Colorado Wildlife Action Plan
Appendix A: Rare Plants

By the Colorado Natural Heritage Program

For

Colorado Parks and Wildlife

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Cover photos: Background – shortgrass prairie (Renée Rondeau); foreground – *Asclepias uncialis* (Jill Handwerk).

EXECUTIVE SUMMARY

The purpose of this Addendum to Colorado's State Wildlife Action Plan (SWAP) (CPW 2015) 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 original 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. 2009), 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. When 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 components of the 2011 Draft Addendum. Draft components were circulated among all RPCI members for review and revision. For this 2015 version, the Draft Addendum was thoroughly reviewed to reflect recent advances in nomenclature, for currentness of content, and to reflect on the ground changes. Eleven species were added to the list, 17 species underwent name or rank changes but remained on the list, and 15 species were removed which had taxonomic uncertainty or were found to be more common than previously thought. Further, 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 117 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 2014; 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 2014, CNHP and TNC 2011). Shrublands are Colorado's most important habitat for rare plants (supporting 24% of the imperiled species), occupying 19% of the state's acreage. Barrens occupy less than 1% of Colorado, but 20% of our rarest plants are primarily associated with barren habitats. Pinyon-juniper woodlands, cliffs and canyons, and alpine habitats combined provide habitat for nearly 40% of the rare plant species (Figures 2 and 3). Mapping of habitat types is from SWReGAP (Prior-Magee et al. 2007; USGS 2004).

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. Part 5, 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 Addendum to Colorado's State Wildlife Action Plan (CPW 2015) 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 the original 2011 draft of 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. In 2014-2015 the Colorado Natural Heritage Program, revised the 2011 draft to reflect the current conservation status of Colorado's rare plants. 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. When 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 Appendix E 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) 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 was instrumental in the preparation of this Addendum to Colorado's SWAP. 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 components of the draft Addendum. This 2015 revised Addendum was updated by CNHP in collaboration with CPW and CNAP. Components of both the 2011 draft and the revised 2015 Addendum 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

In 2009 the RPCI Strategy identified the 121 plant species of greatest conservation need in Colorado (PGCN). However, since that time new information has been acquired for many of the PGCN resulting in the revision of the conservations status of several species and the refinement of the original list. Specifically; eleven species were added to the list, 17 species underwent name or rank changes but remained on the list, and 15 species were removed which had taxonomic uncertainty or were found to be more common than previously thought. We now have a total of 117 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 Reports, and characterization abstracts);
2) Colorado's Biodiversity Scorecard (CNHP and TNC 2011);
3) U.S. Forest Service species assessments (http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml);
4) the Colorado Rare Plant Field Guide (http://www.cnhp.colostate.edu/);
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 5 and Table 3 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. One additional key habitat types was identified (barrens), 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 barrens habitat. These data were augmented, amended, and confirmed by expert review. Results are presented in Part 2 of this document and Chapter 6 of the full 2015 SWAP 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 (Part 5, Table 3). In order to capture similar concepts in as consistent a way as possible, we used a "Threats Taxonomy" to categorize threats in the Access database. The Threats Taxonomy in the 2011 draft was based on a taxonomy originally developed by The Nature Conservancy and adapted for use in the SWAP. In the interim, a standardized lexicon has been developed by the Conservation Measures Partnership (Salafsky et al. 2008), and is recommended in the 2012 Best Practices for State Wildlife Action Plans guidance (AFWA 2012). For the 2015 SWAP and Addendum, we have adopted the Salafsky lexicon's classification of general threats (see Appendix A for the full classification). The database that was developed to house information on PGCN and habitats has been updated to reflect the new lexicon.

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 stakeholders, including RPCI botanists, for expert review. Results are presented in Part 3 and Table 3, and Appendix Tables B1-B3 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). In the 2011 Addendum the Conservation Actions Taxonomy was based on a taxonomy originally developed by The Nature Conservancy, and adapted for use in the SWAP. In the interim, a standardized lexicon has been developed by the Conservation Measures Partnership (Salafsky et al. 2008). For the 2015 SWAP and Rare Plant Addendum, we have adopted the Salafsky lexicon's classification of conservation actions (see Appendix A for the full classification). The database that was developed to house information on PGCN and habitats has been updated to reflect the new lexicon.

Content of the database was submitted to stakeholders, including RPCI botanists for expert review. Results are presented in Parts and 5 and Table 3 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 multiple sources including stakeholder review, the RPCI Strategy, and agency recommendations. They have been widely vetted by Colorado's botanical community, and represent a consensus on the steps needed to determine the status of Colorado's PGCN and identify early warning signs of declining trends. They are presented in Part 6 of this document.

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

This element is tiered to the SWAP published in 2015. The next revision of that document is scheduled to begin in ten years. During that revision, we hope to update the content of this Addendum as necessary. The review process established in the SWAP is presented in Part 7 of this document.

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

The stakeholder list of botanical experts in Colorado, including members of 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. Stakeholders derived from the RPCI partnership (Appendix E) and the members of the Colorado Native Plant Society were invited to review the document at various stages throughout its development. These two groups represent over 700 individuals from all levels of government, as well as non-governmental organizations, the private sector, various interest groups, and private citizens.

Part 1: PLANTS OF GREATEST CONSERVATION NEED

In a comprehensive evaluation of the Colorado flora a total of 3,322 vascular plant species were documented to occur in Colorado; 2,797 of these were native, 108 of the native species are endemic to Colorado, and 527 species are non-native but variously naturalized (Ackerfield 2015). 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 540 rare plant species in Colorado; of these, 117 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 115 species are considered vulnerable (ranked G3) (CNHP 2014). Nearly 70 of Colorado's plant species are on the BLM Sensitive Species List, and approximately 60 on the U.S. Forest Service Sensitive Species List. Currently, 16 Colorado native plant species are federally listed by the U.S. Fish and Wildlife Service as Threatened or Endangered; another three species are candidates for listing.

Plants of Greatest Conservation Need (PGCN) are defined as the 117 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. This list has been updated from the original 2009 RPCI and 2011 draft Addendum lists to reflect current knowledge, changes in nomenclature, and taxonomic uncertainty. Specifically; eleven species were added to the list, 17 species underwent name or rank changes but remained on the list, and 14 species were removed which had taxonomic uncertainty or were found to be more common than previously thought. 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 Tier 1 and 2 PGCN, along with each species' 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 2012).

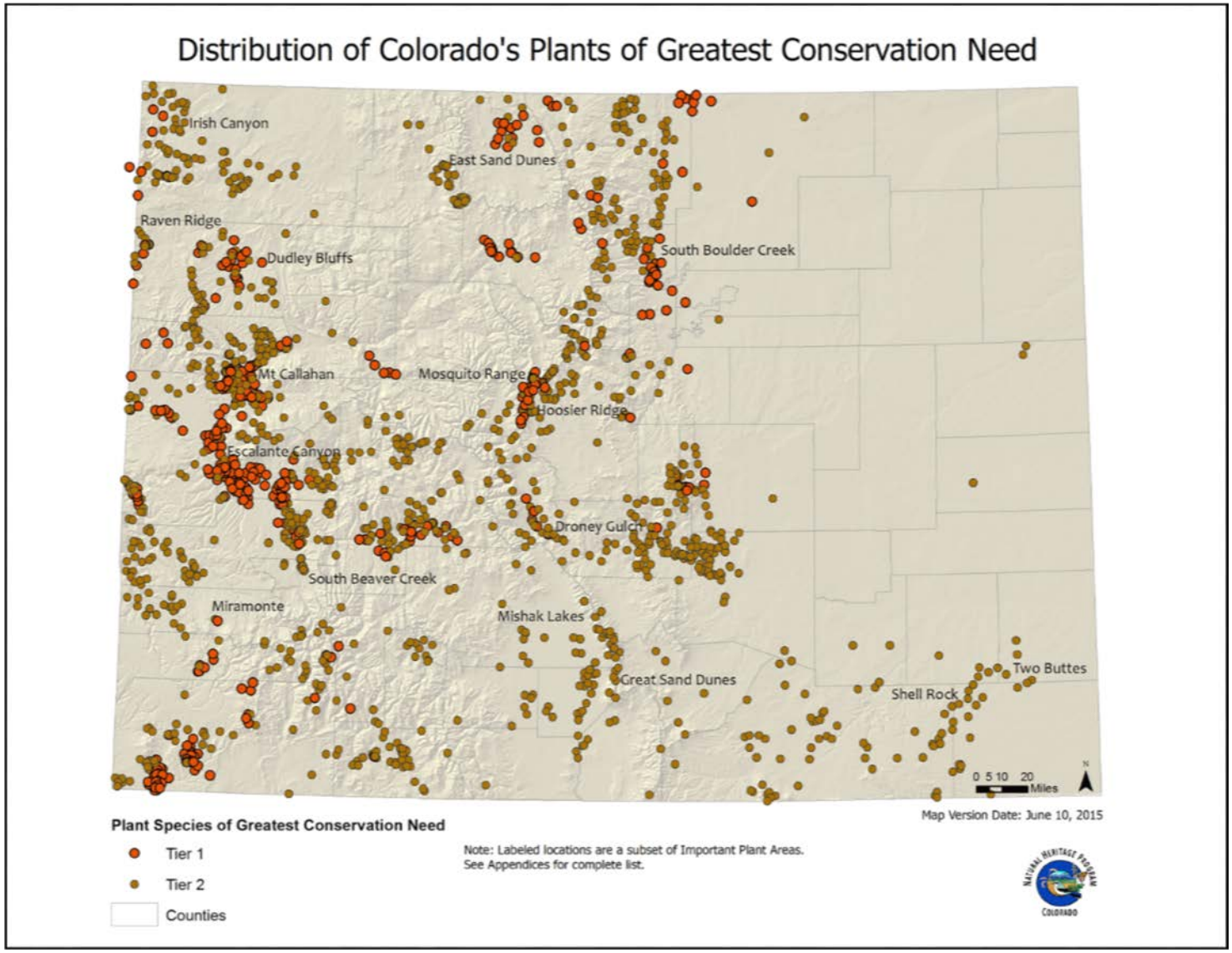

Figure 1. Map of Colorado showing distribution of Colorado's Plants of Greatest Conservation Need (Tier 1 and Tier 2 species).

Table 1. Colorado Plants of Greatest Conservation Need

NatureServe status ranks are: 1 = Critically Imperiled; 2 = Imperiled; 3 = Vulnerable; 4 = Apparently Secure; 5 = Demonstrably Secure; T = subspecies; Q = taxonomic question; SNA = Not Applicable (not in Colorado). 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; Medium = 25-50% of range within Colorado; Low = < 25% of range within Colorado (source: Colorado Natural Heritage Program).

Scientific Name	**Common Name**	**Species Priority**	**Global & State Status Ranks**	**Federal Agency Status**	**Percent of Range in Colorado**
Aletes latilobus	Canyonlands aletes	Tier 1	G1G2 / S1	BLM	Medium
Aliciella sedifolia	Stonecrop gilia	Tier 1	G1 / S1	USFS	Endemic
Astragalus deterior	Cliff-palace milkvetch	Tier 1	G1G2 / S1S2		Endemic
Astragalus humillimus	Mancos milkvetch	Tier 1	G1 / S1	LE	Low
Astragalus microcymbus	Skiff milkvetch	Tier 1	G1 / S1	C/BLM	Endemic
Astragalus osterhoutii	Kremmling milkvetch	Tier 1	G1 / S1	LE	Endemic
Astragalus schmolliae	Chapin Mesa milkvetch	Tier 1	G1 / S1	C	Endemic
Astragalus tortipes	Sleeping Ute milkvetch	Tier 1	G1 / S1	C/BLM	Endemic
Boechera glareosa		Tier 1	G1 / S1		Medium
Corispermum navicula	Boat-shaped bugseed	Tier 1	G1? / S1	BLM	Endemic
Descurainia kenheilii	Heil's tansy mustard	Tier 1	G1 / S1		Endemic
Draba malpighiacea	Whitlow-grass	Tier 1	G1? / S1?		Endemic
Draba weberi	Weber's draba	Tier 1	G1 / S1	USFS	Endemic
Erigeron wilkenii	Wilken fleabane	Tier 1	G1 / S1		Endemic
Eriogonum brandegeei	Brandegee wild buckwheat	Tier 1	G1G2 / S1S2	BLM/USFS	Endemic

Scientific Name	**Common Name**	**Species Priority**	**Global & State Status Ranks**	**Federal Agency Status**	**Percent of Range in Colorado**
Eriogonum pelinophilum	Clay-loving wild buckwheat	Tier 1	G2 / S2	LE	Endemic
Eutrema penlandii	Penland alpine fen mustard	Tier 1	G1G2 / S1S2	LT	Endemic
Gutierrezia elegans	Lone Mesa snakeweed	Tier 1	G1 / S1	BLM	Endemic
Hackelia gracilenta	Mesa Verde stickseed	Tier 1	G1G2 / S1S2		Endemic
Ipomopsis polyantha	Pagosa skyrocket	Tier 1	G1 / S1	LE	Endemic
Ipomopsis ramosa	Coral ipomopsis	Tier 1	G1 / S1		Endemic
Lepidium huberi	Huber's pepperwort	Tier 1	G1G2 / S1S2		High
Lygodesmia doloresensis	Dolores River skeletonplant	Tier 1	G1G2 / S1S2	BLM	High
Mimulus gemmiparus	Budding monkey flower	Tier 1	G1 / S1	USFS	Endemic
Oenothera coloradensis ssp. *coloradensis*	Colorado butterfly plant	Tier 1	G3T2 / S1	LT	Medium
Oreoxis humilis	Pikes Peak spring parsley	Tier 1	G1 / S1	USFS	Endemic
Packera mancosana	Mancos shale packera	Tier 1	G1 / S1		Endemic
Pediocactus knowltonii	Knowlton cactus	Tier 1	G1 / SNA	LE	Historical
Penstemon debilis	Parachute penstemon	Tier 1	G1 / S1	LT	Endemic
Penstemon gibbensii	Gibben's beardtongue	Tier 1	G1G2 / S1	BLM	High
Penstemon penlandii	Penland penstemon	Tier 1	G1 / S1	LE	Endemic
Penstemon scariosus var. *albifluvis*	White River penstemon	Tier 1	G4T1 / S1	BLM	Low
Phacelia formosula	North Park phacelia	Tier 1	G1 / S1	LE	Endemic
Phacelia gina-glenneae	Troublesome phacelia	Tier 1	G1 / S1		Endemic
Phacelia submutica	DeBeque phacelia	Tier 1	G2 / S2	LT	Endemic
Physaria congesta	Dudley Bluffs bladderpod	Tier 1	G1 / S1	LT	Endemic
Physaria obcordata	Piceance twinpod	Tier 1	G1G2 / S1S2	LT	Endemic
Physaria pulvinata	Cushion bladderpod	Tier 1	G1 / S1	BLM	Endemic
Physaria rollinsii	Rollins twinpod	Tier 1	G1 / S1		Endemic
Physaria scrotiformis	West Silver bladderpod	Tier 1	G1 / S1		Endemic

Scientific Name	**Common Name**	**Species Priority**	**Global & State Status Ranks**	**Federal Agency Status**	**Percent of Range in Colorado**
Sclerocactus glaucus	Colorado hookless cactus	Tier 1	G2G3 / S2S3	LT	Endemic
Sclerocactus mesae-verdae	Mesa Verde hookless cactus	Tier 1	G2 / S2	LT	Low
Spiranthes diluvialis	Ute ladies'-tresses	Tier 1	G2G3 / S2	LT	Medium
Aletes humilis	Larimer aletes	Tier 2	G2G3 / S2S3		Endemic
Aletes macdougalii ssp. *breviradiatus*	Mesa Verde aletes	Tier 2	G3T2T3 / S1		Medium
Anticlea vaginatus	Alcove death camas	Tier 2	G2 / S2		Low
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		High
Astragalus debequaeus	DeBeque milkvetch	Tier 2	G2 / S2	BLM	Endemic
Astragalus equisolensis	Horseshoe milkvetch	Tier 2	G5T1 / S1	BLM	Low
Astragalus iodopetalus	Violet milkvetch	Tier 2	G2 / S1	USFS	Medium
Astragalus missouriensis var. *humistratus*	Missouri milkvetch	Tier 2	G5T1 / S1	USFS	Endemic
Astragalus naturitensis	Naturita milkvetch	Tier 2	G2G3 / S2S3	BLM	High
Astragalus piscator	Fisher Towers milkvetch	Tier 2	G2G3 / S1	BLM	Low
Astragalus rafaelensis	San Rafael milkvetch	Tier 2	G2G3 / S1	BLM	High
Astragalus sparsiflorus	Front Range milkvetch	Tier 2	G2 / S2		Endemic
Boechera crandallii	Crandall's rock-cress	Tier 2	G2 / S2	BLM	High
Botrychium lineare	Narrowleaf grape fern	Tier 2	G2G3 / S2S3	USFS	Medium
Calochortus ciscoensis	Cisco sego lily	Tier 2	G2 / S1		Low
Camissonia eastwoodiae	Eastwood evening primrose	Tier 2	G2 / S1	BLM	Medium
Castilleja puberula	Downy Indian-paintbrush	Tier 2	G2G3 / S2S3		Endemic
Cirsium perplexans	Adobe thistle	Tier 2	G2G3 / S2S3		Endemic
Cleome multicaulis	Slender spiderflower	Tier 2	G2G3 / S2S3	BLM	High

Scientific Name	**Common Name**	**Species Priority**	**Global & State Status Ranks**	**Federal Agency Status**	**Percent of Range in Colorado**
Delphinium ramosum var. *alpestre*	Colorado larkspur	Tier 2	G4T2 / S2		High
Delphinium robustum	Wahatoya Creek larkspur	Tier 2	G2? / S2?		Medium
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 smithii	Smith whitlow-grass	Tier 2	G2 / S2	USFS	Endemic
Erigeron kachinensis	Kachina daisy	Tier 2	G2 / S1	BLM	Low
Eriogonum clavellatum	Comb Wash buckwheat	Tier 2	G2 / S1	BLM	Medium
Eriogonum coloradense	Colorado wild buckwheat	Tier 2	G2 / S2	BLM	Endemic
Frasera coloradensis	Colorado green gentian	Tier 2	G2G3 / S2S3		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
Lepidium crenatum	Alkaline pepperwort	Tier 2	G2 / S2		Medium
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
Mentzelia paradoxensis	Paradox stickleaf	Tier 2	G2? / S2?		Endemic
Mentzelia rhizomata	Roan Cliffs blazing star	Tier 2	G2 / S2	BLM	Endemic
Mertensia humilis	Rocky Mountain bluebells	Tier 2	G2 / S1		Medium
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
Oonopsis foliosa var. *monocephala*	Rayless goldenweed	Tier 2	G3G4T2 / S2		Endemic

Scientific Name	**Common Name**	**Species Priority**	**Global & State Status Ranks**	**Federal Agency Status**	**Percent of Range in Colorado**
Oonopsis puebloensis	Pueblo goldenweed	Tier 2	G2 / S2		Endemic
Oreocarya osterhoutii	Osterhout cat's-eye	Tier 2	G2G3 / S2	BLM	Low
Oreocarya revealii	Gypsum Valley cat's- eye	Tier 2	G2 / S2	BLM	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
Penstemon acaulis var. *yampaensis*	Yampa beardtongue	Tier 2	G3T2 / S2		High
Penstemon degeneri	Degener beardtongue	Tier 2	G2 / S2	BLM/USFS	Endemic
Penstemon fremontii var. *glabrescens*	Fremont's beardtongue	Tier 2	G3G4T2 / S2		Endemic
Penstemon grahamii	Graham beardtongue	Tier 2	G2 / S1	BLM	Low
Penstemon mensarum	Grand Mesa penstemon	Tier 2	G2 / S2		Endemic
Penstemon scariosus var. *cyanomontanus*	Plateau penstemon	Tier 2	G4T2 / S2		High
Physaria alpina	Avery Peak twinpod	Tier 2	G2 / S2		Endemic
Physaria bellii	Bell's twinpod	Tier 2	G2G3 / S2S3		Endemic
Physaria parviflora	Piceance bladderpod	Tier 2	G2 / S2	BLM	Endemic
Physaria pruinosa	Pagosa bladderpod	Tier 2	G2 / S2	BLM/USFS	Endemic
Physaria vicina	Good-neighbor bladderpod	Tier 2	G2 / S2	BLM	Endemic
Potentilla rupincola	Rocky Mountain cinquefoil	Tier 2	G2 / S2	USFS	Endemic
Ptilagrostis porteri	Porter feathergrass	Tier 2	G2 / S2	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		High
Telesonix jamesii	James telesonix	Tier 2	G2 / S2		Very High
Thalictrum heliophilum	Sun-loving meadow rue	Tier 2	G2 / S2	BLM/USFS	Endemic
Thelypodiopsis juniperorum	Juniper tumble mustard	Tier 2	G2 / S2		Endemic

Scientific Name	**Common Name**	**Species Priority**	**Global & State Status Ranks**	**Federal Agency Status**	**Percent of Range in Colorado**
Thelypodium paniculatum	Northwestern thelypody	Tier 2	G2 / SH		Low
Townsendia fendleri	Fendler's townsend-daisy	Tier 2	G2 / S2		High
Townsendia glabella	Gray's townsend-daisy	Tier 2	G2 / S2		Endemic
Townsendia rothrockii	Rothrock townsend-daisy	Tier 2	G2G3 / S2S3		Endemic
Trifolium dasyphyllum ssp. *anemophilum*	Whip-root clover	Tier 2	G5T2? / S1		Low

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 2014; CNHP and TNC 2011; Colorado Native Plant Society 1997).

