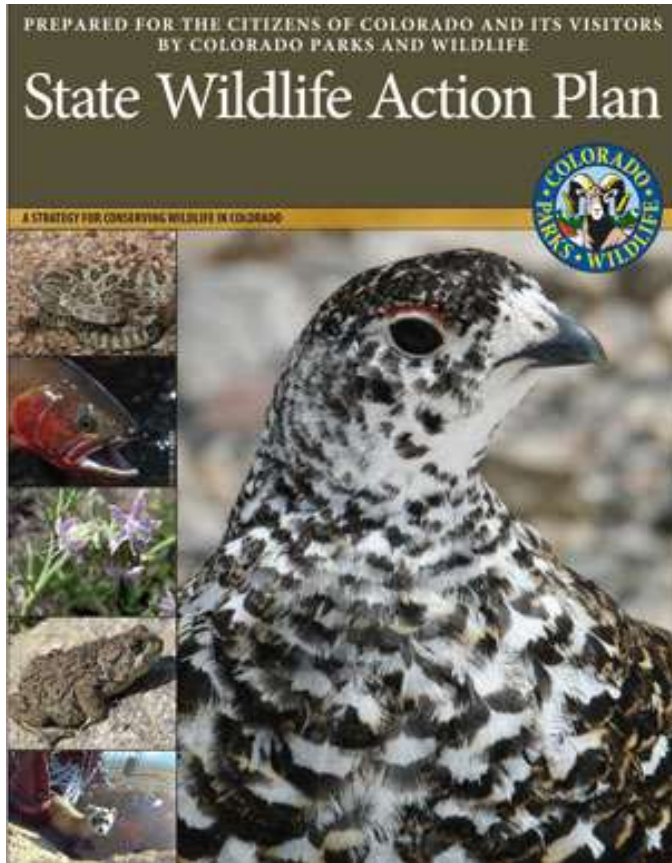


Utilizing the SWAP to Guide Conservation of Tier 1 and Tier 2 Plants in Colorado

Raquel Wertsbaugh, CNAP Coordinator
14th Annual Colorado Rare Plant Symposium
September 8, 2017



What is the SWAP?



- Purpose: Outline and prioritize Colorado's conservation needs and coordinate efforts with members of Colorado's conservation community and stakeholders
- Required by USFWS for CPW to receive federal State Wildlife Grant funding
- Formulated by CPW, contracted to CNHP, with input from partners throughout the state
- Not a regulatory document
- Rare Plant Addendum was added to the current SWAP (YAY!!!!)

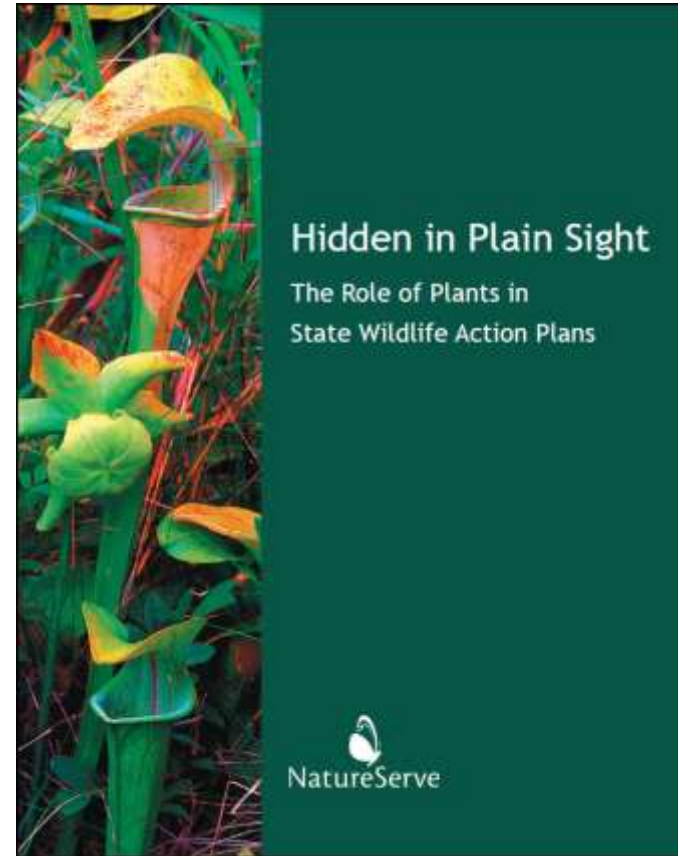


"I'm trying to organize a stampede, but everybody's got her own agenda."

