.us</u>

The Nature Conservancy2424 Spruce Street, Boulder, CO 80302; www.tnc.org



Ipomopsis polyantha, Pagosa skyrocket. David G. Anderson





Colorado Rare Plant Conservation Initiative