Colorado's barrens and shrublands are especially rich habitats for imperiled plant species, followed by alpine, pinyon-juniper woodlands, and cliff and canyon habitats (CNHP 2014, CNHP and TNC 2011). Shrublands are Colorado's most important habitat for rare plants (supporting 24% of the imperiled species), occupying 19% of the state's acreage. Barrens are the second most important habitat for PGCN, occupying less than 1% of Colorado, but supporting 20% of our rarest plants. Alpine, pinyon-juniper woodlands, and cliff and canyon habitats combined provide habitat for nearly 40% of the state's rare plant species (Figures 2 and 3). Mapping of habitat types is from SWReGAP (Prior-Magee et al. 2007; USGS 2004).

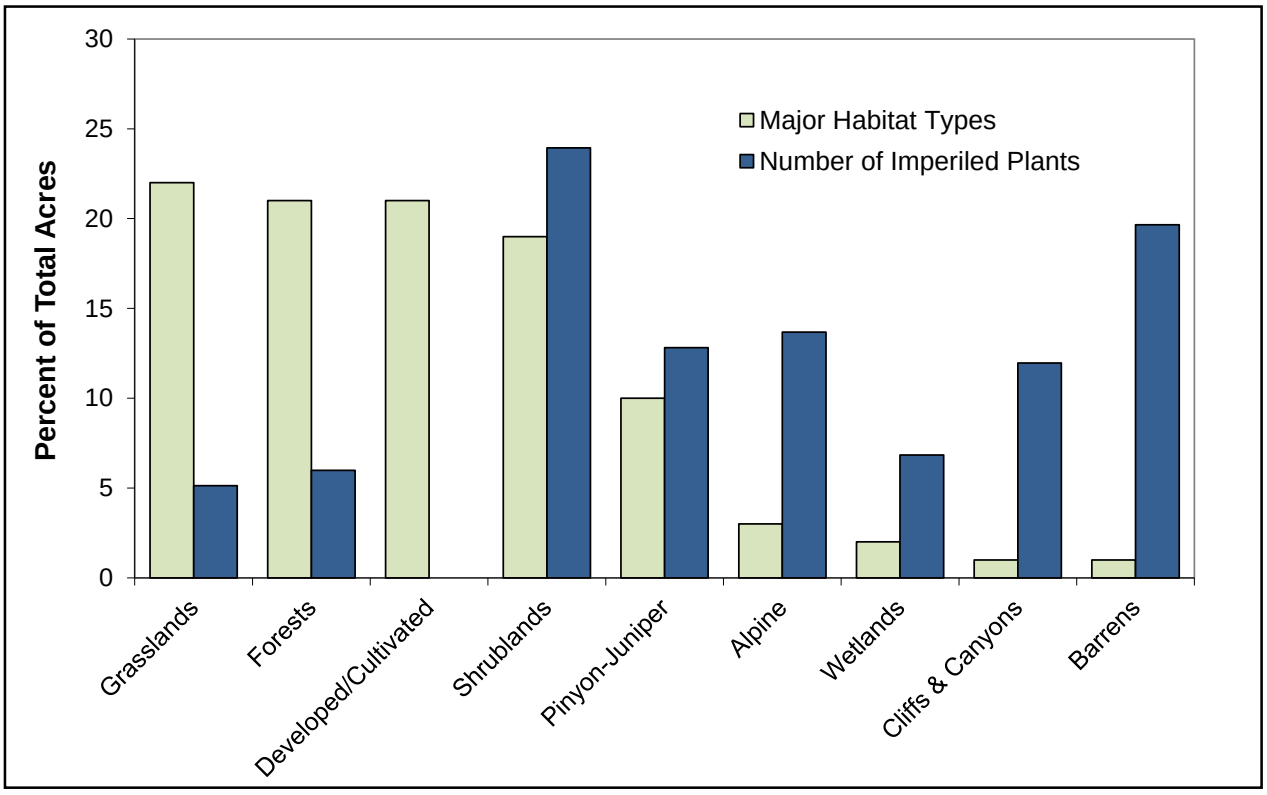

Figure 2. Key habitats as percentage of Colorado and the number of PGCN within each habitat type.

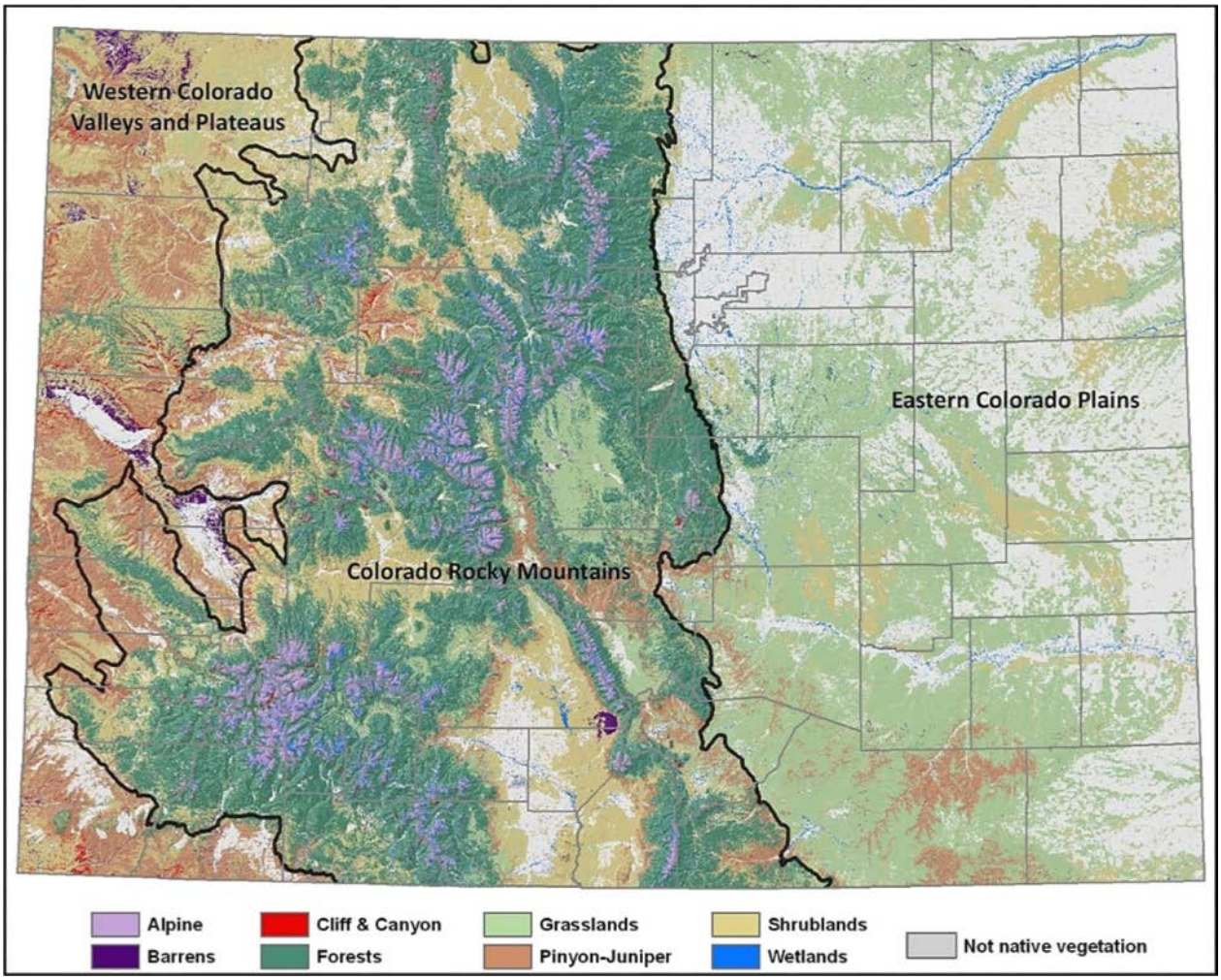

Figure 3. Distribution of major rare plant habitat types in Colorado.

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 and animals are grasslands, forests, shrublands, pinyon-juniper woodlands, wetlands, alpine, and cliff and canyon habitats. However, the SWAP did not specifically recognize the barrens habitat type for wildlife that is, in fact, one of the highest priority habitat type for plants. Therefore, this habitat type has been added to Colorado's SWAP to reflect the importance of the barrens habitat for PGCN. Colorado's SWAP now addresses the condition of all key habitats pertinent to PGCN, including barrens. For a description of each habitat type see Chapter 3 in the full 2015 SWAP document.

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: shrublands, barrens, alpine, cliffs and canyons, and pinyon-juniper woodlands (Table 2, Figure 3). This Addendum does not change the conservation priorities for habitats presented in the SWAP; rather, it expands the priority list to include the barrens habitat specific to rare plant conservation. Details on species supported, key threats, and prioritized conservation actions for PGCN habitats can be found in the full SWAP document, Chapter 6: Threats and Actions for Habitats.

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
Very High	Shrublands	Desert Shrub
		Greasewood
		Oak & Mixed Mountain Shrub
		Sagebrush
		Saltbrush
		Sandsage
		Upland Shrub
	Barrens	Barrens
High	Alpine	Alpine
	Cliff and Canyon	Cliff and Canyon
	Pinyon-Juniper	Pinyon-Juniper
Moderate	Wetlands	Grass/Forb Dominated Wetlands
		Playas
		Riparian Woodlands & Shrublands
		Seeps and Springs
		Shrub-dominated Wetlands
	Forests	Aspen Forest
		Douglas Fir
		Limber/Bristlecone Pine
		Lodgepole
		Mixed Conifer
		Ponderosa Pine
		Spruce-Fir
	Grasslands	Foothill/Mountain Grassland
		Mixed/Tallgrass prairie
		Shortgrass prairie

Part 3: PROBLEMS AFFECTING THE SPECIES

Colorado's human population is rapidly expanding 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 5.5 million in 2015 to approximately 7.8 million by 2040 (Colorado Department of Local Affairs 2015). 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 ecosystems or wildlife). Additionally, a lack of funding to support rare plant research and conservation activities has been a chronic problem.

The following issues are statewide in scope, and apply to many PGCN. Part 5; Table 3 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. The number of active oil and gas well in Colorado has almost doubled from 22,228 in 2000 to 43,354 in 2010 (Sumi 2012). The habitat that supports many rare plants throughout the state is underlain by rich deposits of oil and natural gas. Over 25% of PGCN are found in such habitats. 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). Further, 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. Nearly 30% of PGCN are directly threatened by motorized recreation, and it is often difficult to enforce regulations or close access to protect plant habitat. 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-one (18%) of PGCN are currently threatened by urban, suburban, and ex-urban development. 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. Further, 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. Thirty-nine (33%) of PGCN are threatened by fragmentation from road construction and/or ROW maintenance.

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 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). Colorado is predicted to become 2.5 to 5°F hotter with spring run-off occurring 1-3 week's earlier (Lukas et al. 2014). Further, most models predict Colorado will see an increase in heat waves, drought and wildfire frequency and severity by mid-century. These potential impacts will interact with the other stresses to rare plants, e.g., loss or fragmentation of habitat from development, mining, and the 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 117 PGCN scored Extremely Vulnerable or Highly Vulnerable (Appendix B, Table 3). Exceptions were *Cirsium perplexans* and *Ptilagrostis porteri*, which scored Moderately Vulnerable, and *Ipomopsis aggregata* ssp. w*eberi*, which scored Presumed Stable. There was insufficient information to complete the Index for three species *Delphinium robustum, Pediocactus*

knowltonii and *Thelypodium paniculatum*. 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
- sensitivity to 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 (58%) of Colorado's PGCN have their entire range within the state, which is projected to experience temperature increases of approximately 5 – 5.5 degrees Fahrenheit (www.climatewizard.org). For most PGCN (82%), 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 (42%) 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, and natural gas exploration). However, there are many influences over land use – economic, political, and social –how actual land use plays out over future years is highly uncertain.

The most significant data gaps are species specific information on pollinators and mutualisms such as mycorrhizal relationships. This lack of knowledge has also been identified in the Threats and Conservation Actions component of this document. 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.

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, flooding or insect infestations. 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).

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. Part 5, 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)

The recommended actions below are reflect both the priorities from the RPCI Strategy and the species specific actions listed as high priority in Part 5, Table 3.

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 26 Important Plant Areas ranked (B1) and without Conservation Action Plans, for action in 2015-2020 (Appendix C).

   a. Develop and implement conservation action plans with working groups consisting of local experts, land trusts, and land managers. Identify appropriate actions for each area.

   b. Work with land trusts and willing landowners to place conservation easements on private lands within the B1 Important Plant Areas (and selected B2s).

   c. Work with the Colorado Natural Areas Program to protect the B1 Important Plant Areas as Colorado Natural Areas. Develop multi-species proposals to fund habitat protection of imperiled plant species across Colorado.

3. Work with public agencies to promote consideration of PGCN in land use planning, enforce existing grazing, travel and surface occupancy regulations, and establish and/or expand legal designation to protect habitat

4. Work with public agencies to collect/share best available data and to develop and implement best management practices for energy development, transportation, recreation, urban/exurban development, grazing, and weed control, and to pursue special agency designations for PGCNs as needed.

5. Work with public agencies and to educate development industries about avoiding and/or mitigating impacts to PGCN, and Publish educational material/sponsor educational programs to raise public awareness of PGCN.

6. Develop a plant policy for the Colorado Department of Natural Resources, General Assembly joint resolution, and Governor's executive order.

7. 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.

8. 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.

9. Improve scientific understanding of the distribution, natural history, response to management, disturbance, and climate change, and address the current status of PGCN through inventory, research and monitoring.

10. Adopt measures for ex situ (off site) conservation in case native populations are extirpated. This is recommended as a high priority action for all Tier 1 and Tier 2 PGCN.

11. Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)

12. Conduct taxonomic and/or genetic research. Four Tier 1 and four Tier 2 species are in need of taxonomic research.

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 SWAP component of Colorado's SWAP*** every ten years, starting in 2025, 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. Update the ***Colorado Rare Plant Conservation Strategy*** every ten years, starting in 2019, 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 290 Important Plant Areas (IPAs) have been identified by the Colorado Natural Heritage Program and recognized by RPCI. IPAs are based on CNHP's Potential Conservation Areas, and include the highest quality locations for PGCN. They are ranked by CNHP on a scale as having either Outstanding Biodiversity Significance (B1) or Very High Significance (B2). Figure 4 depicts the location of all the IPAs within Colorado. IPAs represent our best estimate of the areas needed to support the continued existence of Colorado's most imperiled plant species in places where they currently occur. Potential distribution shifts in response to climate change are not incorporated in this iteration; however, modeling potential habitat/range shifts in response to projected climate changes is a high priority conservation action for all PGCN. 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. Figure 5 shows the relationship of the IPAs to Colorado Natural Areas which are one of the ways PGCN are provided with some protection on both public and private lands. There are 42 Designated Natural Areas that recognize and conserve portions of 39 IPAs. In addition, portions of 33 IPAs are protected within Bureau of Land Management Areas of Critical Environmental Concern (ACEC), Wilderness Study Areas (WSA) or U.S. Forest Service Research Natural Areas. A complete list of IPAs can be found in Appendix C, and of Designated Natural Areas within IPAs in Appendix D.