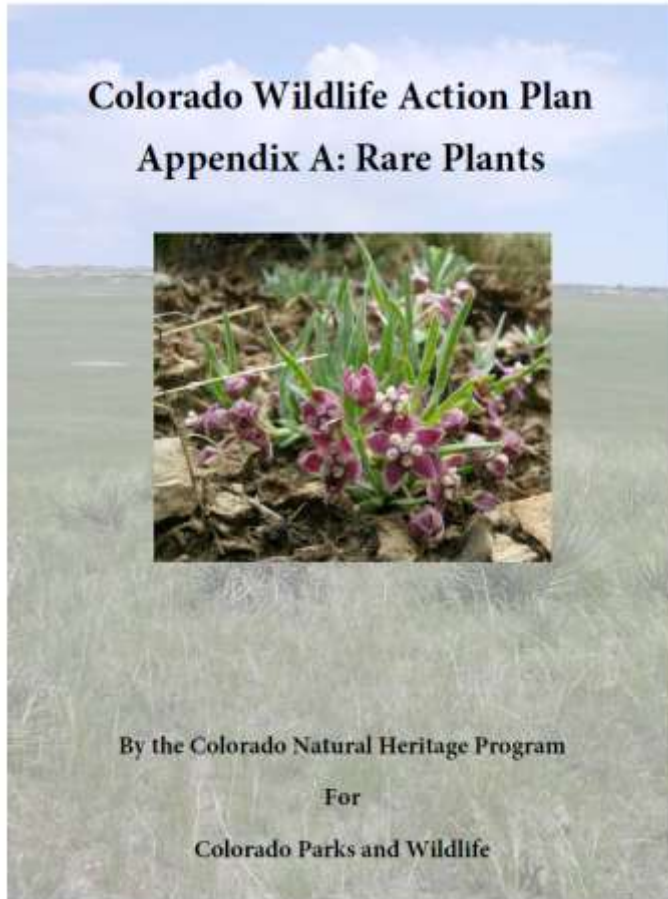


Significance of Rare Plant Addendum

- As of 2008, only 6 states included plants in their SWAPs
- Provides guidance to natural resource managers and citizens on conservation of rare plants
- Recognition of plants, even though not required in the SWAP
- A huge accomplishment of the Rare Plant Conservation Initiative (RPCI)!



SWAP Rare Plant Addendum



Purpose:

Set a statewide conservation 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.



Development of Rare Plant Addendum

- Draft addendum developed by RPCI in 2011
- Writing of rare plant addendum contracted out by CPW to CNHP
- Stakeholder input by both RPCI (2011) and CNHP/CPW (2015)
 - Input from over 700 individuals



How can we utilize the SWAP Rare Plant Addendum?

- Get familiar with and utilize the tools provided
- Utilize it as a conservation strategy within your organization and when working with partners
- Use it as a guide to prioritize resources for Plant Species of Greatest Conservation Need and associated habitats
- Promote the implementation of actions that benefit multiple species (plants & wildlife)
- Keep track of your implementation of conservation actions



Addendum “Parts”

- 1) Plants of Greatest Conservation Need (PGCN)
- 2) Key habitats
- 3) Problems affecting the species
- 4) Priorities for conservation action
- 5) Priorities, threats, and conservation actions for PGCN
- 6) Strategies for monitoring species and success of conservation actions
- 7) Review, coordination, and public participation



Part 1: Plants of Greatest Conservation Need

Tier 1 PGCN- all G1 species, all federally listed species

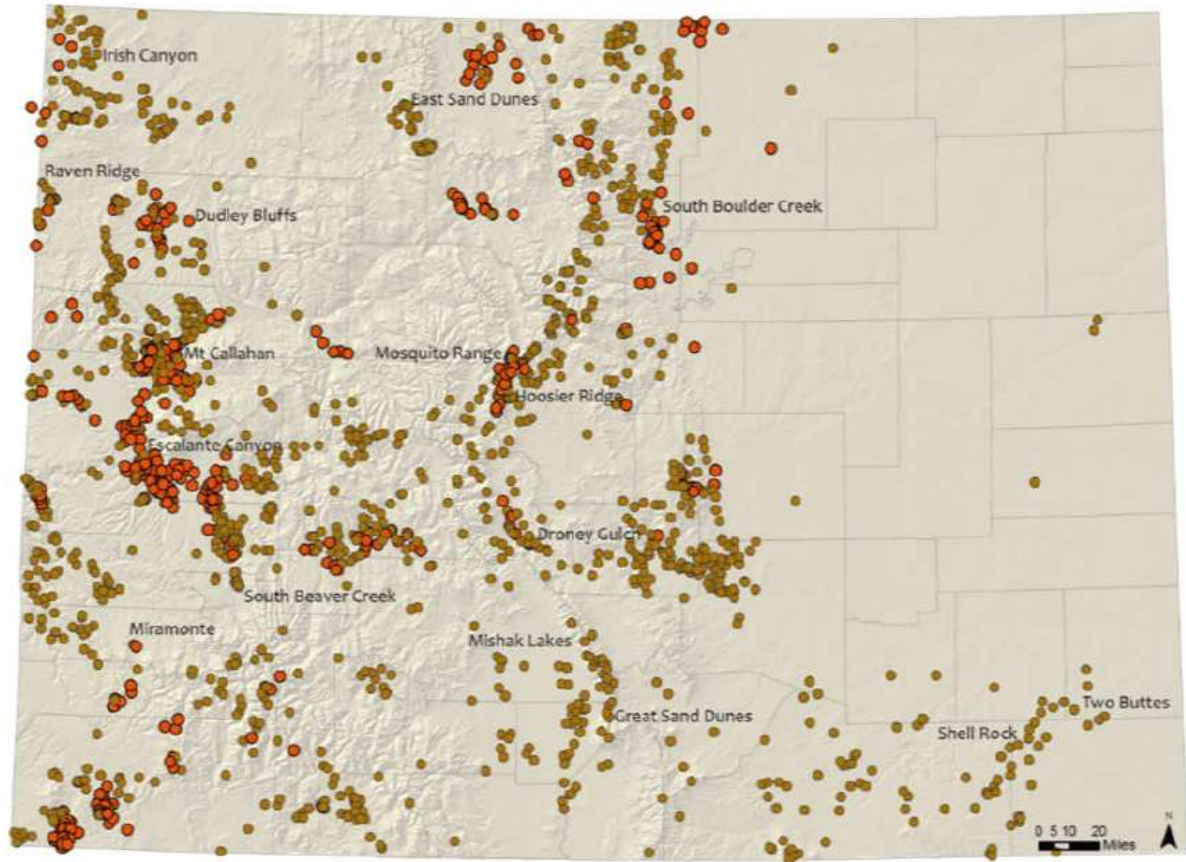
Tier 2 PGCN- all G2 species not federally listed

117 total species (43 Tier 1, 74 Tier 2)

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



Distribution of Colorado's Plants of Greatest Conservation Need



Plant Species of Greatest Conservation Need

- Tier 1
- Tier 2
- Counties

Note: Labeled locations are a subset of Important Plant Areas. See Appendices for complete list.



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



Part 2: Key Habitats

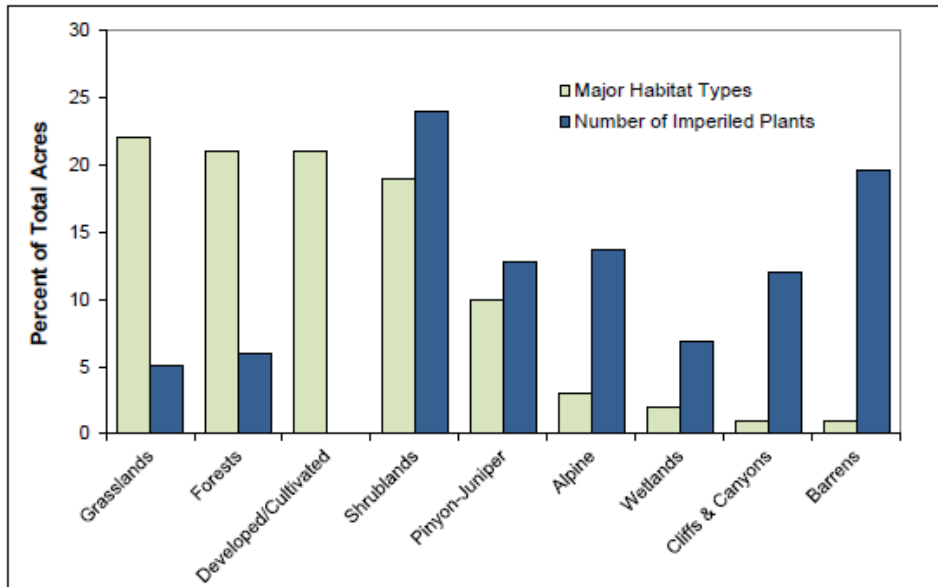


Figure 2. Key habitats as percentage of Colorado and the number of PGCN within each habitat type.