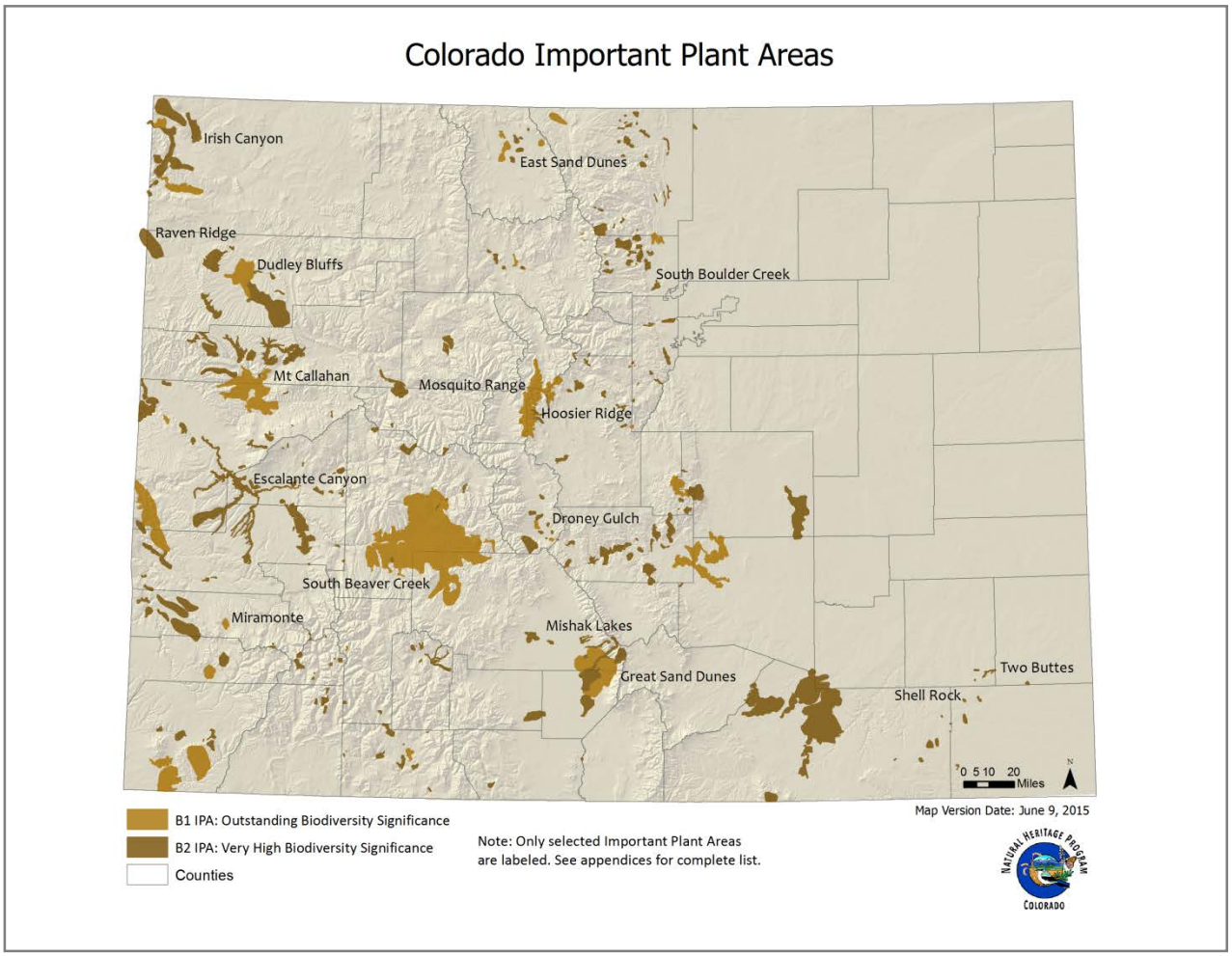

Figure 4. Map of Important Plant Areas (IPAs) in Colorado.

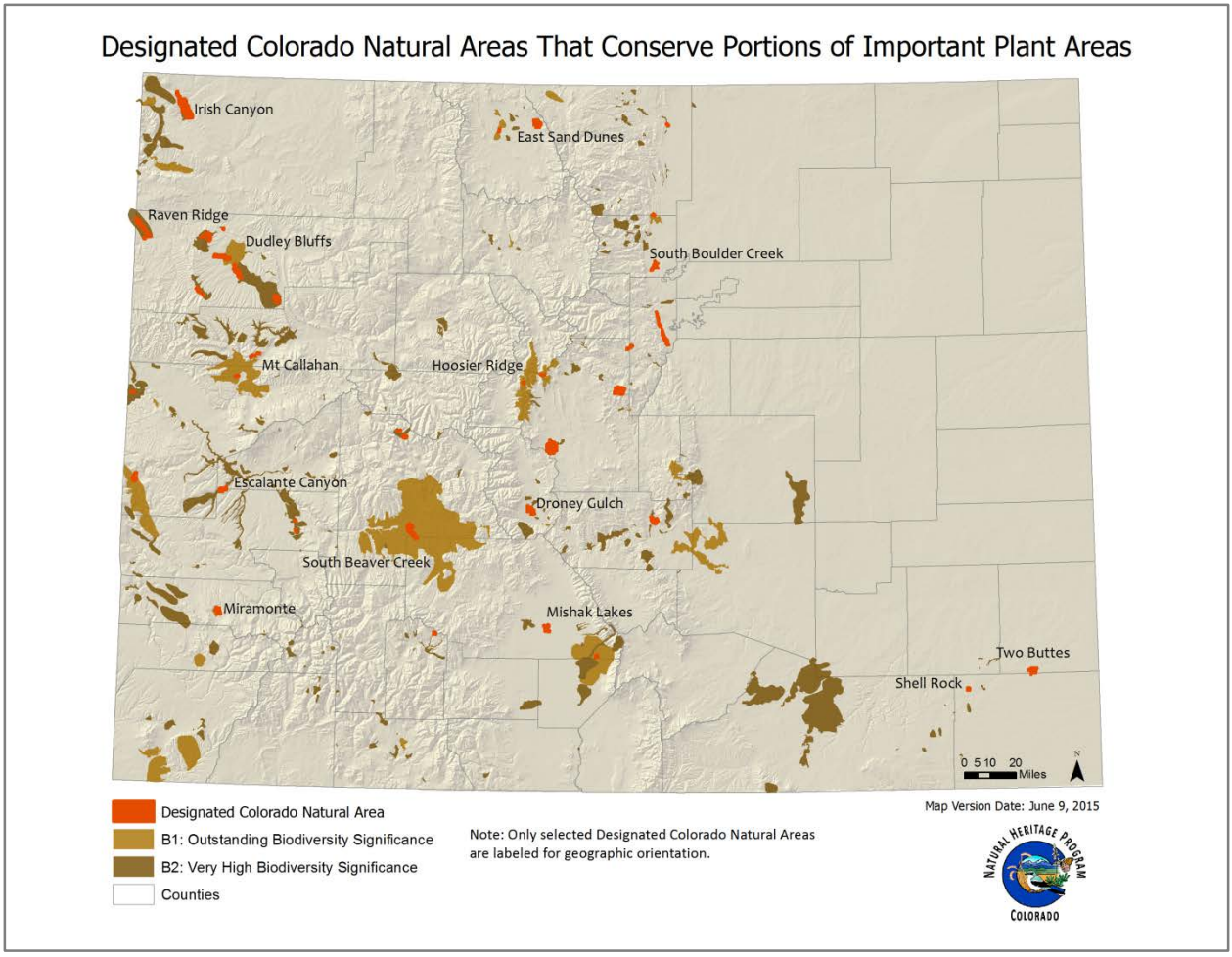

Figure 5. Map of Designated Colorado Natural Areas that conserve portions of Important Plant Areas.

Priority Research and Survey Efforts Needed

Research

Very little is known about the life history and reproductive biology of most Colorado's PGCN. Fifty-six of the PGCN list lack of knowledge on reproductive and/or pollination biology, and specific habitat parameters as a threat. Response to change, disturbance, and other threats area poorly understood for nearly 40 of the PGCN. Additionally, eleven species need taxonomic work, including *Dolores* River skeletonplant (*Lygodesmia doloresensis*) and the Colorado and Wahatoya Creek larkspurs (*Delphinium ramosum* var. *alpestre* and *D. robustum*) among others (Part 5, 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, Integrated Weed Management Plans, 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 current status. There are 87 PGCN for which the complete distribution in Colorado is yet not fully known, and 65 PGCN for which a majority of the locations are considered historical (e.g. not visited in 20 or more years.). PGCN with primarily historical observations include, but are not limited to Cronquist milkvetch (*Astragalus cronquistii*), Mancos milkvetch (*Astragalus humillimus*), and Comb Wash buckwheat (*Erigonum clavellatum*). Recently described species such as Coral ipomopsis (*Ipomopsis ramosa*) and West Silver bladderpod (*Physaria scrotiformis*) are some of the many PGCN for which the complete distribution in Colorado in unknown.

Recommended surveys and survey-related actions include the following. See Part 6 for monitoring recommendations.

- Prioritize survey needs for PGCN annually (for example, during Annual Colorado Rare Plant Technical Committee Symposia, Biodiversity Scorecard updates, etc.).

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

Part 5: PRIORITIES, THREATS, AND CONSERVATION ACTIONS FOR PGCN

The following tables contain detailed conservation priorities, threats, and conservation actions for PGCN species (Table 3). Part 1 of this document describes the general process used for generating these tables, and is repeated here for reference. 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 Reports, and characterization abstracts);
2) Colorado's Biodiversity Scorecard (CNHP and TNC 2011);
3) U.S. Forest Service species assessments (http://www.fs.fed.us/r2/projects/scp/assessments/index.shtml);
4) the Colorado Rare Plant Field Guide (http://www.cnhp.colostate.edu/);
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. These data are housed at the Colorado Natural Heritage Program (www.cnhp.colostate.edu). Distribution information is based primarily on CNHP's element occurrence database (CNHP 2015). Population status information is drawn from the species Biodiversity Score in Colorado's Biodiversity Scorecard, which reflects the size, quality and landscape integrity of species occurrences in Colorado. Scores are High, Medium and Low. Population trend information, when available, is from CNHP's Element Rank Report database. Habitat is derived from various sources including SW REGap and refined by expert opinion.

Detailed conservation priorities, threats, and conservation actions for habitats can be found in the full SWAP document, Chapter 6: Threats and Actions for Habitats.

Table 3. Plant Species of Greatest Conservation Need – Priorities, Threats, and Conservation Actions. Sorted by priority (Tier 1 and 2), then by Taxonomic Group, then by Scientific Name.

Tier 1 Plants

Canyonlands aletes

Aletes latilobus

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Colorado Plateau	P	Cliffs and Canyons	☑
					Saltbush	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
06.1 Recreational Activities	Non-motorized recreation	2.1 Site/Area Management	Manage public use to minimize habitat disturbance	M
06.1 Recreational Activities	Non-motorized recreation; climbing.	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	L
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	L

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

Table 3 - Continued.

Stonecrop gilia

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Southern Rocky Mountains	P	Alpine	☑

Aliciella sedifolia

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
02.3 Livestock Farming & Ranching	Degradation of alpine habitats from sheep grazing	2.1 Site/Area Management	Implement compatible grazing management	H
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Non motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Cliff-palace milkvetch	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Colorado Plateau	P	Cliffs and Canyons	☑

Astragalus deterior

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	H
06.1 Recreational Activities	Non-motorized recreation	2.1 Site/Area Management	Manage public use to minimize trampling and surface disturbance	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
07.1 Fire & Fire Suppression	Increased fire frequency	2.1 Site/Area Management	Implement compatible forest management practices	M
08.1 Invasive Non-native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Mancos milkvetch

Astragalus humillimus

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Colorado Plateau	P	Cliffs and Canyons	☑
					Pinyon - Juniper	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	3.1 Species Management	Develop collaborative management agreements with Tribal Leaders to minimize fragmentation and loss from road development and maintenance	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Implement landowner outreach/education program	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	L

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

Table 3 - Continued.

Skiff milkvetch

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Southern Rocky Mountains	P	Sagebrush	☑

Astragalus microcymbus

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
14.4 Predation	Herbivory (e.g.,rabbits)	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize surface disturbance and off trail use	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components by continuing long term monitoirng	M
01.1 Housing & Urban Areas	Potential residental development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	L

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

Table 3 - Continued.

Kremmling milkvetch

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Southern Rocky Mountains	P	Sagebrush	☑

Astragalus osterhoutii

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize surface disturbance and off road use	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
07.2 Dams & Water Management/Use	Fragmentation and loss of native habitat due to dam development & water storage	1.2 Resource & Habitat Protection	Establish legal designation to protect habitat (e.g., Wilderness Area, Research Natural Area)	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	L
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	L

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

Table 3 - Continued.

Schmoll milkvetch

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Colorado Plateau	P	Pinyon - Juniper	☑

Astragalus schmolliae

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	H
08.1 Invasive Non-Native/Alien Species	Invasive plants	8.0 Research & Monitoring	Examine impact of post-fire management strategies	H
08.1 Invasive Non-Native/Alien Species	Invasive plants - especially musk thistle and cheatgrass moving into burned areas	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Population status in areas outside National Park is poorly understood	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	2.1 Site/Area Management	Implement compatible practices for transportation projects	L
7.1 Fire & Fire Suppression	Altered fire regime (potential for increased fire extent due to cheatgrass)	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	L

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

Table 3 - Continued.

Sleeping Ute milkvetch	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	D	Stable	D	Colorado Plateau	P	Saltbush	☑

Astragalus tortipes

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Habitat loss and fragmentation from housing development proposed near habitat.	1.2 Resource & Habitat Protection	Work with Tribe to protect habitat and minimize surface disturbance	H
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish legal designation to protect habitat (e.g. state Natural Area)	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
06.1 Recreational Activities	Motorized recreation	5.3 Private Sector Standards & Codes	Implement Best Management Practices for recreation management	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Dorn's rockcress

Boechera glareosa

Tier 1 Plants

Population Status	Population Trend
Unknown	Unknown

Distribution	Type
Wyoming Basin	P
Utah-Wyoming Rocky Mountains	O

Habitat	Primary
Barrens	☑
Pinyon - Juniper	☐
Ponderosa Pine	☐
Sagebrush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Boat-shaped bugseed

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Sand Dunes	☑
					Barrens	☐

Corispermum navicula

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize surface disturbance and off trail use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Heil's tansy mustard	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Unknown	X	Unknown	Southern Rocky Mountains	P	Alpine	☑

Descurainia kenheilii

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Whitlow-grass

Draba malpighiacea

Tier 1 Plants

Population Status	Population Trend	Distribution Type	Habitat	Primary
Unknown	Unknown	Southern Rocky Mountains	Alpine	☑
			Aspen	☐
			Spruce - Fir	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.3 Genetic relationship with other subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxonomic and/or genetic research	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Weber's draba

Draba weberi

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Alpine	☑
					Mountain Streams	☑

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Work with land manager to post No Trespassing signage	M
07.2 Dams & Water Management/Use	Natural system modification (hydrological) - dam construction	4.2 Training	Educate dam operator about avoiding and/or mitigating impacts	M
07.2 Dams & Water Management/Use	Natural system modification (hydrological) - dam construction	5.3 Private Sector Standards & Codes	Develop Best Management Practices for water resource management	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Wilken fleabane

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Utah-Wyoming Rocky Mountains	P	Cliffs and Canyons	☑

Erigeron wilkenii

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.3 Genetic relationship with other subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxonomic and/or genetic research	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Brandegee wild buckwheat

Eriogonum brandegeei

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Southern Rocky Mountains	P	Barrens	☑
						Sagebrush	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	L

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

Table 3 - Continued.

Clay-loving wild buckwheat

Eriogonum pelinophilum

Tier 1 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low Rapidly declining	D	Stable	D	Colorado Plateau	P	Saltbush	☑

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
02.1 Annual & Perennial Non-Timber Crops	Conversion to cropland	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	M
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Expand and continue long term monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Penland alpine fen mustard

Eutrema penlandii

Tier 1 Plants

Population Status		Population Trend		Distribution Type	Habitat	Primary
Medium	D	Stable	D	Southern Rocky Mountains	Wetlands	☑
					Alpine	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity (e.g. close roads or block access to sensitive areas)	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
03.2 Mining & Quarrying	Mining operations	5.3 Private Sector Standards & Codes	Develop and implement Best Management Practices for mining	M
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Lone Mesa snakeweed

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Colorado Plateau	P	Sagebrush	☑
					Barrens	☐

Gutierrezia elegans

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Oil and gas drilling and seismic testing	2.1 Site/Area Management	Manage energy development to limit surface disturbance and fragmentation	H
06.3 Work & Other Activities	Infrastructure development for visitor use	2.1 Site/Area Management	Design public improvements to avoid surface disturbance and fragmentation of habitat	H
07.2 Dams & Water Management/Use	Habiat fragmentation and loss from water storage project	2.1 Site/Area Management	Coordinate on ecologically sensitive design of dam and reservoir to minimize flooding and habit loss	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Mesa Verde stickseed

Hackelia gracilenta

Tier 1 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Colorado Plateau	P	Pinyon - Juniper	☑
						Cliffs and Canyons	☐
						Mixed Conifer	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
06.1 Recreational Activities	Non-motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L
7.1 Fire & Fire Suppression	Altered fire regime (potential for increased fire extent due to cheatgrass)	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	L

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

Table 3 - Continued.

Pagosa skyrocket

Ipomopsis polyantha

Tier 1 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Southern Rocky Mountains	P	Foothill and Mountain Grasslands	☑
Rapidly declining						Barrens	☐
						Ponderosa Pine	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
01.2 Commercial & Industrial Areas	Commerical and industrial development	2.1 Site/Area Management	Manage development to limit surface disturbance and habitat loss	H
04.2 Utility & Service Lines	Habitat alteration	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	4.3 Awareness & Communications	Implement landowner outreach/education program	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	L

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

Table 3 - Continued.

Coral ipomopsis

Ipomopsis ramosa

Tier 1 Plants

Population Status		Population Trend	
Unknown	X	Unknown	X

Distribution	Type
Southern Rocky Mountains	P

Habitat	Primary
Spruce - Fir	☑
Aspen	☐
Mixed Conifer	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Huber's pepperwort	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Unknown	X	Unknown	Utah High Plateau	P	Sagebrush	☑

Lepidium huberi

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Dolores River skeletonplant

Lygodesmia doloresensis

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑
					Saltbush	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	1.2 Resource & Habitat Protection	Expand existing Palisade ACEC to protect off-road habitat	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.3 Genetic relationship with other species and/or subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxonomic and/or genetic research	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
7.1 Fire & Fire Suppression	Altered fire regime (potential for increased fire extent due to cheatgrass)	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	L

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

Table 3 - Continued.

Budding monkey flower	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Cliffs and Canyons	☑
						Seeps and Springs	☐
Mimulus gemmiparus						Wetlands	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Non-motorized recreation	2.1 Site/Area Management	Manage public trail use to avoid surface disturbance and fragmentation of habitat	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	L

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

Table 3 - Continued.

Colorado butterfly plant	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Low	Declining			Wetlands	☑

Oenothera coloradensis ssp. coloradensis

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Maintain and enhance existing hydrologic regime	H
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Pikes Peak spring parsley	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	High	D	Stable	D	Southern Rocky Mountains	P	Alpine	☑

Oreoxis humilis

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
06.1 Recreational Activities	Non-motorized recreation	5.3 Private Sector Standards & Codes	Implement Best Management Practices for recreation management	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.3 Genetic relationship with other subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Assess taxonomic status and relationship to Oreoxis alpina	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Mancos shale packera

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Unknown	X	Unknown	Southern Rocky Mountains	P	Barrens	☑

Packera mancosana

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.3 Genetic relationship with other subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxomonic and/or genetic research	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Knowlton cactus	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Unknown	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑

Pediocactus knowltonii

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	5.4 Compliance & Enforcement	Enforce collecting regulations	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Parachute penstemon

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Southern Rocky Mountains	P	Barrens	☑
				Utah High Plateau	P		

Penstemon debilis

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Work with Occidental Petroleum to Implement Best Management Practices for energy development	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	7.2 Alliance & Partnership Development	Engage Occidental Petroleum in collaborative, proactive planning and conservation programs	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state, federal and private partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	L

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

Table 3 - Continued.