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 |
| High | Barrens | Barrens |
| | 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 |



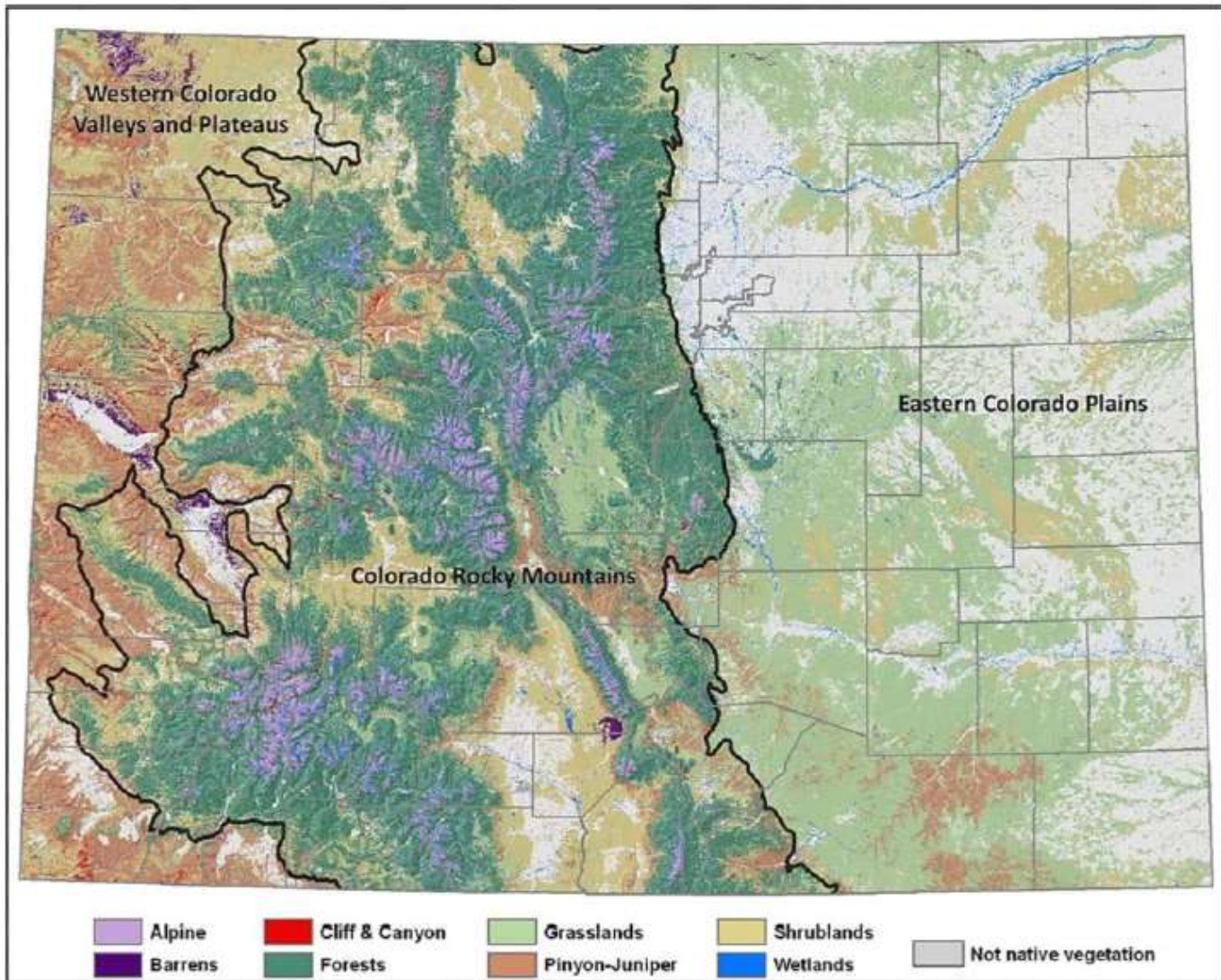


Figure 3. Distribution of major rare plant habitat types in Colorado.

Key Habitats

Sagebrush

Tier I Species

| Group | Species | Common Name | Primary |
|---------|---|-------------------------------|-------------------------------------|
| Birds | <i>Leucosticte australis</i> | Brown-capped rosy-finch | <input type="checkbox"/> |
| Birds | <i>Athene cucularia</i> | Burrowing owl | <input type="checkbox"/> |
| Birds | <i>Tympanuchus phasianellus columbianus</i> | Columbian sharp-tailed grouse | <input checked="" type="checkbox"/> |
| Birds | <i>Aquila chrysaetos</i> | Golden eagle | <input checked="" type="checkbox"/> |
| Birds | <i>Centrocercus urophasianus</i> | Greater sage-grouse | <input checked="" type="checkbox"/> |
| Birds | <i>Centrocercus minimus</i> | Gunnison sage-grouse | <input checked="" type="checkbox"/> |
| Mammals | <i>Mustela nigripes</i> | Black-footed ferret | <input type="checkbox"/> |
| Mammals | <i>Myotis thysanodes</i> | Fringed myotis | <input type="checkbox"/> |
| Mammals | <i>Cynomys gunnisoni</i> | Gunnison's prairie dog | <input checked="" type="checkbox"/> |
| Mammals | <i>Myotis lucifugus</i> | Little brown myotis | <input type="checkbox"/> |
| Mammals | <i>Corynorhinus townsendii pallescens</i> | Townsend's big-eared bat ssp. | <input type="checkbox"/> |
| Mammals | <i>Cynomys leucurus</i> | White-tailed prairie dog | <input checked="" type="checkbox"/> |
| Plants | <i>Eriogonum brandegeei</i> | Brandegee wild buckwheat | <input type="checkbox"/> |
| Plants | <i>Physaria pulvinata</i> | Cushion bladderpod | <input checked="" type="checkbox"/> |
| Plants | <i>Boechera glareosa</i> | Dorn's rockcress | <input type="checkbox"/> |
| Plants | <i>Lepidium huberi</i> | Huber's pepperwort | <input checked="" type="checkbox"/> |
| Plants | <i>Astragalus osterhoutii</i> | Kremmling milkvetch | <input checked="" type="checkbox"/> |
| Plants | <i>Gutierrezia elegans</i> | Lone Mesa snakeweed | <input checked="" type="checkbox"/> |
| Plants | <i>Penstemon penlandii</i> | Penland penstemon | <input checked="" type="checkbox"/> |
| Plants | <i>Physaria rollinsii</i> | Rollins twinpod | <input checked="" type="checkbox"/> |
| Plants | <i>Astragalus microcymbus</i> | Skiff milkvetch | <input checked="" type="checkbox"/> |
| Plants | <i>Phacelia gina-glennae</i> | Troublesome phacelia | <input checked="" type="checkbox"/> |

| General Threat | Specific Threat | General Conservation Action | Specific Conservation Action | Priority |
|--|---|---|--|----------|
| 02.1 Annual & Perennial Non-Timber Crops | Conversion to cropland, primarily pasture grasses, chaining | 2.3 Habitat & Natural Process Restoration | Restore sagebrush using accepted techniques appropriate to site-specific conditions | H |
| 02.3 Livestock Farming & Ranching | Altered native vegetation (grazing intensity) | 2.1 Site/Area Management | Implement compatible grazing practices | H |
| 03.1 Oil & Gas Drilling | Oil and gas drilling | 5.3 Private Sector Standards & Codes | Implement Best Management Practices for energy development and mining | H |
| 04.2 Utility & Service Lines | Oil and gas pipelines | 5.1 Legislation | Promote consideration of biodiversity issues in transportation and land use planning processes | H |
| 07.3 Other Ecosystem Modifications | Altered native vegetation (juniper encroachment) | 2.3 Habitat & Natural Process Restoration | Re-seed native species | H |
| 07.3 Other Ecosystem Modifications | Altered native vegetation (low forb and grass diversity) | 2.1 Site/Area Management | Implement compatible grazing practices | H |
| 11.1 Habitat Shifting & Alteration | Habitat shifting and alteration due to climate change | 8.0 Research & Monitoring | Research population parameters and/or monitor status | H |
| 01.1 Housing & Urban Areas | Urban, suburban, and ex-urban development | 1.2 Resource & Habitat Protection | Acquire conservation easement for habitat protection | M |
| 03.2 Mining & Quarrying | Coal mining | 5.3 Private Sector Standards & Codes | Implement Best Management Practices for energy development and mining | M |
| 04.2 Utility & Service Lines | Overhead utility lines and towers | 5.3 Private Sector Standards & Codes | Implement Best Management Practices for energy development and mining | 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 – cheatgrass | 2.2 Invasive/Problematic Species Control | Write and/or implement integrated weed/pest management plan | L |