Gibben's beardtongue

Penstemon gibbensii

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Wyoming Basin	P	Barrens	☑
			Utah-Wyoming Rocky Mountains	O		

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	5.4 Compliance & Enforcement	Enforce collecting regulations	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Penland penstemon

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Southern Rocky Mountains	P	Sagebrush	☑

Penstemon penlandii

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	2.1 Site/Area Management	Manage roads to limit disturbance and fragmentation of habitat	H
04.2 Utility & Service Lines	Habitat alteration	2.1 Site/Area Management	Coordinate with energy companies on ecologically sensitive placement of utility lines to minimize surface disturbance and fragmentation	H
04.2 Utility & Service Lines	Habitat alteration	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize disturbance and fragmentation of habitat from off road use	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue demographic monitoring	H
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

White River penstemon	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Wyoming Basin	P	Barrens	☑
				Utah High Plateau	O	Pinyon - Juniper	☐
Penstemon scariosus var. albifluvis						Saltbush	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas development and implement conservation agreement	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

North Park phacelia

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Southern Rocky Mountains	P	Barrens	☑

Phacelia formosula

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize surface disturbance and off road use	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field surveys in suitable habitat	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L

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

Table 3 - Continued.

Troublesome phacelia	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	X	Unknown	Southern Rocky Mountains	P	Sagebrush	☑

Phacelia gina-glenneae

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Designate as BLM sensitive species	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize trampling and surface disturbance	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce travel restrictions	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field surveys in suitable habitat	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

DeBeque phacelia

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Utah High Plateau	P	Barrens	☑
			Southern Rocky Mountains	O		

Phacelia submutica

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
04.2 Utility & Service Lines	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Population dynamics and vulnerability to disturbance are poorly known	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Dudley Bluffs bladderpod	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	D	Stable	D	Utah High Plateau	P	Barrens	☑

Physaria congesta

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure (e.g. roads)	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
04.2 Utility & Service Lines	Habitat alteration	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Piceance twinpod

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Utah High Plateau	P	Barrens	☑

Physaria obcordata

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure (e.g. roads)	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
04.2 Utility & Service Lines	Habitat alteration	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Cushion bladderpod

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Sagebrush	☑
					Barrens	☐

Physaria pulvinata

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Oil & gas development and seismic testing	2.1 Site/Area Management	Manage energy development to limit surface disturbance and fragmentation	H
06.3 Work & Other Activities	Infrastructure development for visitor use at Lone Mesa	2.1 Site/Area Management	Design public improvements to be compatible with biodiversity	H
07.2 Dams & Water Management/Use	habitat fragmentation and loss from water sotrage project	2.1 Site/Area Management	Coordinate on ecologically sensitive design of dam and reservior to minimize flooding and habitat loss	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution on private land	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Rollins twinpod

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Sagebrush	☑
					Barrens	☐

Physaria rollinsii

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.3 Tourism & Recreation Areas	Recreation area development (Signal Peak)	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

West Silver bladderpod	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Unknown	Unknown	Southern Rocky Mountains	P	Alpine	☑
					Barrens	☐
Physaria scrotiformis					Spruce - Fir	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Colorado hookless cactus

Sclerocactus glaucus

Tier 1 Plants

Population Status		Population Trend
Low	D	Unknown

Distribution	Type
Colorado Plateau	P
Utah High Plateau	P
Southern Rocky Mountains	O

Habitat	Primary
Saltbush	☑

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
04.2 Utility & Service Lines	Habitat alteration	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	1.2 Resource & Habitat Protection	Establish legal designation to protect habitat (e.g., Area of Critical Environmental Concern)	M
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity issues in transportation and land use planning processes	L
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Mesa Verde hookless cactus

Sclerocactus mesae-verdae

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Colorado Plateau	P	Barrens	☑
						Saltbush	☐

Tier 1 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	5.4 Compliance & Enforcement	Enforce collecting regulations	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with industry, tribal, state and federal partners to limit density of oil/gas leasing and development	M
04.2 Utility & Service Lines	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Establish mitigation requirements for developments and other projects that impact species/habitats	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M
14.4 Predation	Insect herbivory	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Work with land owner to implement Best Management Practices for transportation projects	L
05.2 Gathering Terrestrial Plants	Collection of orchids, cactus	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Ute ladies'-tresses

Spiranthes diluvialis

Tier 1 Plants

Population Status		Population Trend	
Low	D	Declining	D

Distribution	Type
Front Range	P
Southern Rocky Mountains	P
Central Shortgrass Prairie	O
Utah-Wyoming Rocky Mountains	O

Habitat	Primary
Riparian Woodlands and Shrublands	☑

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H
06.1 Recreational Activities	Non motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	5.4 Compliance & Enforcement	Enforce 404 wetlands regulations	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
04.2 Utility & Service Lines	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	M
06.1 Recreational Activities	Non motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
14.1 Scarcity	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Tier 2 Plants

Larimer aletes

Aletes humilis

Population Status		Population Trend		Distribution	Type	Habitat	Primary
High	D	Stable	D	Southern Rocky Mountains	P	Cliffs and Canyons	☑
						Ponderosa Pine	☐

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Mesa Verde aletes

Aletes macdougalii ssp. breviradiatus

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Colorado Plateau	P	Cliffs and Canyons	☑
					Pinyon - Juniper	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Alcove death camas	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Utah-Wyoming Rocky Mountains	P	Cliffs and Canyons	☑
						Wetlands	☐

Anticlea vaginatus

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	L

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

Table 3 - Continued.

Dwarf milkweed

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Central Shortgrass Prairie	P	Shortgrass Prairie	☑
				Southern Rocky Mountains	O		

Asclepias uncialis ssp. uncialis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
02.1 Annual & Perennial Non-Timber Crops	Conversion to cropland	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
14.2 Low annual recruitment	Population limited by unknown biological requirements	8.0 Research & Monitoring	Research critical life history/habitat components	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Gunnison milkvetch

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Southern Rocky Mountains	P	Sagebrush	☑

Astragalus anisus

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
01.1 Housing & Urban Areas	Rural and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
06.1 Recreational Activities	Non-motorized recreation (e.g. mountain bikes)	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L
07.1 Fire & Fire Suppression	Altered fire regime (potential for increased fire extent due to cheatgrass)	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	L
08.1 Invasive Non-Native/Alien Species	Invasive plants (especially cheatgrass)	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Cronquist milkvetch

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Unknown	D	Colorado Plateau	P	Saltbush	☑

Astragalus cronquistii

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

DeBeque milkvetch

Astragalus debequaeus

Tier 2 Plants

Population Status		Population Trend	
Medium	D	Declining	D

Distribution	Type	Habitat	Primary
Southern Rocky Mountains	P	Pinyon - Juniper	☑
Utah High Plateau	P	Barrens	☐
Colorado Plateau	O	Saltbush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing practices	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	M

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

Table 3 - Continued.

Horseshoe milkvetch	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑

Astragalus equisolensis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
06.1 Recreational Activities	Non motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.3 Genetic relationship unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxomonic and/or genetic research	M
07.1 Fire & Fire Suppression	Altered fire regime (potential for increased fire extent due to cheatgrass)	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	L

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

Table 3 - Continued.

Violet milkvetch

Astragalus iodopetalus

Population Status		Population Trend
Low	D	Unknown

Distribution	Type
Colorado Plateau	P
Southern Rocky Mountains	P

Habitat	Primary
Sagebrush	☑
Mixed Conifer	☐

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.3 Genetic relationship unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxomonic and/or genetic research	H
06.1 Recreational Activities	Non-motorized recreation	5.3 Private Sector Standards & Codes	Implement Best Management Practices for recreation management	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	M

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

Table 3 - Continued.

Missouri milkvetch	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Southern Rocky Mountains	P	Oak and Mixed Mountain Shrublands	☑
Astragalus missouriensis var. humistratus						Foothill and Mountain Grasslands	☐
Tier 2 Plants						Ponderosa Pine	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Naturita milkvetch

Astragalus naturitensis

Tier 2 Plants

Population Status		Population Trend
Low	D	Unknown

Distribution	Type
Colorado Plateau	P
Southern Rocky Mountains	P
Utah High Plateau	O

Habitat	Primary
Cliffs and Canyons	☑
Pinyon - Juniper	☐
Sagebrush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Fisher Towers milkvetch

Astragalus piscator

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑
					Saltbush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
07.1 Fire & Fire Suppression	Altered fire regime (potential for increased fire extent due to cheatgrass)	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	L

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

Table 3 - Continued.

San Rafael milkvetch	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑

Astragalus rafaelensis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Front Range milkvetch	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	X	Unknown	Front Range	P	Mixed Conifer	☑

Astragalus sparsiflorus

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	L
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	L

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

Table 3 - Continued.

Crandall's rock-cress	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Unknown	Unknown	Southern Rocky Mountains	P	Sagebrush	☑

Boechera crandallii

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Narrowleaf grape fern	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Low	D	Declining	D	Southern Rocky Mountains	P	Aspen	☑
							Foothill and Mountain Grasslands	☐
Botrychium lineare								
Tier 2 Plants							Mixed Conifer	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	M
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.4 Populaiton status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	L

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

Table 3 - Continued.

Cisco sego lily

Calochortus ciscoensis

Population Status		Population Trend
Unknown	X	Unknown

Distribution	Type
Utah High Plateau	P
Colorado Plateau	O

Habitat	Primary
Saltbush	☑

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	L

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

Table 3 - Continued.

Eastwood evening primrose

Camissonia eastwoodiae

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	X	Unknown	Colorado Plateau	P	Saltbush	☑
					Pinyon - Juniper	☐

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Downy Indian paintbrush	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Alpine	☑

Castilleja puberula

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Adobe thistle

Cirsium perplexans

Tier 2 Plants

Population Status		Population Trend	
Low	D	Stable	D

Distribution	Type
Colorado Plateau	P
Southern Rocky Mountains	P
Utah High Plateau	P

Habitat	Primary
Sagebrush	☑
Saltbush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
08.1 Invasive Non-Native/Alien Species	Bio-control of non-native Cirsium species	2.2 Invasive/Problematic Species Control	Design weed control activites to avoid native thistles and develop methods for mitigating impacts from bio-control agents such as introduced weevils	H
08.1 Invasive Non-Native/Alien Species	Mis-identification of native thistles in weed control efforts	4.3 Awareness & Communications	Educate land owners, managers, and those engaged in weed control about avoiding impacts to native thistles	H
08.1 Invasive Non-Native/Alien Species	Mis-identification of native thistles in weed control efforts	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution of natural occurrences	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	L
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	L
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	L

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

Table 3 - Continued.

Slender spiderflower

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Southern Rocky Mountains	P	Wetlands	☑
						Playas	☐

Cleome multicaulis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
02.1 Annual & Perennial Non-Timber Crops	Hydrological alterations to support potato, and other crop production	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Establish legal designation to protect habitat (e.g., Area of Critical Environmental Concern)	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Colorado larkspur

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Alpine	☑

Delphinium ramosum var. alpestre

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.3 Genetic relationship with other subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxomonic and/or genetic research	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Wahatoya Creek larkspur

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Unknown	X	Unknown	Southern Rocky Mountains	P	Aspen	☑

Delphinium robustum

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.3 Genetic relationship with other subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxomonic and/or genetic research	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	M
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

Table 3 - Continued.

Clawless draba

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Southern Rocky Mountains	P	Alpine	☑

Draba exunguiculata

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
08.2 Problematic Native Species	Trampling by mountain goats	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	L
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	L

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

Table 3 - Continued.

San Juan whitlow-grass	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Alpine	☑

Draba graminea

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M

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

Table 3 - Continued.

Gray's Peak whitlow-grass	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	X	Unknown	Southern Rocky Mountains	P	Alpine	☑

Draba grayana

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
08.2 Problematic Native Species	Trampling by mountain goats	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	L
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	L

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

Table 3 - Continued.

Smith whitlow-grass

Draba smithii

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Cliffs and Canyons	☑
					Aspen	☐
					Mixed Conifer	☐
					Upland Shrub	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Kachina daisy	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	High	D	Unknown	Colorado Plateau	P	Cliffs and Canyons	☑

Erigeron kachinensis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Maintain natural hydrologic regime	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	L

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

Table 3 - Continued.

Comb Wash buckwheat	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Colorado Plateau	P	Saltbush	☑

Eriogonum clavellatum

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Colorado wild buckwheat

Eriogonum coloradense

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Alpine	☑
					Foothill and Mountain Grasslands	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Colorado green gentian	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	X	Declining	X	Central Shortgrass Prairie	P	Shortgrass Prairie	☑

Frasera coloradensis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M

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

Table 3 - Continued.

Canadian River spiny aster

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Pinyon - Juniper	☑

Herrickia horrida

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
07.1 Fire & Fire Suppression	Altered fire regime	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Rabbit Ears gilia

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Mixed Conifer	☑

Ipomopsis aggregata ssp. weberi

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
13.3 Genetic relationship with other subspecies unknown	Genetics of isolated populations poorly understood	8.0 Research & Monitoring	Genetic studies to determine the isolation and genetic diversity of disparate occurrences	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
02.3 Livestock Farming & Ranching	Grazing and trampling by native and non-native ungulates	2.1 Site/Area Management	Implement compatible grazing management	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	L
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	L
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	L
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	L

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

Table 3 - Continued.

Globe gilia

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Alpine	☑

Ipomopsis globularis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.2 Mining & Quarrying	Mining operations	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Monitor occurrences for weed invasion and control promptly	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
05.2 Gathering Terrestrial Plants	Collecting for rock gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L
05.2 Gathering Terrestrial Plants	Collecting for rock gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	L

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

Table 3 - Continued.

Alkaline pepperwort

Lepidium crenatum

Tier 2 Plants

Population Status		Population Trend
Medium	D	Unknown

Distribution	Type
Colorado Plateau	P
Southern Rocky Mountains	P
Utah-Wyoming Rocky Mountains	P

Habitat	Primary
Pinyon - Juniper	☑
Greasewood	☐
Sagebrush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
05.1 Control of Nuisance Species & Collecting Terrestrial Animals	This species is difficult to distinguish from invasive Lepidium latifolium	4.3 Awareness & Communications	Implement landowner outreach/education program	M
07.1 Fire & Fire Suppression	Piling and burning slash from hazardous fuels reduction projects	4.3 Awareness & Communications	Implement landowner outreach/education program	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Coordinate with related agencies to align goals, policies, measures of success, etc.	M

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

Table 3 - Continued.

Alcove bog orchid

Limnorchis zothecina

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Utah-Wyoming Rocky Mountains	P	Cliffs and Canyons	☑
					Seeps and Springs	☐
					Wetlands	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Colorado desert-parsley	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	D	Declining	D	Colorado Plateau	P	Sagebrush	☑
					Southern Rocky Mountains	O	Barrens	☐

Lomatium concinnum

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
06.1 Recreational Activities	Motorized Recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Payson lupine

Lupinus crassus

Tier 2 Plants

Population Status		Population Trend
Low	D	Unknown

Distribution	Type
Colorado Plateau	P
Southern Rocky Mountains	P

Habitat	Primary
Pinyon - Juniper	☑
Barrens	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	M
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
07.1 Fire & Fire Suppression	Altered fire regime	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Paradox stickleaf	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Unknown	Unknown	Colorado Plateau	P	Saltbush	☑

Mentzelia paradoxensis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	M
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

Table 3 - Continued.

Roan Cliffs blazing star	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Barrens	☑
				Utah High Plateau	P		

Mentzelia rhizomata

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Rocky Mountain bluebells

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Sagebrush	☑

Mertensia humilis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Golden blazing star

Nuttallia chrysantha

Population Status		Population Trend	
Low	D	Declining	D

Distribution	Type	Habitat	Primary
Central Shortgrass Prairie	P	Barrens	☑
Southern Rocky Mountains	O	Pinyon - Juniper	☐

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.2 Mining & Quarrying	Mining (limestone)	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.2 Mining & Quarrying	Mining (limestone)	4.2 Training	Educate development industries about avoiding and/or mitigating impacts to rare or sensitive species	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
04.2 Utility & Service Lines	Habitat alteration	5.3 Private Sector Standards & Codes	Implement Best Management Practices for urban development, landscaping, etc.	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Arkansas Canyon stickleaf

Nuttallia densa

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Pinyon - Juniper	☑
					Upland Shrub	☐

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	4.3 Awareness & Communications	Implement landowner outreach/education program	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
06.1 Recreational Activities	Non motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

Table 3 - Continued.

Narrow-leaf evening primrose

Oenothera acutissima

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Utah-Wyoming Rocky Mountains	P	Sagebrush	☑
					Wetlands	☐
			Wyoming Basin	O		

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Maintain and restore natural hydrologic regime	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Rayless goldenweed

Oonopsis foliosa var. monocephala

Tier 2 Plants

Population Status		Population Trend
Medium	D	Unknown

Distribution	Type
Central Shortgrass Prairie	P
Southern Rocky Mountains	O

Habitat	Primary
Shortgrass Prairie	☑

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.2 Utility and Service Lines	Habitat alteration	5.3 Private Sector Standards & Codes	Implement Best Management Practices for urban development, landscaping, etc.	M
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M

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

Table 3 - Continued.

Pueblo goldenweed

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Central Shortgrass Prairie	P	Shortgrass Prairie	☑
						Barrens	☐

Oonopsis puebloensis

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
03.2 Mining & Quarrying	Mining (limestone)	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.2 Mining & Quarrying	Mining (limestone)	4.2 Training	Educate development industries about avoiding and/or mitigating impacts to rare or sensitive species	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	4.3 Awareness & Communications	Implement landowner outreach/education program	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
04.2 Utility & Service Lines	Habitat alteration	5.3 Private Sector Standards & Codes	Implement Best Management Practices for urban development, landscaping, etc.	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Osterhout cat's-eye

Oreocarya osterhoutii

Tier 2 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Colorado Plateau	P	Barrens	☑
						Pinyon - Juniper	☐
						Saltbush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
07.1 Fire & Fire Suppression	Altered fire regime in pinyon juniper habitat	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Gypsum Valley cat's-eye

Oreocarya revealii

Tier 2 Plants

Population Status		Population Trend
Low	X	Unknown

Distribution	Type
Colorado Plateau	P
Southern Rocky Mountains	O

Habitat	Primary
Saltbush	☑
Barrens	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
06.1 Recreational Activities	Motorized recreation	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Round-leaf four o'clock	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	D	Declining	D	Central Shortgrass Prairie	P	Barrens	☑

Oxybaphus rotundifolius

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
03.2 Mining & Quarrying	Mining (limestone)	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.2 Mining & Quarrying	Mining (limestone)	4.2 Training	Educate development industries about avoiding and/or mitigating impacts to rare or sensitive species	H
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	4.3 Awareness & Communications	Implement landowner outreach/education program	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
04.2 Utility & Service Lines	Habitat alteration	5.3 Private Sector Standards & Codes	Implement Best Management Practices for urban development, landscaping, etc.	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Bessey locoweed

Oxytropis besseyi var. obnapiformis

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Wyoming Basin Utah High Plateau	P	Sagebrush	☑

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	M
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Yampa beardtongue

Penstemon acaulis var. yampaensis

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	X	Unknown	Wyoming Basin	P	Sagebrush	☑
			Utah-Wyoming Rocky Mountains	O		

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Degener beardtongue

Penstemon degeneri

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Pinyon - Juniper	☑
					Foothill and Mountain Grasslands	☐

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
05.2 Gathering Terrestrial Plants	Collecting for gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
07.1 Fire & Fire Suppression	Altered fire regime	2.3 Habitat & Natural Process Restoration	Restore natural fire regime	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

Table 3 - Continued.