Part 4: Priorities for Conservation Action

6 Statewide Conservation Objectives:

1. Secure on-the-ground, site specific habitat protection and/or management
2. Minimize threats and develop climate change adaptation strategies
3. Improve scientific understanding
4. Develop and implement a state program and policies
5. Facilitate stewardship
6. Adopt measures of ex-situ (off site) conservation

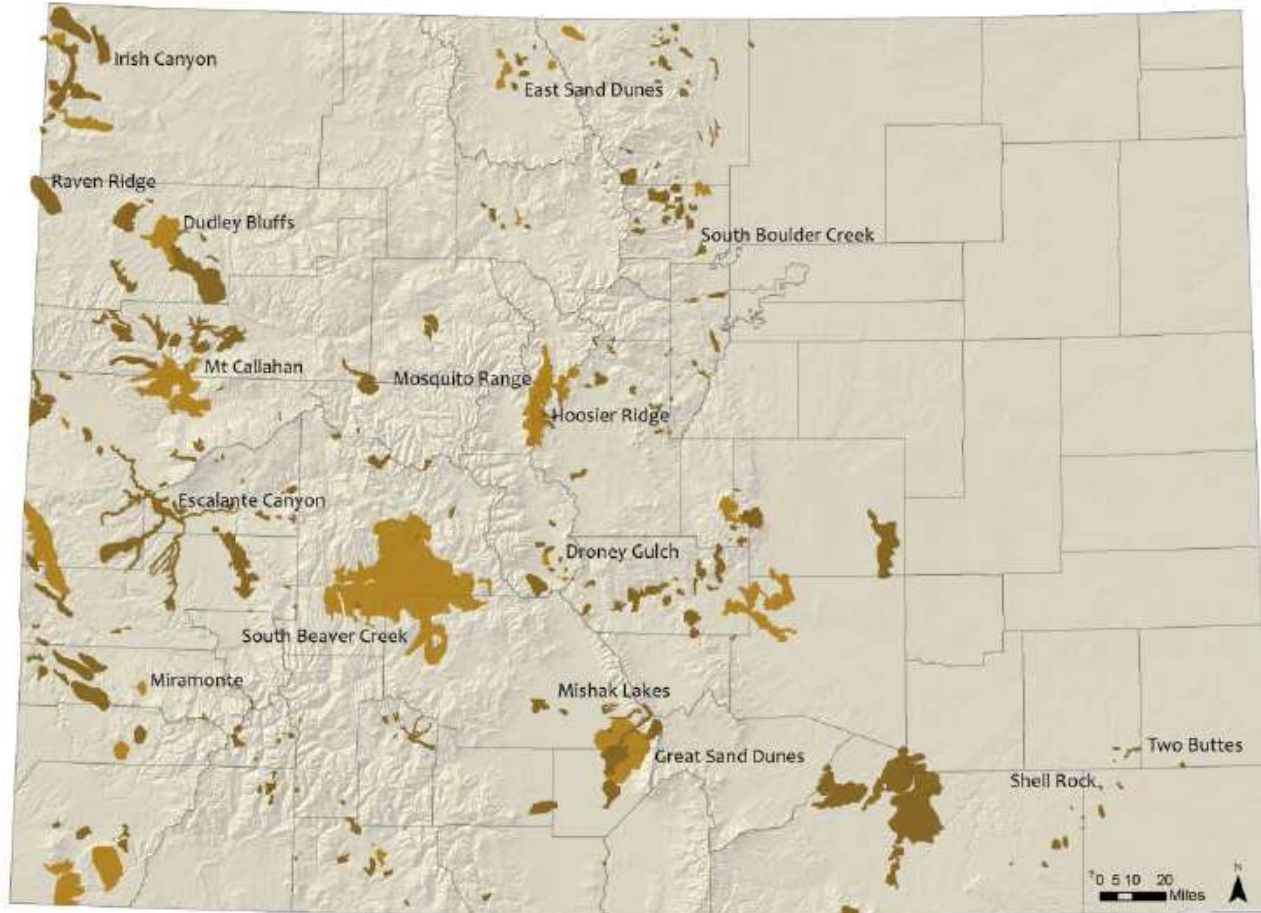





Important Plant Areas

- Over 290 Important Plant Areas (IPAs) identified by CNHP and recognized by RPCI
- Based on CNHP's Potential Conservation Areas
- IPAs provide guidance for conservation opportunities and highlight areas where public and private land managers can prioritize conservation actions for plants
- 42 designated state natural areas overlap portions of 39 IPAs
- 33 IPAs are protected within BLM ACECs, Wilderness Study Areas, or USFS Research Natural Areas