Fremont's beardtongue	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Utah High Plateau	P	Pinyon - Juniper	☑
				Wyoming Basin	O	Sagebrush	☐

Penstemon fremontii var. glabrescens

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	M
06.1 Recreational Activities	Motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Graham beardtongue

Penstemon grahamii

Tier 2 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Low	D	Stable	D	Wyoming Basin	P	Barrens	☑
						Pinyon - Juniper	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
05.2 Gathering Terrestrial Plants	Collecting for gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Grand Mesa penstemon	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	D	Stable	X	Southern Rocky Mountains	P	Aspen	☑
							Foothill and Mountain Grasslands	☐
Penstemon mensarum								
Tier 2 Plants							Oak and Mixed Mountain Shrublands	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Plateau penstemon

Penstemon scariosus var. cyanomontanus

Tier 2 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	D	Utah-Wyoming Rocky Mountains	P	Pinyon - Juniper	☑
						Sagebrush	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
05.2 Gathering Terrestrial Plants	Collecting for gardens	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
05.2 Gathering Terrestrial Plants	Collecting for gardens	5.4 Compliance & Enforcement	Enforce collecting regulations	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L

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

Table 3 - Continued.

Avery Peak twinpod	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Unknown	Unknown	Southern Rocky Mountains	P	Alpine	☑

Physaria alpina

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Bell's twinpod

Physaria bellii

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Central Shortgrass Prairie	P	Barrens	☑
				Front Range	P		

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	8.0 Research & Monitoring	Monitor population status	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	L

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

Table 3 - Continued.

Piceance bladderpod

Physaria parviflora

Tier 2 Plants

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Stable	X	Utah High Plateau	P	Barrens	☑
				Southern Rocky Mountains	O		

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
08.1 Invasive Non-Native/Alien Species	Invasive plants (including leafy spurge)	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M

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

Table 3 - Continued.

Pagosa bladderpod

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Medium	D	Unknown	Southern Rocky Mountains	P	Barrens	☑

Physaria pruinosa

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	M
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	M
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
06.1 Recreational Activities	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M

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

Table 3 - Continued.

Good-neighbor bladderpod	Population Status	Population Trend	Distribution	Type	Habitat	Primary
	Low	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑

Physaria vicina

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Rocky Mountain cinquefoil	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Cliffs and Canyons	☑

Potentilla rupincola

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	L
08.1 Invasive Non-Native/Alien Species	Invasive plants	8.0 Research & Monitoring	Monitor populations for introduction of new weeds	L
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	L

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

Table 3 - Continued.

Porter feathergrass

Population Status		Population Trend		Distribution	Type	Habitat	Primary
Medium	D	Declining	D	Southern Rocky Mountains	P	Wetlands	☑

Ptilagrostis porteri

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.2 Mining & Quarrying	Mining (peat, placer)	1.2 Resource & Habitat Protection	Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)	H
03.2 Mining & Quarrying	Mining (peat, placer)	4.2 Training	Educate miners about avoiding and/or mitigating impacts	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	1.2 Resource & Habitat Protection	Establish in-stream flow rights	H
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	M
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.6 Response to change, disturbance, & other threats poorly understood	Response to management/disturbance poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M
13.6 Response to change, disturbance, & other threats poorly understood	Restoration techniques are poorly understood	8.0 Research & Monitoring	Seed banking and identification of effective restoration methods	M

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

Table 3 - Continued.

Parish's alkali grass	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Wetlands	☑

Puccinellia parishii

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
07.2 Dams & Water Management/Use	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Maintain natural hydrologic regime	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Arizona willow

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	D	Unknown	Southern Rocky Mountains	P	Wetlands	☑

Salix arizonica

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M

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

Table 3 - Continued.

Weber saussurea	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Medium	D	Unknown	Southern Rocky Mountains	P	Alpine	☑

Saussurea weberi

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history (e.g., is species rhizomatous?)/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
03.2 Mining & Quarrying	Mining operations	5.3 Private Sector Standards & Codes	Implement Best Management Practices for mining	M
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

James telesonix

Telesonix jamesii

Tier 2 Plants

Population Status		Population Trend
Medium	D	Unknown

Distribution	Type
Southern Rocky Mountains	P

Habitat	Primary
Cliffs and Canyons	☑
Alpine	☐
Mixed Conifer	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Sun-loving meadow rue	Population Status		Population Trend		Distribution	Type	Habitat	Primary
	Medium	D	Stable	D	Utah High Plateau	P	Barrens	☑
					Southern Rocky Mountains	O		

Thalictrum heliophilum

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	H
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Monitor for the presence of noxious weeds and implement weed control immediately if detected	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.5 Population trend unknown	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	M

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

Table 3 - Continued.

Juniper tumble mustard	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	X	Unknown	Colorado Plateau	P	Pinyon - Juniper	☑
				Southern Rocky Mountains	O	Sagebrush	☐
Thelypodiopsis juniperorum				Utah High Plateau	O		

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	H
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	M
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
03.1 Oil & Gas Drilling	Fragmentation of native habitat due to oil/gas development & associated infrastructure	5.3 Private Sector Standards & Codes	Implement Best Management Practices for energy development and mining	L
03.1 Oil & Gas Drilling	Oil & gas development, pipelines, and infrastructure	5.2 Policies & Regulations	Work with state and federal partners to limit density of oil/gas leasing and development	L
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	L

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

Table 3 - Continued.

Northwestern thelypody

Thelypodium paniculatum

Tier 2 Plants

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Unknown	D	Unknown	Southern Rocky Mountains	P	Wetlands	☑
			Wyoming Basin	O		

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

Table 3 - Continued.

Fendler's townsend-daisy

Townsendia fendleri

Population Status		Population Trend
Low	D	Unknown

Distribution	Type
Central Shortgrass Prairie	P
Southern Rocky Mountains	P

Habitat	Primary
Barrens	☑

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H
13.3 Genetic relationship with other species and/or subspecies unknown	Taxonomic status is uncertain	8.0 Research & Monitoring	Conduct taxomonic and/or genetic research	H
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
02.3 Livestock Farming & Ranching	Incompatible timing, intensity, duration of grazing or improved range	2.1 Site/Area Management	Implement compatible grazing management	L

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

Table 3 - Continued.

Gray's townsend-daisy	Population Status		Population Trend	Distribution	Type	Habitat	Primary
	Low	D	Unknown	Southern Rocky Mountains	P	Barrens	☑
				Colorado Plateau	O		

Townsendia glabella

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
01.1 Housing & Urban Areas	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H
04.1 Roads & Railroads	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Promote consideration of biodiversity in transportation and land use	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
06.3 Work & Other Activities	This species is difficult to distinguish from other more common Townsendia	4.3 Awareness & Communications	Careful identification and marking for avoidance	M
07.1 Fire & Fire Suppression	Piling and burning slash from hazardous fuels reduction projects	4.3 Awareness & Communications	Careful identification and marking for avoidance	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Develop and/or implement integrated weed management	M
08.1 Invasive Non-Native/Alien Species	Invasive plants	2.2 Invasive/Problematic Species Control	Map weed infestations and sensitive no spray/no mow zones	M
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
06.1 Recreational Activities	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L

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

Table 3 - Continued.

Rothrock townsend-daisy

Townsendia rothrockii

Tier 2 Plants

Population Status		Population Trend
Medium	D	Unknown

Distribution	Type
Southern Rocky Mountains	P

Habitat	Primary
Alpine	☑
Spruce - Fir	☐

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
06.1 Recreational Activities	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	H
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

Table 3 - Continued.

Whip-root clover

Population Status		Population Trend	Distribution	Type	Habitat	Primary
Low	X	Unknown	Central Shortgrass Prairie	P	Shortgrass Prairie	☑

Trifolium dasyphyllum ssp. anemophilum

Tier 2 Plants

General Threat	Specific Threat	General Conservation Action	Specific Conservation Action	Priority
11.1 Habitat Shifting & Alteration	Phenological response to climate change of species itself and/or inter-dependent species unknown	8.0 Research & Monitoring	Conduct primary research on rare plant and pollinator responses to changing climate, and other vulnerability factors (dispersal mechanisms, mutualisms)	H
11.1 Habitat Shifting & Alteration	Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features	3.4 Ex-Situ Conservation	Seed banking (incl. protocols, collection, and cultivation)	H
11.1 Habitat Shifting & Alteration	Habitat shifting and alteration due to climate change	3.1 Species Management	Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs	M
11.2 Droughts	Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados, etc.)	7.2 Alliance & Partnership Development	Engage in collaborative, proactive planning and conservation programs	M
13.1 Complete distribution in Colorado unknown	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M
13.2 Critical life history/habitat components unknown	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M
13.4 Population status unknown	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	M
13.6 Response to change, disturbance, & other threats poorly understood	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	M

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

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

Species Monitoring

Twenty-three Plants of Greatest Conservation Need (PGCN) are currently being monitored to help understand long-term trends and/or impacts of various land use activities (Table 4). Priorities for additional species monitoring are the Tier 1 PGCN that are not currently being monitored, and the Tier 2 PGCN with suspected downward trends. These species were identified as in need of monitoring through various sources including Colorado's Biodiversity Scorecard (CNHP and TNC 2011) and the expert opinion of Colorado's scientific community, via the RPCI and the stakeholders who reviewed this document. There are twelve Tier 1 species which list 'Implement Demographic Monitoring' as a conservation action to determine long term population trends. Species for which monitoring was rated as an urgent priority are indicated with an *.

<u>High Priority Tier 1 species in need of monitoring:</u>

Aletes latilobus
Aliciella sedifolia
*Corispermum navicula**
*Draba weberi**
Erigeron wilkenii
Hackelia gracilenta
Lygodesmia doloresensis
*Oreoxis humilis**
Penstemon gibbensii
Penstemon scariosus var. *albifluvis**
*Phacelia submutica**
Physaria pulvinata

Twenty Tier 2 species were identified in the Threats and Actions section (Part 5) of this document as in need of monitoring to determine long term population trends. Species for which monitoring was rated as an urgent priority are indicated with an *.

<u>High Priority Tier 2 species in need of monitoring:</u>

Asclepias uncialis ssp. *uncialis*
Astragalus missouriensis var. *humistratus*
Astragalus sparsiflorus
Calochortus ciscoensis
Camissonia eastwoodiae
Oonopsis puebloensis
Oreocarya revealii
*Oxybaphus rotundifolius**
Penstemon degeneri
Physaria vicina

*Cleome multicaulis**
Limnorchis zothecina
Mentzelia rhizomata
Nuttallia densa
*Oenothera acutissima**
Potentilla rupincola
Puccinellia parishii
*Salix arizonica**
Telesonix jamesii
Thalictrum helinophilum

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, and interested public groups.

- Support existing and establish new monitoring projects for priority species (for example, Adopt a Rare plant and Rare Plant Monitoring Stewards Program supported by DBG, CNAP, CNHP & CoNPS) and provide results to appropriate land managers to facilitate adaptive management for the long-term survival of PGCN.

- Review existing monitoring studies for their adequacy in detecting trends, redesigning studies when warranted

- 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.

- Update Natural Heritage ranks and the Biodiversity Scorecard every five years to record changes in conservation status of rare plants.

Table 4. List of Plants of Greatest Conservation Need (PGCN) currently being monitored, with lead agency for monitoring efforts.

Species	Common Name	Agency or Organization Leads
Aletes humilis	Larimer aletes	TNC
Astragalus debequaeus	DeBeque milkvetch	BLM
Astragalus microcymbus	Skiff milkvetch	DBG, BLM
Astragalus osterhoutii	Kremmling milkvetch	BLM
Astragalus schmolliae	Chapin Mesa milkvetch	CNHP, MVNP
Eriogonum brandegeei	Brandegee's buckwheat	DBG, BLM
Eriogonum pelinophilum	Clay-loving wild buckwheat	BLM, CNAP
Eutrema penlandii	Penland alpine fen mustard	BLM, USFS, MRHI
Ipomopsis polyantha	Pagosa skyrocket	CNAP,BLM, FWS
Mimulus gemmiparus	Budding monkeyflower	CNAP
Oenothera acutissima	Narrow-leaf evening primrose	BLM
Oenothera coloradensis ssp. *coloradensis*	Colorado butterfly plant	CFC
Penstemon debilis	Parachute penstemon	BLM, CNAP, OXY USA
Penstemon grahamii	Graham's penstemon	BLM
Penstemon penlandii	Penland's penstemon	BLM
Phacelia formosula	North Park phacelia	BLM, ANWR
Physaria bellii	Bell's twinpod	CB, CNAP, DBG, CFC
Physaria congesta	Dudley Bluffs bladderpod	BLM, CNAP
Physaria obcordata	Piceance twinpod	BLM, CNAP
Physaria pruinosa	Frosty bladderpod	CNHP, TNC
Ptilagrostis porteri	Porter feathergrass	USFS
Sclerocactus glaucus	Colorado hookless cactus	DBG, BLM
Spiranthes diluvialis	Ute ladies'-tresses	CB, CFC

Key to agency acronyms

ANWR – Arapaho National Wildlife Refuge
BLM – Bureau of Land Management
CB – City of Boulder MRHI –
CFC – City of Fort Collins
CNAP – Colorado Natural Areas Program
CNHP – Colorado Natural Heritage Program
DBG – Denver Botanical Gardens
FWS – Fish & Wildlife Service
Mosquito Range Heritage Initiative
MVNP – Mesa Verde National Park
TNC – The Nature Conservancy
USFS – United States Forest Service

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 various measures, including 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 various trends:

- Proportion of all PGCN 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 PGCN species with seed collections in ex situ storage.
- Field monitoring of PGCN species demonstrates stable to increasing trends across ten year time periods.

Threat Status

Threat status can be evaluated by various measures:

- Number of high priority threats per PGCN in the 2015 SWAP addendum vs the number in 5 years.
- Quantitative field monitoring of the disturbance effects of grazing, OHV travel, or energy development to PGCN. Stable population trends over 10 years are desirable.

Protection/Conservation Status

Protection and conservation status can be evaluated by measuring various indicators:

- Proportion of all Important Plant Areas with conservation action plans completed with local stakeholder involvement. Presently there are 16 IPAs managed within eight conservation action plans (CAPs) (see Appendix C).
- Proportion of Important Plant Areas with land trusts or agencies working on habitat conservation. For example, there are currently 39 IPAs with portions of their acreage protected by the Colorado Natural Areas Programs through voluntary conservation agreements with landowners (see Appendix C).
- Proportion of occurrences of PGCN with on-the-ground habitat protection (e.g., conservation easements, special designations such as Research Natural Area (RNA) or Area of Critical Environmental Concern (ACEC,) management agreements, etc.). There are currently 33 IPAs with portions of their acreage protected by an RNA or ACEC.
- Success in obtaining state legislation to conserve PGCN.
- Success in obtaining a long-term program and funding mechanism to support a rare plant conservation program in Colorado.

Part 7: REVIEW, COORDINATION, AND PUBLIC PARTICIPATION

Review and Updates to the Rare Plant SWAP

Review and updates to the rare plant SWAP follows the process outlined in the Colorado SWAP, Chapter 9 which states:

> *Guidance provided by USFWS and the AFWA Best Practices for State Wildlife Action Plans document for updating SWAPs distinguishes between major revisions and minor revisions. Major revisions include any change to the SGCN list or the threats assessment, or any change that could result in changes to conservation actions or their priority. We have generated our SGCN list and the subsequent analyses with an eye to potential changes in conservation issues over the next decade. Thus, we do not anticipate the need to conduct major revisions over the 10-year life of this plan. If that need were to occur, we would follow USFWS guidance in conducting major revisions. Meanwhile, as new information becomes available relative to required SWAP elements, it will be incorporated into the SWAP database for use in the next scheduled SWAP update.*

Future revision of this Addendum will be subject to whatever process CPW ultimately employs in updating the State's 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.

Partner Coordination & Public Participation

Throughout the development of the 2011 Draft Rare Plant Addendum to the SWAP, the Rare Plant Conservation Initiative (RPCI) was the primary means of coordination with federal, state, and local agencies on the development and content of the draft document. The RPCI partners have been successful in working with Colorado Parks and Wildlife (CPW) to include rare plants in this iteration of the State's SWAP. For this 2015 revision, members of the RPCI once again provided the primary means of coordination. To augment the coordination and review provided by the RPCI, Parts 1-6 were also sent out for review to a list of stakeholders derived from the RPCI partnership and the membership of the Colorado Native Plant Society. These two groups represent over 700 individuals from all levels of government, as well as non-governmental organizations, the private sector, various interest groups, and private citizens. A complete list of the original 2011 RPCI partners can be found Appendix E.

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

Table A1. Threat taxonomy for species and habitats

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
1 Residential & Commercial Development Threats from human settlements or other non-agricultural land uses with a substantial footprint	**1.1 Housing & Urban Areas** Human cities, towns, and settlements including non-housing development typically integrated with housing (e.g., shopping areas, offices, schools, hospitals)	• Urban, suburban, and ex-urban development
	1.2 Commercial & Industrial Areas Factories and other commercial centers (e.g., manufacturing plants, military bases, power plants, train yards, airports)	• Commercial and industrial development
	1.3 Tourism & Recreation Areas Tourism and recreation sites with a substantial footprint (e.g., ski areas, golf courses, county parks, campgrounds)	• Recreation area developments
2 Agriculture & Aquaculture Threats from farming and ranching as a result of agricultural expansion and intensification, including silviculture and aquaculture	**2.1 Annual & Perennial Non-Timber Crops** Crops planted for food, fodder, fiber, fuel, or other uses (e.g., farms, plantations, orchards, vineyards, mixed agroforestry systems)	• Conversion to cropland • Intensive agricultural operations

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	2.2 Wood & Pulp Plantations Stands of trees planted for timber or fiber outside of natural forests, often with non-native species (e.g., silviculture, Christmas tree farms)	
	2.3 Livestock Farming & Ranching Domestic terrestrial animals raised in one location on farmed or non-local resources (farming); also domestic or semi-domesticated animals allowed to roam in the wild and supported by natural habitats (ranching) (e.g., cattle feed lots, dairy farms, cattle ranching, chicken farms)	• Altered native vegetation • Degradation of alpine habitats from sheep grazing • Incompatible timing, intensity, duration of grazing • Range improvement operations • Reduced grass and forb diversity • Incompatible timing, intensity, duration of grazing
	2.4 Marine & Freshwater Aquaculture Aquatic animals raised in one location on farmed or non-local resources; also hatchery fish allowed to roam in the wild	
3 Energy Production & Mining Threats from production of non-biological resources	**3.1 Oil & Gas Drilling** Exploring for, developing, and producing petroleum and other liquid hydrocarbons (e.g., oil wells, natural gas drilling)	• Altered native vegetation • Fragmentation of native habitat due to oil/gas development & associated infrastructure
	3.2 Mining & Quarrying Exploring for, developing, and producing minerals and rocks (e.g., coal mines, alluvial gold panning, gold mines, rock quarries)	• Mining operations • Uranium mining

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	3.3 Renewable Energy Exploring, developing, and producing renewable energy (e.g., geothermal power production, solar farms, wind farms)	• Fragmentation of native habitat due to renewable energy development & associated infrastructure
4 Transportation & Service Corridors Threats from long narrow transport corridors and the vehicles that use them	**4.1 Roads & Railroads** Surface transport on roadways and dedicated tracks (e.g., highways, secondary roads, logging roads, bridges and causeways, fencing associated with roads, railroads)	• Fragmentation • Right of Way maintenance
	4.2 Utility & Service Lines Transport of energy & resources (e.g., electrical and phone wires, oil and gas pipelines)	• Fragmentation • Right of Way maintenance • Habitat alteration
5 Biological Resource Use Threats from consumptive use of "wild" biological resources including both deliberate and unintentional harvesting effects; also control of specific species	**5.1 Control of Nuisance Species or Collecting**[1] Killing or control of non-native plant species	• Herbicide treatment of non-native *Cirsium* species • Bio-control of non-native *Cirsium* species

[1] In the Salafsky taxonomy, this threat is "Hunting and Collecting Terrestrial Animals." Salafsky's terminology is intended to address conservation needs at a global scale, including places where hunting is not managed. For the purposes of Colorado's Rare Plant SWAP, the reference to hunting in this context was deemed to be misleading and inappropriate. Thus, we have re-named this threat category.