Colorado Important Plant Areas



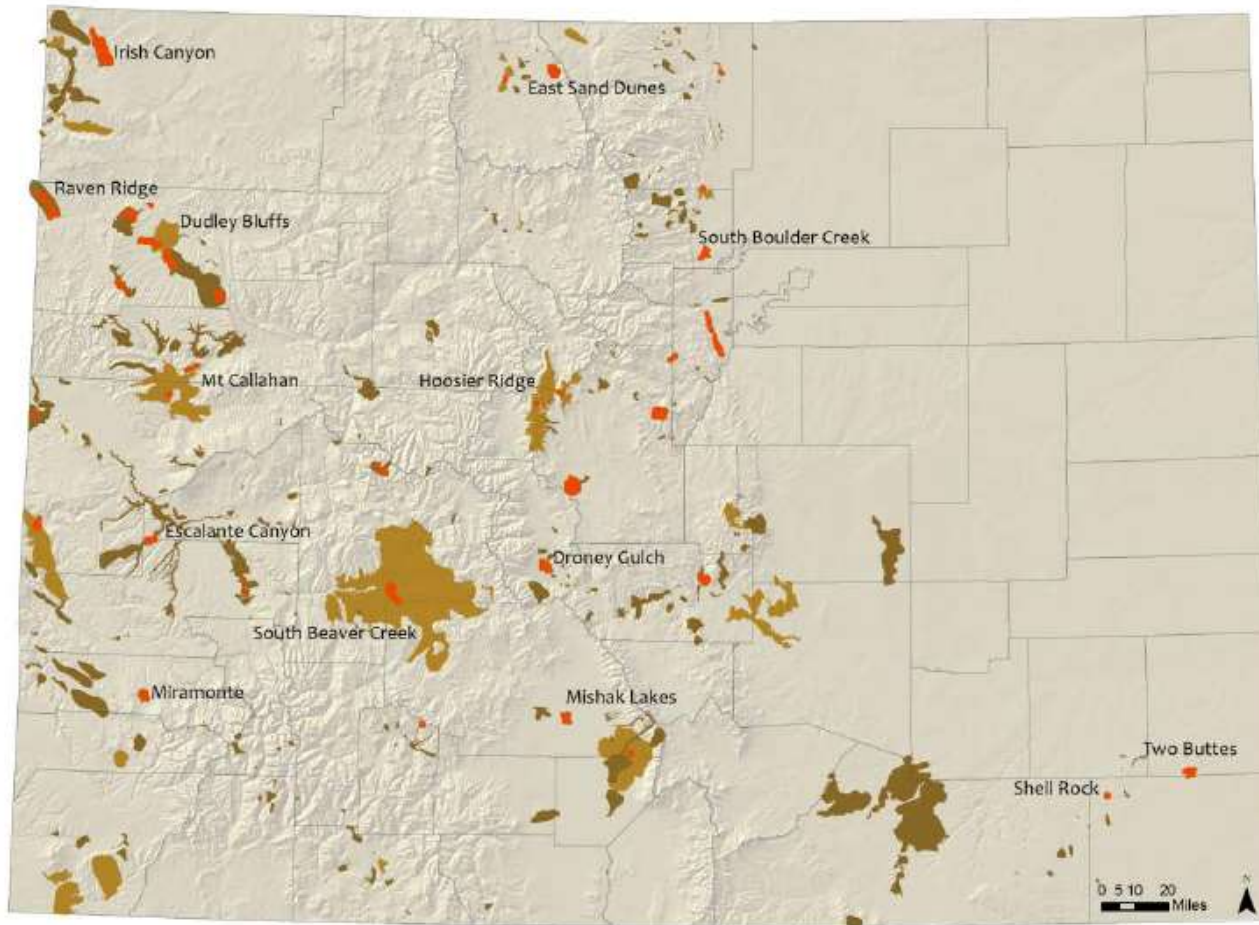
-  B1 IPA: Outstanding Biodiversity Significance
-  B2 IPA: Very High Biodiversity Significance
-  Counties

Note: Only selected Important Plant Areas are labeled. See appendices for complete list.

Map Version Date: June 9, 2015



Designated Colorado Natural Areas That Conserve Portions of Important Plant Areas



- Designated Colorado Natural Area
- B1: Outstanding Biodiversity Significance
- B2: Very High Biodiversity Significance
- Counties

Note: Only selected Designated Colorado Natural Areas are labeled for geographic orientation.

Map Version Date: June 9, 2015



Part 5: Priorities, Threats, & Conservation Actions for PGCN

- Tables with PCGN, sorted by Tier 1 & Tier 2
- Population status, population trend, distribution, habitat
- General threats, specific threats, general conservation action, specific conservation action, priority



| Budding monkey flower | Population Status | Population Trend | Distribution | Type | Habitat | Primary | |
|-----------------------|-------------------|------------------|--------------|--------------------------|---------|--------------------|-------------------------------------|
| | Medium | D | Unknown | Southern Rocky Mountains | P | Cliffs and Canyons | <input checked="" type="checkbox"/> |
| | | | | | | Seeps and Springs | <input type="checkbox"/> |
| | | | | | | Wetlands | <input type="checkbox"/> |

Mimulus gemmiparus

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 |



Part 6: Strategies for Monitoring Species, and Success of Conservation Actions

Recommended monitoring actions:

- Prioritize monitoring needs for PGCN annually and share priorities with stakeholders
- Support existing and establish new monitoring projects for priority species
- Review existing monitoring studies
- Ensure monitoring studies have adequate funding to address key questions
- Devise a monitoring schedule to ensure populations are monitored at appropriate times
- Update Natural Heritage ranks and Biodiversity Scorecards



Success of Conservation Actions

- 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?

Indicators for measuring success:

- Viability status
- Threat status
- Protection/conservation status



Other Tools: Climate Change Vulnerability Index



Species Common Name

Temperature Scope

Hamon AET:PET Moisture Metric Scope

>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

Nat'l 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

Tier 1

| Species | Common Name | >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 | Nat'l 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 |
|-------------------------------|------------------------|-------|----------|----------|------------------|------------------|------------------|-----------------|----------------|---------------|---------------|----------------------|--------------------------|-----------------------------|-------------------------------|----------------------------------|-------------|----------|--------------|-------------------|-------------|----------------|-----------------------|---------------------|
| <i>Aletes latilobus</i> | Canyonlands aletes | 100 | | | | | 100 | | Inc | Inc | N | Inc | N | Inc | GI | Inc | N | N | SI | N | U | N | U | EV |
| <i>Aliciella sedifolia</i> | Stonecrop gilia | 100 | | | 93 | 7 | | | GI | N | N | Inc | N | Inc | GI | GI | N | SI | N | N | U | N | U | EV |
| <i>Astragalus deterior</i> | Cliff-palace milkvetch | 100 | | | | 100 | | | Inc | Inc-SI | N | Inc | N | Inc | Inc | Inc | N | N | SI | N | N | N | SI | EV |
| <i>Astragalus humillimus</i> | Mancos milkvetch | 100 | | | | | 100 | | Inc | N | N | Inc | N | Inc | GI | Inc | N | N | SI | N | N | N | SI | EV |
| <i>Astragalus microcymbus</i> | Skiff milkvetch | 100 | | 97 | 3 | | | | SI-N | SI-N | Inc | Inc | SD | SI | Inc | SI | SI | N | N | N | N | N | SI | EV |
| <i>Astragalus osterhoutii</i> | Kremmling milkvetch | 100 | | | 100 | | | | SI | N | SI | Inc | SD | N | Inc | SI | SI | N | SI | N | N | N | SI | EV |
| <i>Astragalus schmolliae</i> | Sleeping Ute milkvetch | 100 | | | | 100 | | | Inc | N | N | Inc | N | N | Inc | Inc | SI | N | N | N | N | N | SI | EV |
| <i>Astragalus tortipes</i> | Sleeping Ute milkvetch | 100 | | | | | 100 | | Inc-SI | Inc-SI | Inc | Inc | N | N | GI | SI | SI | N | N | N | N | N | SI | EV |
| <i>Boechera glareosa</i> | | 100 | | | 100 | | | | Inc | N | Inc | Inc | N | N | GI | Inc | N | N | Inc | N | U | N | U | EV |
| <i>Corispermum navicula</i> | Boat-shaped bugseed | 100 | | | 33 | 67 | | | Inc | N | N | Inc | N | N | GI | Inc | N | N | Inc | N | U | N | U | EV |



How can we utilize the SWAP Rare Plant Addendum?



- Get familiar with and utilize the tools provided
- Utilize it as a conservation strategy within your organization and when working with partners
- Use it as a guide to prioritize resources for Plant Species of Greatest Conservation Need and associated habitats



- Promote the implementation of actions that benefit multiple species (plants & wildlife)
- Keep track of your implementation of conservation actions
 - ❖ And celebrate our accomplishments!!



Discussion/Questions?

<http://cpw.state.co.us/aboutus/Pages/StateWildlifeActionPlan.aspx>