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	5.2 Gathering Terrestrial Plants Harvesting plants, fungi, and other non-timber/non-animal products for commercial, recreation, subsistence, research or cultural purposes, or for control reasons (e.g., wild mushrooms, cactus, orchids, control of host plants to combat timber diseases)	• Collection of orchids, cactus
	5.3 Logging & Wood Harvesting Harvesting trees and other woody vegetation for timber, fiber, or fuel (e.g., clear cutting of hardwoods, pulp operations, fuel wood collection)	• Clearcutting • Even-age timber management • Fragmentation
	5.4 Fishing & Harvesting Aquatic Resources Harvesting aquatic wild animals or aquatic plants for commercial, recreation, subsistence, research, or cultural purposes, or for control/persecution reasons	
6 Human Intrusions & Disturbance Threats from human activities that alter, destroy and disturb habitats and species associated with non-consumptive uses of biological resources	**6.1 Recreational Activities** People spending time in nature or traveling in vehicles outside of established transport corridors, usually for recreational reasons (e.g., off-road vehicles, snowmobiles, mountain bikes, hikers, skiers, pets in rec areas, temporary campsites, rock-climbing)	• Campsites and hiking • ORV trail development and use • Motorized and non-motorized recreation • Rock climbing, hiking near cliffs & crevices

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	6.2 War, Civil Unrest & Military Exercises Actions by military forces without a permanent footprint (e.g., tanks and other military vehicles, training exercises and ranges, defoliation, munitions testing)	• Tank maneuver's
	6.3 Work & Other Activities People spending time in or traveling in natural environments for reasons other than recreation, military activities, or research (e.g., law enforcement, drug smugglers, illegal immigrants, species research, vandalism)	• Proximal non-recreation disturbance • Infrastructure development for recreational visitor use
7 Natural System Modifications Threats from actions that convert or degrade habitat in service of "managing" natural or semi-natural systems, often to improve human welfare	**7.1 Fire & Fire Suppression** Suppression or increase in fire frequency and/or intensity outside of its natural range of variation (e.g., fire suppression to protect homes, inappropriate fire management, escaped agricultural fires, arson, campfires)	• Altered fire regime • Fire suppression leading to high intensity fires • Altered fire regime and juniper encroachment • Wildfires exacerbated by climate change
	7.2 Dams & Water Management/Use Changing water flow patterns from their natural range of variation either deliberately or as a result of other activities (e.g., dam construction, dam operations, sediment control, change in salt regime, wetland filling, levees and dikes, surface water diversion, groundwater pumping, channelization, artificial lakes)	• Altered hydrological regime (surface or aquifer) • Natural system modification (hydrological) - dam, diversion, or drop structure construction or modification • Natural system modification (hydrological) – groundwater pumping and surface water diversions • Scouring floods • Water storage

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	7.3 Other Ecosystem Modifications Other actions that convert or degrade habitat in service of "managing" natural systems to improve human welfare (e.g., land reclamation projects, abandonment of managed lands, rip-rap along shorelines, mowing grass, tree thinning, removal of snags from streams)	• Altered native vegetation • Fragmentation • Natural system modification - wetland filling, eutrophication, siltation
8 Invasive & Other Problematic Species & Genes Threats from non-native and native plants, animals, pathogens /microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance	**8.1 Invasive Non-Native/Alien Species** Harmful plants, animals, and microbes not originally found within the ecosystem(s) in question and directly or indirectly introduced and spread into it by human activities (e.g., feral animals, cheatgrass)	• Invasive plants – tamarisk • Invasive plants – cheatgrass
	8.2 Problematic Native Species Harmful plants, animals, or microbes that are originally found within the ecosystem(s) in question, but have become "out-of-balance" or "released" directly or indirectly due to human activities (e.g., native plants that hybridize with other plants)	• Habitat loss / degradation due to beetle kill • Habitat loss due to insect damage and fire • Predation and parasites
	8.3 Introduced Genetic Material Human altered or transported organisms or genes (e.g., pesticide resistant crops, using nonlocal seed stock, genetically modified insects for biocontrol)	• Hybridization with nonlocal genetic material

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	8.4 Pathogens	• NA
9 Pollution Threats from introduction of exotic and/or excess materials or energy from point and nonpoint sources	**9.1 Household Sewage & Urban Waste Water** Water-borne sewage and non-point runoff from housing and urban areas that include nutrients, toxic chemicals and/or sediments (e.g., discharge from municipal waste treatment plants, leaking septic systems, fertilizers and pesticides from lawns and golf-courses)	• Water pollution
	9.2 Industrial & Military Effluents Water-borne pollutants from industrial and military sources including mining, energy production, and other resource extraction industries that include nutrients, toxic chemicals and/or sediments	• Waste or residual materials (mine tailings, excess sediment loads, etc.)
	9.3 Agricultural & Forestry Effluents Water-borne pollutants from agricultural, silvicultural, and aquaculture systems that include nutrients, toxic chemicals and/or sediments (e.g., nutrient loading from fertilizer runoff, herbicide runoff, manure from feedlots, soil erosion)	• Herbicide/pesticide spraying or runoff and nonpoint source pollution • Nutrient loads • Pesticide spraying (prey reduction) • Poisoning (fire ant insecticides) • Reduced water quality due to herbicide/pesticide runoff
	9.4 Garbage & Solid Waste Rubbish and other solid materials including those that entangle wildlife	

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	9.5 Air-Borne Pollutants Atmospheric pollutants from point and nonpoint sources (e.g., acid rain, smog from vehicle emissions, excess nitrogen deposition)	• Air pollution (precipitating/concentrating on high elevation snow fields)
	9.6 Excess Energy Inputs of heat, sound, or light that disturb wildlife or ecosystems (e.g., noise from highways or airplanes, heated water from power plants, lamps attracting insects)	
10 Geological Events Threats from catastrophic geological events	**10.1 Volcanoes** (*not applicable to Colorado*) Volcanic events (e.g., eruptions, emissions of volcanic gasses)	
	10.2 Earthquakes/Tsunamis (*not likely to be applicable to Colorado*) Earthquakes and associated events	
	10.3 Avalanches/Landslides Avalanches or landslides	
11 Climate Change & Severe Weather Threats from long-term climatic changes which may be linked to global warming and other severe climatic/weather events that are outside of the natural range of variation, or potentially can wipe out a vulnerable species or habitat	**11.1 Habitat Shifting & Alteration** Major changes in habitat composition and location (e.g., desertification, tundra thawing)	• Habitat shifting and alteration due to climate change • Phenological response to climate change of species itself and/or inter-dependent species unknown • Vulnerability due to movement barriers, poor dispersal capacity, and/or restriction to rare habitat features •

Level 1	Level 2 (General Threats in Part 5, Table 3)	Level 3 – illustrative examples (Specific Threats in Part 5, Table 3)
	11.2 Droughts Periods in which rainfall falls below the normal range of variation (e.g., severe lack of rain, loss of surface water sources)	• Lack of water due to drought and exacerbated by climate change
	11.3 Temperature Extremes Periods in which temperatures exceed or go below the normal range of variation (e.g., heat waves, cold spells, disappearance of glaciers)	
	11.4 Storms & Flooding Extreme precipitation and/or wind events (e.g., thunderstorms, tornados, hailstorms, ice storms or blizzards, dust storms)	• Climate variability (e.g., prolonged rain or hail events) • Climate variability (intensification or alteration of normal weather patterns, e.g., droughts, tornados)
12 Organizational capacity and management*	12.1 Lack of coordination	
	12.2 Lack of funding	
	12.3 Lack of common goals	
	12.4 Confused or gaps in authorities	
	12.5 Legislation/policy changes	
13 Lack of knowledge*	13.1 Complete distribution in Colorado unknown	• Complete distribution in Colorado unknown
	13.2 Critical life history/habitat components unknown	• Biology, ecology, and habitat poorly known
	13.3 Genetic relationship with other species or subspecies unknown	• Taxonomic status is uncertain

Level 1	**Level 2** (General Threats in Part 5, Table 3)	**Level 3 – illustrative examples** (Specific Threats in Part 5, Table 3)
	13.4 Population status unknown (majority of documented occurrences are ranked E or H)	• Lack of data on population status
	13.5 Population trend unknown	• Long term population trends unknown
	13.6 Response to change, disturbance, & other threats poorly understood	• Threats are poorly understood • Response to management/disturbance poorly understood
14 Natural Factors*	14.1 Scarcity (leading to inbreeding depression)	• Globally rare and/or small population size
	14.2 Low annual recruitment	
	14.3 Low reproductive rate	
	14.4 Predation	• Herbivory
	14.5 Competition	
	14.6 Loss of species from suitable habitat	

*These factors are not included in Salafsky et al. 2008, but were deemed necessary to fully express threats to wildlife in Colorado.

Table A2. Conservation Action taxonomy for PGCN species and habitats

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
1 Land/Water Protection Actions to identify, establish or expand parks and other legally protected areas	**1.1 Site/Area Protection** Establishing or expanding public or private parks, reserves, and other protected areas (e.g., national parks, wildlife sanctuaries, private reserves)	• Purchase or acquire legal ownership of land for protection of species or habitat
	1.2 Resource & Habitat Protection Establishing protection or easements of some specific aspect of the resource on public or private lands (e.g., easements, development rights, water rights, instream flow rights, wild and scenic river designation)	• Acquire conservation easement for habitat protection • Acquire water rights or instream flow rights • Establish and/or expand legal designation to protect habitat (e.g., wilderness, state Natural Area, Research Natural Area, Area of Critical Environmental Concern)
2 Land/Water Management Actions directed at conserving or restoring sites, habitats and the wider environment	**2.1 Site/Area Management** Management of protected areas and other resource lands for conservation (e.g., site design, demarcating borders, putting up fences, training park staff, control of poachers)	• Design public improvements to be compatible with biodiversity • Implement compatible practices for transportation projects • Implement compatible forest management • Implement compatible grazing practices • Implement seasonal closures • Manage public use to be compatible with biodiversity • Manage to limit disturbance

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
	2.2 Invasive/Problematic Species Control Controlling and/or preventing invasive and/or other problematic plants, animals, and pathogens	• Control non-native plants • Map weed infestations and sensitive no spray/no mow zones • Manage research, management, and recreation activities to control the spread of pathogens • Remove tamarisk through biological, chemical, mechanical means and prevent re-establishment • Write and/or implement integrated weed/pest management plan
	2.3 Habitat & Natural Process Restoration Enhancing degraded or restoring missing habitats and ecosystem functions; dealing with pollution (e.g., creating forest corridors, prairie re-creation, riparian tree plantings, prescribed burns, breaching levees, dam removal)	• Adjust operation of dam • Discourage introduction of non-native ornamental species • Maintain appropriate patch size and habitat mosaic • Manage natural herbivory • Remove infrastructure (e.g., roads, dams) • Re-seed native species • Restore and/or close overused trails, tracks • Restore native habitat • Restore natural fire regime • Restore natural hydrologic regime

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
3 Species Management Actions directed at managing or restoring species, focused on the species of concern itself	**3.1 Species Management** Managing specific plant populations of concern	• Develop collaborative management agreements • Model potential habitat/range shifts in response to projected climate changes and prepare adaptation plan to define in situ and ex situ conservation needs • Implement existing management/recovery plan • Maintain comprehensive species database • Write and implement management/recovery plan
	3.2 Species Recovery Manipulating, enhancing or restoring specific plant and animal populations (e.g., manual pollination of trees, disease/parasite management)	• Maintain genetic connection/integrity within and between populations
	3.3 Species Re-Introduction Re-introducing species to places where they formally occurred or benign introductions	• Reintroduce extirpated native species • Translocate species to historic range
	3.4 Ex-Situ Conservation Protecting biodiversity out of its native habitats (e.g., captive breeding, artificial propagation, gene banking)	• Seed banking (incl. protocols, collection, and cultivation)
4 Education & Awareness Actions directed at people to improve understanding and skills, and influence behavior	**4.1 Formal Education** Enhancing knowledge and skills of students in a formal degree program (e.g., public schools, colleges, and universities, continuing education)	

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
	4.2 Training Enhancing knowledge, skills and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of degree programs (e.g., monitoring workshops or training, learning networks or how-to manuals, stakeholder education on specific issues)	• Educate development industries about avoiding and/or mitigating rare plant impacts • Improve communication among researchers and policy/decision-makers • Improve knowledge of species, habitats, problems, via professional meetings and other venues
	4.3 Awareness & Communications Raising environmental awareness and providing information through various media	• Implement landowner outreach/education and incentives programs • Publish educational material/sponsor educational programs to raise public awareness
5 Law & Policy Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards	**5.1 Legislation** Making, implementing, changing, influencing, or providing input into formal government sector legislation or polices (e.g., state ballot initiatives, providing data to policy makers, zoning regulations, species protection laws)	

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
	5.2 Policies & Regulations Making, implementing, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels: international, national, state/provincial, local/community, tribal (e.g., input into agency plans regulating certain species or resources, working with local governments or communities to implement zoning regulations, promoting sustainable harvest on state lands)	• Establish mitigation requirements for developments • Promote consideration of biodiversity issues in transportation and land use planning processes • Promote zoning that concentrates use and protects habitat • Work with state and federal partners to limit density of oil/gas leasing and development
	5.3 Private Sector Standards & Codes Setting, implementing, changing, influencing, or providing input into voluntary standards & professional codes that govern private sector practice (e.g., Conservation Measures Partnership Open Standards, corporate adoption of forestry best management practices, sustainable grazing by a rancher)	• Implement Best Management Practices for o Recreation management o energy development & mining o forest management o livestock grazing o transportation, urban development, landscaping o water resource management
	5.4 Compliance & Enforcement Monitoring and enforcing compliance with laws, policies & regulations, and standards & codes at all levels (e.g., water quality standard monitoring, initiating criminal and civil litigation)	• Enforce 404 wetlands regulations • Enforce collecting regulations • Enforce state/federal/local pollution standards • Enforce off-road travel restrictions

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
6 Livelihood, Economic & Other Incentives Actions to use economic and other incentives to influence behavior	**6.1 Linked Enterprises & Livelihood Alternatives** Developing enterprises that directly depend on the maintenance of natural resources or provide substitute livelihoods as a means of changing behaviors and attitudes (e.g., ecotourism, nontimber forest product harvesting)	
	6.2 Substitution Promoting alternative products and services that substitute for environmentally damaging ones (e.g., farmed salmon as a replacement for pressure on wild populations, promoting recycling and use of recycled materials)	
	6.3 Market Forces Using market mechanisms to change behaviors and attitudes (e.g., certification, positive incentives, grass and forest banking, valuation of ecosystem services such as flood control)	
	6.4 Conservation Payments Using direct or indirect payments to change behaviors and attitudes (e.g., quid-pro-quo performance payments, resource tenure incentives)	• Implement Purchase/Transfer Development Rights program for habitat protection • Mitigate species/habitat loss (e.g., grass banking, mitigation banking, credits for off-site habitat protection)

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
	6.5 Non-Monetary Values Using intangible values to change behaviors and attitudes (e.g., spiritual, cultural, links to human health)	
7 External Capacity Building Actions to build the infrastructure to do better conservation	**7.1 Institutional & Civil Society Development** Creating or providing non-financial support & capacity building for non-profits, government agencies, communities, and for-profits (e.g., creating new local land trusts)	
	7.2 Alliance & Partnership Development Forming and facilitating partnerships, alliances, and networks of organizations (e.g., Conservation Measures Partnership)	• Coordinate with related agencies to align goals, policies, measures of success, etc. • Coordinate with related agencies to identify and secure funding • Engage in collaborative, proactive planning and conservation programs
	7.3 Conservation Finance Raising and providing funds for conservation work (private foundations, debt-for-nature swaps)	• Provide economic assistance for private land habitat improvements and/or species conservation • Obtain funding to support recommended conservation actions

Level 1	Level2 (General Actions in Part 5, Table 3)	Level 3 (Specific Actions in Part 5, Table 3)
8 Research and Monitoring* (general actions in Table X)		• Conduct field inventory to refine known distribution • Conduct primary research on species and habitat responses to changing climate • Improve understanding of species/habitat distribution (field inventory, modeling) • Research critical life history/habitat components • Research population parameters and/or monitor status. • Research species/habitat response to management • Research genetic relation to other (sub)species

* This factor is not included in the Salafsky classification, but was deemed necessary to fully express actions needed to conserve wildlife and rare plants in Colorado.

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 micro-climate 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
-0.097 - -0.119
-0.074 - -0.096
-0.051 - -0.073
-0.028 - -0.050
>-0.028

Section B – Indirect Exposure to Climate Change

1. **Exposure to sea level rise**: not applicable to Colorado. We rated all species 'Neutral.'

2a. **Distribution relative to natural barriers**: degree to which species' vulnerability is influenced by its ability to shift range/distribution in response to climate change. Scoring categories ***for both natural barriers and anthropogenic barriers*** are:

Greatly 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 *Neutral* for species in habitats not vulnerable to climate change.
	Examples for natural barriers: lowland terrestrial species completely surrounded by high mountains (or bordered closely and completely on the north side by high mountains); cool-water stream fishes for which barriers would completely prevent access to other cool-water areas if the present occupied habitat became too warm as a result of climate change; most nonvolant species that exist only on the south side of a very large lake in an area where habitats are expected to shift northward with foreseeable climate change.

	Examples for anthropogenic barriers: species limited to small habitats within intensively developed urban or agricultural landscapes through which the species cannot pass, A specific example of this category is provided by the quino checkerspot butterfly (*Euphydryas editha quino*), a resident of northern Baja California and southern California; warming climates are forcing this butterfly northward, but urbanization in San Diego blocks its movement (Parmesan 1996, Nature 382:765).
Increase Vulnerability:	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.
	Examples for natural barriers: certain lowland plant or small mammal species whose ranges are mostly (50-90%) bordered by high mountains or a large lake.
	Examples for anthropogenic barriers: most streams inhabited by a fish species have dams that would prevent access to suitable habitat if the present occupied habitat became too warm as a result of climate change; intensive urbanization surrounds 75% of the range of a salamander species.
Somewhat Increase Vulnerability:	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.
	Examples for natural barriers: certain lowland plant or small mammal species whose ranges are partially but not mostly bordered by high mountains or a large lake.
	Examples for anthropogenic barriers: 10-50% of the margin of a plant species' range is bordered by intensive urban development; 25% of the streams occupied by a fish species include dams that are likely to impede range shifts driven by climate change.
Neutral:	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.
	Examples of species in this category: most birds (for which barriers do not exist); terrestrial snakes in extensive plains or deserts that may have small barriers that would not impede distributional shifts with climate change; small alpine-subalpine mammal (e.g., ermine, snowshoe hare) in extensive mountainous wilderness area lacking major rivers or lakes; fishes in large deep lakes or large main-stem rivers that are basically invulnerable to projected climate change and lack dams, waterfalls, and significant pollution; a plant whose climate envelope is shifting northward and range is bordered on the west by a barrier but for which no barriers exist to the north.

We rated all species tied to specific substrates (i.e., barrens and cliff/canyon species) 'Increase' since the edge of these substrates will function as a barrier to plant movement. We rated all alpine species that

occur below 12,500 feet (i.e., could still shift upward in elevation) 'Increase' and all alpine species that only occur above 12,500 feet 'Greatly Increase.' All other species were evaluated individually based on spatial relationship (viewed in GIS) among known EOs, extent of modeled range/habitat (described below), and natural barriers (e.g., edge of habitat; surrounding mountains, canyons).

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

2b. **Distribution relative to anthropogenic barriers**: We rated all species individually based on the spatial relationship among known EOs, extent of modeled range/potential habitat (described above), and non-natural barriers (e.g., urban development, cropland). The natural and non-natural land cover used in this analysis was developed by reclassifying SWReGAP land cover categories. Definitions of scoring categories are listed above.

3. **Impact of land use changes resulting from human responses to climate change**: This factor is intended to identify species that might be further threatened by strategies designed to mitigate or adapt to climate change (e.g., renewable energy projects such as wind-farms, solar arrays, biofuels production, hydro-power; tree-planting for carbon offsets). We made the assumptions that:

- Tree planting for carbon offsets is not likely in Colorado;
- Wind development is most likely to occur on the eastern plains and Front Range;
- Solar array development is potential for any grassland or shrubland habitat on both east and west slopes;
- Significant hydro-power development is not likely in Colorado;
- Natural gas drilling should be included here based on on-going political "clean fuel" dialogue, and the assumption that natural gas drilling could increase because of this.

Definitions of scoring categories are:

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

Section C - Sensitivity

1. **Dispersal and movement**: *Mimulus gemmiparus* was rated 'Greatly Increase' because it propagates vegetatively within a very narrowly distributed habitat. *Botrychium* lineare was 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. The remaining *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. brandegeei*, as 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). Asclepias uncialis ssp. uncialis and Erigeron kachinensis were also rated "Somewhat Increase' based on their potential for wind dispersal. *Ptilagrostis porteri*, *Puccinellia parishii,* and *Cirsium perplexans* 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.

Definitions of scoring categories are:

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. 'Somewhat increase' All others were rated 'Neutral' or 'Somewhat increase' based on species habitat preferences. Definitions of scoring categories are:

Greatly Increase Vulnerability:	Species is completely or almost completely (> 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.

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

(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 Increase Vulnerability:	Considering the range of mean annual precipitation across occupied cells, the species has experienced **very small (< 4 inches/100 mm)** precipitation variation in the past 50 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 Vulnerability:	Considering the range of mean annual precipitation across occupied cells, the species has experienced **slightly lower than average (11 - 20 inches/255 - 508 mm)** 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 Decrease Vulnerability:	Considering the range of mean annual precipitation across occupied cells, the species has experienced **greater than average (> 40 inches/1,016 mm)** precipitation variation in 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 semi-desert 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, were rated 'Greatly Increase.' Alpine species that are not restricted to wetter micro-sites were rated 'Neutral.' Shrubland species were rated 'Somewhat Increase' for their dependence on seasonal hydrologic regimes. 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 river scour 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 were rated 'Somewhat Increase' with the exception of Draba graminea and D. grayana which were rated 'Greatly Increase', all other species were rated 'Neutral.' Definitions of scoring factors are:

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

3. **Restriction to uncommon geological features or derivatives** - This factor pertains to a species' need for a particular soil/substrate, geology, water chemistry, or specific physical feature (e.g., caves, cliffs, active sand dunes) for reproduction, feeding, growth, or otherwise existing for one or more portions of the life cycle (e.g., normal growth, shelter, reproduction, seedling establishment). It focuses on the commonness of suitable conditions for the species on the landscape, as indicated by the commonness of the features themselves combined with the degree of the species' restriction to them. Climate envelopes may shift away from the locations of fixed (within at least a 50 year timeframe) geological features or their derivatives, making species tied to these uncommon features potentially more vulnerable to habitat loss from climate change than are species that thrive under diverse conditions. Definitions of scoring categories are:

Increase 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 spring snails 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 pike minnow (*Ptychocheilus lucius*) 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 (*Achillea millefolium*) and coyote (*Canis latrans*) should be assigned to this category.

Species that are tied primarily to barrens habitats were rated 'Increase' or 'Somewhat Increase'. *Ipomopsis globularis* and *Saussurea weberi* were also rated 'Increase' based on their restriction to calcareous substrates. Cliff/canyon species were rated 'Somewhat Increase.' Several species that are known to occur on various substrates were rated 'Somewhat Decrease' based on the assumption that species occupying multiple substrates 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 (*Athene cunicularia*) 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**: *Physaria congesta*, 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 (Clark 2013). *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* and, *Puccinellia*, were rated 'Neutral' because they are wind pollinated. All others were rated either 'Neutral' based on recent research or species assessments e.g. Tepedino 2009, Tepedino et al. 2011) 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 'Somewhat Increase' based on their known symbiotic relationship with *Rhizobium* bacteria to fix nitrogen. 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 117 species scored 111were Extremely Vulnerable or Highly Vulnerable (Table B1). Scoring factors are summarized by number of species receiving each possible score in Table B2. Table B3 details the results of the CCVI analysis by species. See Part 3 (Problems Affecting the Species) of this document for discussion.

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

Index Score	Number of PGCN
Extremely Vulnerable	104
Highly Vulnerable	7
Moderately Vulnerable	2
Presumed Stable	1
Insufficient Evidence	3

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
Exposure to temperature increase*	>5.5	100
	5.5 – 5.1	14
	Unknown distribution	3
Exposure to reduction in moisture*	<-.119	6
	0.119	47
	0.096	47

Scoring Factor	Score	Number of Species
	0.073	13
	0.05	1
	Unknown distribution	3
Natural Barriers	Greatly Increase	5
	Increase	75
	Somewhat Increase	15
	Neutral	20
	Unknown	2
Anthropogenic Barriers	Greatly Increase	2
	Increase	11
	Somewhat Increase	31
	Neutral	70
	Unknown	3
Climate Change Mitigation	Increase	49
	Somewhat Increase	9
	Neutral	52
	Somewhat Decrease	5
	Unknown	2
Dispersal	Greatly Increase	1
	Increase	108
	Somewhat Increase	4
	Neutral	3
	Somewhat Decrease	0
	Decrease	0
	Unknown	1
Historical Thermal Niche	Greatly Increase	0
	Increase	0
	Somewhat Increase	0

Scoring Factor	Score	Number of Species
	Neutral	80
	Somewhat Decrease	34
	Unknown	3
Physiological Thermal Niche	Greatly Increase	0
	Increase	29
	Somewhat Increase	2
	Neutral	85
	Somewhat Decrease	0
	Unknown	1
Historical Hydrological Niche	Greatly Increase	36
	Increase	48
	Somewhat Increase	20
	Neutral	10
	Somewhat Decrease	0
	Unknown	3
Physiological Hydrological Niche	Greatly Increase	15
	Increase	62
	Somewhat Increase	29
	Neutral	10
	Somewhat Decrease	0
	Unknown	1
Disturbance Regime	Increase	3
	Somewhat Increase	43
	Neutral	70
	Somewhat Decrease	0
	Decrease	0
	Unknown	1
Dependence on Ice/Snow	Greatly Increase	2

Scoring Factor	Score	Number of Species
	Increase	0
	Somewhat Increase	13
	Neutral	101
	Unknown	1
Physical Habitat Restriction	Increase	30
	Somewhat Increase	20
	Neutral	61
	Somewhat Decrease	5
	Decrease	0
	Unknown	1
Dependence on Other Species to Generate Habitat	Greatly Increase	0
	Increase	0
	Somewhat Increase	0
	Neutral	116
	Unknown	1
Pollinator Versatility	Increase	0
	Somewhat Increase	14
	Neutral	57
	Unknown	46
Dependence on Other Species for Propagule Dispersal	Increase	0
	Somewhat Increase	0
	Neutral	114
	Unknown	3
Other Species Interactions (e.g., mutualisms)	Increase	0
	Somewhat Increase	20
	Neutral	15
	Unknown	82

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.

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Tier 1																								
Aletes latilobus	Canyonlands aletes	100					100		Inc	Inc	N	Inc	N	Inc	GI	Inc	N	N	SI	N	U	N	U	EV
Aliciella sedifolia	Stonecrop gilia	100				93	7		GI	N	N	Inc	N	Inc	GI	GI	N	SI	N	N	U	N	U	EV
Astragalus deterior	Cliff-palace milkvetch	100				100			Inc	Inc-SI	N	Inc	N	Inc	Inc	Inc	N	N	SI	N	N	N	SI	EV
Astragalus humillimus	Mancos milkvetch	100					100		Inc	N	N	Inc	N	Inc	GI	Inc	N	N	SI	N	N	N	SI	EV
Astragalus microcymbus	Skiff milkvetch	100		97	3				SI-N	SI-N	Inc	Inc	SD	SI	Inc	SI	SI	N	N	N	N	N	SI	EV
Astragalus osterhoutii	Kremmling milkvetch	100			100				SI	N	SI	Inc	SD	N	Inc	SI	SI	N	SI	N	N	N	SI	EV
Astragalus schmolliae	Sleeping Ute milkvetch	100				100			Inc	N	N	Inc	N	N	Inc	Inc	SI	N	N	N	N	N	SI	EV
Astragalus tortipes	Sleeping Ute milkvetch	100					100		Inc-SI	Inc-SI	Inc	Inc	N	N	GI	SI	SI	N	N	N	N	N	SI	EV
Boechera glareosa		100			100				Inc	N	Inc	Inc	N	N	GI	Inc	N	N	Inc	N	U	N	U	EV
Corispermum navicula	Boat-shaped bugseed	100			33	67			Inc	N	N	Inc	N	N	GI	Inc	N	N	Inc	N	U	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Descurainia kenheilii	Heil's tansy mustard	100					100		Inc	N	N	Inc	N	Inc	GI	N	N	SI	N	N	U	N	U	EV
Draba malpighiacea	Whitlow-grass	100				100			Inc	N	SD	Inc	N	N	Inc	Inc	SI	N	N	N	U	N	U	EV
Draba weberi	Weber's draba	100				100			GI	N	N	Inc	N	Inc	GI	GI	N	SI	N	N	N	N	N	EV
Erigeron wilkenii	Wilken fleabane	100			100				Inc	N	N	Inc	N	Inc	GI	Inc	N	N	SI	N	N	U	U	EV
Eriogonum brandegeei	Brandegee wild buckwheat	100		86	14				Inc	N	N	SI-N	N	N	Inc	Inc	N	N	Inc	N	N	N	N	EV
Eriogonum pelinophilum	Clay-loving wild buckwheat	100				48	52		Inc	Inc	Inc	Inc	SD	N	Inc	SI	SI	N	SI	N	N	N	U	EV
Eutrema penlandii	Penland alpine fen mustard	100			28	72			Inc	N	N	Inc	N	Inc	N	GI	N	SI	N	N	U	N	U	EV
Gutierrezia elegans	Lone Mesa snakeweed	100			100				Inc	SI	Inc	Inc	N	N	GI	SI	N	N	Inc	N	U	N	U	EV
Hackelia gracilenta	Mesa Verde stickseed	100				100			N	SI	N	Inc	N	N	Inc	Inc	SI	N	N	N	U	N	U	EV
Ipomopsis polyantha	Pagosa skyrocket		100		100				Inc	Inc	Inc	Inc	SD	N	GI	Inc	N	N	Inc	N	N	N	U	EV
Ipomopsis ramosa	coral ipomopsis	100			18	82			N	N	SD	Inc	N	N	Inc	Inc	Inc	N	N	N	SI-N	N	U	HV
Lepidium huberi	Huber's pepperweed	100		19	42	22	16	1	SI	N	N	Inc	N	N	SI	SI	SI	N	N	N	N	N	U	HV
Lygodesmia doloresensis	Dolores River skeletonplant	100				98	2		SI	SI	N	Inc	SD	N	Inc	Inc	SI	N	N	N	U	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Mimulus gemmiparus	Budding monkey flower	100				71	29		Inc	N	N	GI	N	Inc	SI	GI	N	N	SI	N	N	N	U	EV
Oenothera coloradensis 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
Oreoxis humilis	Pikes Peak spring parsley	100			18	3	79		Inc	N	N	Inc	N	Inc	Inc	N	N	SI	N	N	N	N	U	EV
Packera mancosana	Mancos shale packera	100			100				Inc	N	N	Inc	N	N	GI	Inc	N	N	Inc	N	N	N	U	EV
Pediocactus knowltonii	Knowlton cactus								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	N	Inc	N	SI	N	U	EV
Penstemon gibbensii	Gibben's beardtongue	100				100			Inc	N	Inc	Inc	SD	N	GI	Inc	N	N	Inc	N	SI	N	U	EV
Penstemon penlandii	Penland penstemon	100			100				SI	SI	SI	Inc	SD	N	GI	SI	SI	N	N	N	SI	N	U	EV
Penstemon scariosus var. *albifluvis*	White River penstemon	100					100		Inc	N	Inc	Inc	SD	N	GI	Inc	N	N	Inc	N	SI	N	U	EV
Phacelia formosula	North Park phacelia	100			99	1			Inc	N	Inc	Inc	N	N	Inc	Inc	N	N	Inc	N	SI	N	U	EV
Phacelia gina-glenneae	Troublesome phacelia	100			100				SI	SI	SI	Inc	SD	N	GI	Inc	SI	N	N	N	N	U	U	EV
Phacelia submutica	DeBeque phacelia	100			4	95	1		Inc	Inc-SI	Inc	Inc	SD	N	GI	Inc	N	N	Inc	N	U	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Physaria congesta	Dudley Bluffs bladderpod	100			100				Inc	Inc	Inc	Inc	N-SD	N	GI	Inc	N	N	Inc	N	SI	N	U	EV
Physaria obcordata	Piceance twinpod	100			100				Inc	N	Inc	Inc	SD	N	Inc	Inc	N	N	Inc	N	N	N	U	EV
Physaria pulvinata	Cushion bladderpod	100			100				Inc	SI-N	Inc	Inc	N	N	Inc	SI	N	N	Inc	N	U	N	U	EV
Physaria rollinsii	Rollins twinpod	100		22	34	37	7		Inc	SI-N	Inc	Inc	SD	N	SI	SI	N	N	Inc	N	U	N	U	EV
Physaria scrotiformis	West Silver bladderpod	100				100			Inc	N	Inc	Inc	N	N	GI	Inc	N	N	SD	N	U	N	U	EV
Sclerocactus glaucus	Colorado hookless cactus	100		1	1	12	86		Inc-SI	SI-N	Inc	Inc	SD	N	Inc	SI	SI	N	N	N	SI	N	U	EV
Sclerocactus mesa-verde	Mesa Verde hookless cactus	100					100		Inc	N	Inc	Inc	N	N	GI	Inc	N	N	Inc	N	SI	N	U	EV
Spiranthes diluvialis	Ute ladies' tresses	88	12		67	33			GI-Inc	GI-Inc	N	Inc	SD	N	SI	GI	SI	N	N	N	U	N	U	EV
Tier 2																								
Aletes humilis	Larimer Aletes	60	40			100			Inc	N	SD	Inc	N	Inc	Inc	Inc	N	N	SI	N	N	N	N	EV
Aletes macdougalii ssp. *Breviradiatus*	Mesa Verde aletes	100				100			N	SI-N	N	Inc	N	N	GI	Inc	SI	N	N	N	U	N	U	EV
Anticlea vaginatus	Alcove death camas	100			100				Inc	N	N	Inc	N	Inc	GI	GI	N	N	SI	N	U	N	U	EV
Asclepias uncialis ssp. *uncialis*	Dwarf milkweed	23	77		71	29			N	SI	Inc	SI	SD	N	Inc	Inc	N	N	N	N	N	N	N	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Astragalus anisus	Gunnison milkvetch	100		45	55				SI	SI	Inc	Inc	SD	N	Inc	SI	SI	N	N	N	N	N	SI	EV
Astragalus cronquistii	Cronquist milkvetch	100					28	72	N	N	Inc	Inc	N	N	Inc	SI	SI	N	N	N	N	N	SI	EV
Astragalus debequaeus	DeBeque milkvetch	100				99	1		Inc	SI	Inc	Inc	SD	N	Inc	Inc	N	N	SI	N	N	N	SI	EV
Astragalus equisolensis	Horseshoe milkvetch	100				100			SI-N	N	SI	Inc	N	N	Inc	Inc	SI	N	N	N	N	N	SI	EV
Astragalus iodopetalus	Violet milkvetch	41	59		59	41			N	SI	Inc	Inc	N	N	GI	Inc	SI	N	N	N	N	N	SI	EV
Astragalus missouriensis var. *humistratus*	Sleeping Ute milkvetch		100		100				Inc-SI	N	Inc	Inc	SD	N	Inc	SI	SI	N	SD	N	N	N	SI	EV
Astragalus naturitensis	Naturita milkvetch	100				98	2		Inc-SI	SI-N	N	Inc	SD	Inc	Inc	Inc	SI	N	SI	N	N	N	SI	EV
Astragalus piscator	Fisher Towers milkvetch	100				100			N	N	Inc	Inc	N	N	GI	SI	SI	N	N	N	N	N	SI	EV
Astragalus rafaelensis	San Rafael milkvetch	100				91	9		Inc	N	N	Inc	N	N	GI	Inc	SI	N	N	N	N	N	SI	EV
Astragalus sparsiflorus	Front Range milkvetch	100			89	11			N	SI	N	Inc	N	N	SI	Inc	Inc	N	N	N	N	N	SI	EV
Boechera crandallii	Crandall's rock cress	100		36	63	1			N	N	Inc	Inc	SD	N	SI	SI	SI	N	N	N	N	N	N	EV
Botrychium lineare	Narrowleaf grape fern	100		7		93			Inc	N	SD	Inc	N	N	SI	SI	SI	N	SD	N	N	N	U	HV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Calochortus ciscoensis	Cisco sego lily	100				2	51	47	Inc	SI	N	Inc	SD	N	GI	SI	SI	N	SI	N	N	N	U	EV
Camissonia eastwoodiae	Eastwood evening primrose	100				42	50	8	N	N	Inc	Inc	SD	N	Inc	SI	SI	N	N	N	U	N	U	HV
Castilleja puberula	Downy Indian-paintbrush	90	10		1	90	8	1	Inc	N	N	Inc	N	Inc	N	N	N	SI	N	N	U	N	U	EV
Cirsium perplexans	Adobe thistle	100			62	38			N	N	Inc	N	SD	N	SI	SI	SI	N	N	N	N	N	N	MV
Cleome multicaulis	Slender spiderflower	2	98			46	54		GI	N	Inc	Inc	SD	N	GI	GI	N	N	N	N	U	N	U	EV
Delphinium ramosum var. *alpestre*	Colorado larkspur	94	6	3	46	48	3		Inc	N	N	Inc	N	Inc	SI	N	N	SI	N	N	U	N	U	EV
Delphinium robustum	Wahatoya Creek larkspur								Inc	U	U	Inc	U	Inc	U	Inc	N	N	SI	N	N	N	N	IE
Draba exunguiculata	Clawless draba	100			32	52	16		Inc	N	N	Inc	N	Inc	SI	N	N	SI	N	N	N	N	N	EV
Draba graminea	San Juan whitlow-grass	100				75	25		Inc	N	N	Inc	N	Inc	SI	GI	N	GI	N	N	N	N	N	EV
Draba grayana	Gray's Peak whitlow-grass	77	23		33	66	1		Inc	N	N	Inc	N	Inc	N	N	N	GI-SI	N	N	N	N	N	EV
Draba smithii	Smith Whitlow-grass	54	46	1	26	35	14	24	Inc	N	N	Inc	N	Inc	N	Inc	N	N	SI	N	N	N	N	EV
Erigeron kachinensis	Kachina daisy	100				100			Inc	N	N	SI	N	Inc	GI	GI	N	N	SI	N	U	N	U	EV
Eriogonum clavellatum	Comb Wash buckwheat	100					99	1	N	SI	Inc	Inc	N	N	GI	SI	SI	N	N	N	N	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Eriogonum coloradense	Colorado wild buckwheat	100		33	27	15	25		Inc	N	N	SI-N	N	Inc	N	Inc	N	SI	N	N	N	N	N	EV
Frasera coloradensis	Colorado green gentian	100			100				SI	SI	SI-N	Inc	N	N	GI	Inc	N	N	SI	N	N	N	U	EV
Herrickia horrida	Canadian River spiny aster		100		13	87			SI-N	N	N	Inc	N	N	GI	Inc	SI	N	N	N	U	N	U	EV
Ipomopsis aggregata ssp. *weberi*	Rabbit Ears gilia	100			65	35			N	N	SD	Inc	SD	N	N	Inc	N	N	N	N	N	N	N	PS
Ipomopsis globularis	Globe gilia	100			45	55			Inc	N	N	Inc	N	Inc	Inc	N	N	SI	Inc	N	N	N	U	EV
Lepidium crenatum	Alkaline pepperwort	100		24	25	51			SI	SI	Inc	Inc	N	N	SI	SI	SI	N	N	N	U	N	U	EV
Limnorchis zothecina	Alcove bog orchid	100			100				Inc	N	N	Inc	SD	Inc	GI	GI	N	N	SI	N	U	N	U	EV
Lomatium concinnum	Colorado desert-parsley	100		42	9	49			SI	Inc-SI	Inc	Inc	N	N	Inc	SI	SI	N	SI	N	U	N	U	EV
Lupinus crassus	Payson lupine	100		3		97			SI	N	SI	Inc	SD	N	SI	Inc	SI	N	N	N	U	N	SI	EV
Mentzelia paradoxensis	Paradox stickleaf	100				80	20		N	N	N	Inc	N	N	Inc	SI	SI	N	N	N	N	N	U	HV
Mentzelia rhizomata	Roan Cliffs blazing star	100		2	93	5			Inc	N	Inc	Inc	N	N	Inc	Inc	N	N	Inc	N	U	N	U	EV
Mertensia humilis	Rocky Mountain bluebells	100			76	24			Inc-SI	SI-N	Inc	Inc	N	N	SI	SI	SI	N	N	N	U	N	U	EV
Nuttallia chrysantha	Golden blazing star	71	29	10	28	62			Inc	SI-N	Inc	Inc-SI	N	N	Inc	Inc	N	N	Inc	N	N	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Nuttallia densa	Arkansas Canyon stickleaf	100		2	98				Inc-SI	SI-N	N	Inc	N	N	Inc	Inc	SI	N	N	N	U	N	U	EV
Oenothera acutissima	Narrow-leaf evening primrose	100		4	70	26			N	N	N	Inc	N	N	Inc	SI	N	N	N	N	U	N	U	HV
Oonopsis foliosa var. *monocephala*	Rayless goldenweed		100		80	20			N	N	Inc	Inc	SD	N	Inc	Inc	N	N	N	N	U	N	U	EV
Oonopsis puebloensis	Pueblo goldenweed	1	99		5	95			Inc	SI-N	Inc	Inc	N	N	Inc	Inc	N	N	Inc	N	U	N	U	EV
Oreocarya osterhoutii	Osterhout's cat's-eye	100				61	39		Inc	Inc-SI	Inc	Inc	SD	N	Inc	Inc	N	N	Inc	N	U	N	U	EV
Oreocarya revealii	Gypsum Valley cat's-eye	100			8	84	8		Inc	N	SI	Inc	N	N	Inc	Inc	SI	N	Inc	N	U	N	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	N	U	N	U	EV
Oxytropis besseyi var. *obnapiformis*	Bessey locoweed	100			36	64			N	N	Inc	Inc	SD	N	SI	SI	SI	N	N	N	U	N	U	HV
Penstemon acaulis var. *yampaensis*	Yampa beardtongue	100			58	42			N	N	SI	Inc	N	N	SI	SI	SI	N	N	N	SI	N	U	EV
Penstemon degeneri	Degener beardtongue	100		29	71				N	N	N	Inc	N	N	Inc	Inc	SI	N	N	N	SI	N	U	EV
Penstemon fremontii var. *glabrescens*	Fremont's beardtongue	100		29	55	16			N	N	Inc	Inc	SD	N	Inc	Inc	SI	N	N	N	SI	N	U	EV
Penstemon grahamii	Graham beardtongue	100					100		Inc	N	Inc	Inc	SD	N	GI	Inc	N	N	Inc	N	SI	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
Penstemon mensarum	Grand Mesa penstemon	100		9	60	11	20		SI	SI	SI	Inc	N	SI	N	SI	Inc	N	N	N	SI	N	U	EV
Penstemon scariosus var. *cyanomontanus*	Plateau penstemon	100			100				Inc	N	N	Inc	N	N	Inc	Inc	SI	N	N	N	SI	N	U	EV
Physaria alpina	Avery Peak twinpod	100			2	98			Inc	N	N	Inc	N	Inc	Inc	N	N	SI	N	N	U	N	U	EV
Physaria bellii	Bell's twinpod	42	58				100		Inc	SI	Inc	Inc	N	N	Inc	Inc	N	N	Inc	N	U	N	U	EV
Physaria parviflora	Piceance bladderpod	100		75	24	1			Inc	N	Inc	Inc	N	N	Inc	Inc	N	N	Inc	N	U	N	U	EV
Physaria pruinosa	Pagosa bladderpod		100	1	95	4			Inc	SI	Inc	Inc	SD	N	Inc	Inc	N	N	Inc	N	N	N	N	EV
Physaria vicina	Good-neighbor bladderpod	100		6	49	42	3		Inc	Inc	N	Inc	N	N	Inc	Inc	SI	N	SI	N	U	N	U	EV
Potentilla rupincola	Rocky Mountain cinquefoil	93	7			100			Inc	N	N	Inc	N	Inc	N	Inc	N	N	SI	N	N	N	SI	EV
Ptilagrostis porteri	Porter's feathergrass	100		7	45	44	4		Inc-SI	N	N	N	N	N	N	GI	N	N	N	N	N	N	U	MV
Puccinellia parishii	Parish's alkali grass	100			100				Inc	SI	N	N	N	N	GI	GI	N	N	N	N	N	N	U	EV
Salix arizonica	Arizona willow		100		100				GI-Inc	N	N	Inc	N	N	GI	GI	N	N	N	N	N	N	SI	EV
Saussurea weberi	Weber saussurea	100			8	92			Inc	N	N	Inc	N	Inc	SI	N	N	SI	N	N	N	N	U	EV
Telesonix jamesii	James telesonix	100			23	53	24		Inc	N	N	Inc	N	Inc	SI	Inc	N	N	SD	N	N	N	U	EV

Species	Common Name	Temperature Scope		Hamon AET:PET Moisture Metric Scope					Natl barriers	Anth barriers	CC mitigation	Dispersal / Movement	Historical thermal niche	Physiological thermal niche	Historical hydrological niche	Physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Pollinators	Other spp disp	Other spp interaction	Vulnerability Score
		>5.5F	5.1-5.5F	< -0.119	-0.097 to -0.119	-0.074 to -0.096	-0.051 to -0.073	-0.028 to-0.05																
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	N	N	N	N	N	N	EV
Thelypodium paniculatum	Northwestern thelypody								U	U	N	Inc	U	N	U	GI	N	N	N	N	U	N	U	IE
Townsendia fendleri	Fendler's 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	N	N	Inc	N	N	N	U	EV
Townsendia rothrockii	Rothrock townsend-daisy	100		16	42	31	11		Inc	N	N	Inc	N	Inc	N	N	N	SI	N	N	N	N	U	EV
Trifolium dasyphyllum ssp. anemophilum	Whip-root clover	100			100				SI	Inc	Inc	Inc	N	N	GI	SI	N	N	N	N	N	N	SI	EV

APPENDIX C: IMPORTANT PLANT AREAS

B1 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan (CAP)**	**Designated Natural Area**	**ACEC or RNA**
Cascade Falls			
Castle Gardens			
Chapin Mesa			
Devils Staircase			
Dolores Canyon South			
Droney Gulch		X	X
Dudley Bluffs	X	X	X
East Sand Dunes		X	
East Toe South			
Elk Falls		X	
Gateway		X	X
Great Sand Dunes-Mishak Lakes		X	
Gunnison Basin		X	X
Half Peak			
Hankins Gulch			
Laramie River Valley Shale Outcrops			
Mill Creek at Pagosa Springs	X		
Miramonte Reservoir West	X	X	
Mosquito Range-Hoosier Ridge		X	X
Mount Callahan		X	
Navajo Wash			
North Park Natural Area	X	X	X
Pikes Peak			
Plateau Creek	X		
Rabbit Mountain		X	
Rare Plants of the Chalk Barrens	X		
Rare Plants of the Wasatch		X	X
Rattlesnake Canyon			
Saint Vrain Mountain			
South Beaver Creek		X	X
Spitzie Draw			
Troublesome Creek	X		
Yampa River and Johnson Canyon			

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
4A Ridge			
Alkali Creek			
Along Route 9			
Antelope Springs			
Antero Reservoir		X	
Anvil Points			
Anvil Points Rim			
B50 Road			
Baca Grande and Reserve			
Badger Creek Tunnel			
Bar X Wash			
Barrel Spring Point			X
Beaver Creek at Beaver Ridge			
Bellows Creek		X	
Big Dominguez Creek			
Big Gypsum Valley	X		
Big Spring and Big Arroyo Hills			
Bison Creek			
Black Mountain at Aspen Park		X	
Blanca Wetlands			X
Bobcat Ridge Hogback			
Buck Gulch			
Buffalograss Playas			
Buffmeyer Draw			
Bull Creek			
Button Rock Mountain			
Buzzard Creek			
Cactus Park at Triangle Mesa			
Calamity Ridge	X	X	X
Camp Gulch			
Canon City Hogback			
Cap Rock Preserve			
Cascade Creek East			
Case Reservoir Bluffs			
Cathedral Bluffs		X	X
Cave Basin Lakes			
Cedar Creek			
Cedar Hill			

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
Cedaredge			
Cherokee Park			
Cherokee Park South			
Cheyenne Canyon			
Chromo			
Cimarron			
Cimarron State Wildlife Area			
Clear Creek			
Clear Creek to Golden			
Coffintop Mountain			
Cold Spring Mountain			
Colona Mountain			
Columbine Pass/Chicago Basin			
Conn Creek			
Copper Gulch			
Cordova Mesa			
Cotopaxi			
Cottonwood Creek Road			
Cougar Springs			
County Line			
Cow Ridge			
Coyote Wash			
Crater Lake			
Cumberland Ditch			
Curley Peak			
Dale Creek			
Deadman Creek-Western Sangres			
Deep Creek Uplands West			
Deer Creek East			
Devils Kitchen			
Disappointment Valley Northwest			
Dixon Creek			
Dolores-Norwood Road			
Dry Cedar Creek			
Dry Creek Basin			
Dry Fork Kimball Creek			
Dry Fork Piceance Creek			
Duck Lake			

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
East Beaver Creek			
East Carrizo Creek			
East Fork Parachute Creek			
East Fork San Juan River			
East Lost Park		X	
East of Young Gulch			
East Paradox Creek			
East Schwachheim Creek			
Endlich Mesa			
Escalante Canyon		X	X
Fairview		X	X
Fairview Peak			
Flat Top to Bostwick Park			
Forest Road 251			
Fourmile Creek-Fremont County			
FR 121 at Big Creek			
Freezeout Creek			
Fremont's Fen			
Fruita and Monument Canyons			
Garden Park Fossil	X	X	X
Geneva Park			
Gift Creek at Hawk			
Gilligan's Island			
Glacier Basin			
Green River			
Grenada Trail			
Greyrock Mountain			
Gunnison Gorge South Rim			X
Gunnison River			
Harrington Gulch			
Hay Gulch	X		
Hecla Junction			X
Hermit Park			
Highland Mary Lakes			
Highway 65 at Grand Mesa NF Boundary			
Horse Gulch	X		
Horseshoe Park			
Hotchkiss Hills			

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
Huff			
Hwy 141 and 145 Junction			
Ice Lake Basin			
Imogene Pass			
Indian Creek Hogback			
Irish Canyon		X	X
James Creek			
Jefferson and Guernsey Creeks			
Ken Caryl Hogback Complex		X	
King Gulch			
Kinikin Road/Sunshine Road			
Kremmling	X		
La Manga Creek			
Lake Como			
Lands End			
Lasauses			X
Lawhead Gulch			
Lennox Mesa			
Lily Mountain			
Lime Mesa			
Little Angry Creek			
Little Coal Creek			
Little Gypsum Valley			
Locke Park			
Lone Pine Creek North			X
Lonetree			
Long Gulch at Platte River Mountains			
Lost Park		X	
Lovers Leap			
Lower Greasewood Gulch		X	X
Luning Promontory			
Lykins Gulch			
Mailbox Park			
Maxwell Ranch South			
McCabe Creek			
McClure Pass			
McIntyre Canyon			
McIntyre Hills			X

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
Meadow Springs Ranch			
Mesa Verde Aqueduct			
Mesa Verde Entrance			
Michigan River at Jackson County Airport			
Middle Two Butte Creek			
Mineral Basin			
Miners Creek			
Mishak Lakes		X	
Moose Mountain			
Morfield and Prater Canyons			
Mount Audubon			
Mount Bellview		X	X
Mount Flora			
Mount Logan Road		X	
Mud Canyon			X
Mud Creek			
Mustang Creek			
Navajo Basin			
Niwot Ridge			
North Boulder Grasslands			
North Creede			
North Fork South Platte			
North Mesa Community Hall			
North Saint Vrain			X
North Sand Dunes			
Old Fall River Road			
Old Grand Mesa Road			
Ou Creek			
Pahlone Slopes			
Parachute Creek			
Paradox Valley North			
Park Creek Hogback		X	
Pasture 10A North			
Peach Valley			X
Phantom Canyon			
Phantom Canyon of Eightmile Creek			X
Piceance Creek		X	X
Pine Park Reservoir			

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
Pine/Piedra Stock Trail			
Poitrey Hills			
Pool Creek			
Pot Creek			
Prospect Park			
Rabbit Valley		X	X
Rat Creek Pond			
Raven Ridge		X	X
Red Dirt Creek at Hinman Reservoir	X		
Revenue Mountain to Landslide Peak			
Reynolds Ranch			
Ritchie Gulch Upland			
Roaring Fork River at Carbondale			
Robb Cemetery			
Rock Creek	X		
Rock Outcrop West of Mason Creek			
Rolling Mountain			
Roubideau Creek			
Royal Gorge			X
Ruby Mountain			X
Russell Lakes			
Sacramento Creek			
San Luis Lakes		X	
Sand Canyon at McElmo			
Seven Hermits			
Sheep Mountain in San Juans			
Shell Rock Canyon		X	
Silver Pick Basin			
Sinbad Valley			
Six and Fifty Reservoir			
Skaguay Reservoir			
Slick Rock Hill			
Snowdon Peak			
South Boulder Creek		X	
South Canal		X	X
South Saint Vrain			
South Tarryall Peak			
Spring Creek at Greenie Mountain			

B2 Important Plant Areas **For Map of IPAs see Part 4, Figure 4**	**Conservation Action Plan**	**Designated Natural Area**	**ACEC or RNA**
Spring Creek Basin			
Springdale			
Sterling Place			
Stollsteimer Creek North	X		
Stony Pass			
Stout Creek			
Stuntz Reservoir			
Taylor Canyon			
Taylor Canyon at San Juan River			
Taylor Canyon at Taylor Park Reservoir			
Taylor Pass			
Taylor River at Almont			
Tecolote Creek Springs			
Tenderfoot Hill			
The Ant Hill			
The Castle			
The Crown			
Threemile Creek			
Timber Gulch			
Turkey Mountain			
Turkey Roost			
Two Butte Creek			
Two Buttes East		X	
Unnamed Tributary to Badger Creek at Howard			
Upper Fourmile Creek			
Upper Medano Creek			
Wells Gulch			
West Mud Creek			
West Silver Mesa			
Wildcat Gulch			
Williams Creek Campground			
Yellowjacket Pass			
Zenobia Peak			

APPENDIX D: COLORADO DESIGNATED NATURAL AREAS CONSERVING IMPORTANT PLANT AREAS

List of Designated Natural Areas Conserving Portions of Important Plant Areas
Antero-Salt Creek
Blue Mountain-Little Thompson Fault
Colorado Tallgrass Prairie
Dakota Hogback
Deer Gulch
Droney Gulch
Duck Creek
Dudley Bluffs
East Lost Park
East Sand Dunes
Escalante Canyon
Fairview
Garden Park Fossil Locality
Gateway Palisade
Geneva Basin Iron Fens
Gothic
Hoosier Ridge
Indian Spring
Irish Canyon
Ken-Caryl Ranch
Limestone Ridge
Lower Greasewood
Mexican Cut
Miramonte
Mishak Lakes
Mount Callahan & Logan Wash Mine
North Park
Park Creek Hogback
Pyramid Rock
Rabbit Valley
Raven Ridge
Ryan Gulch
Shell Duck Creek

List of Designated Natural Areas Conserving Portions of Important Plant Areas
Shell Rock
South Beaver Creek
South Boulder Creek
South Cathedral Bluffs
Staunton
Treasurevault Mtn.
Two Buttes
Wacker Ranch
Wheeler Geologic
Yanks Gulch/Upper Greasewood Creek

APPENDIX E: 2011 COLORADO RARE PLANT CONSERVATION INITIATIVE MEMBERS

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Tim Hogan, University of Colorado Herbarium (COLO)
Steve Kettler, U.S. Fish and Wildlife Service (USFWS)
Andrew Kratz, U.S. Forest Service (USFS)
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Ellen Mayo, U.S. Fish and Wildlife Service
Mitchell McGlaughlin, University of Northern Colorado (UNC)
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Betsy Neely, The Nature Conservancy
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Ipomopsis polyantha, Pagosa skyrocket
By David G. Anderson