

Five Years In: A Status Review of Conservation Actions from the Rare Plant Addendum to the 2015 Colorado State Wildlife Action Plan (SWAP)

Rare Plant Symposium 2020

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Full Colorado SWAP:

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

Appendix A, Rare Plant Addendum Only:

<https://cpw.state.co.us/Documents/CNAP/Rare-Plant-SWAP-2015.pdf>



Colorado Wildlife Action Plan Appendix A: Rare Plants



By the Colorado Natural Heritage Program

For

Colorado Parks and Wildlife

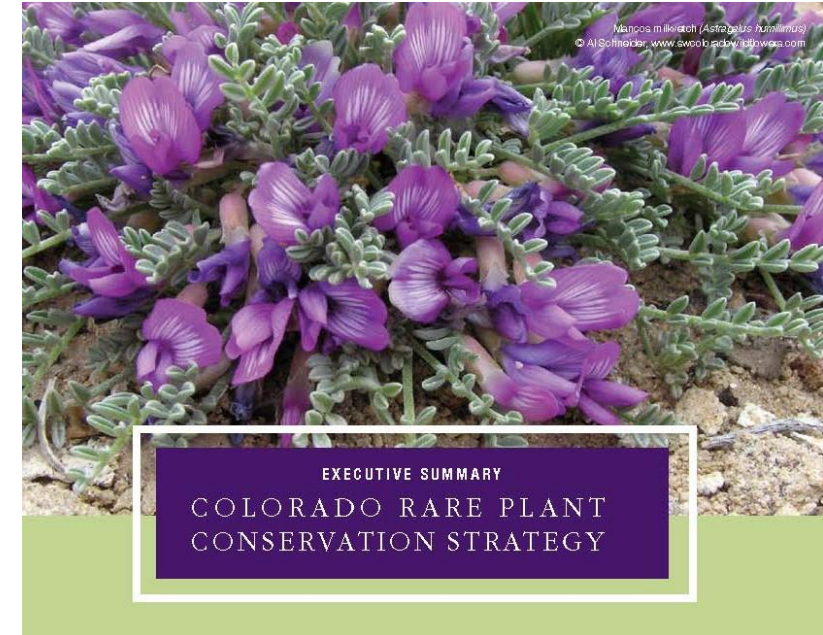
Introduction to the State Wildlife Action Plan (SWAP)

- Conservation roadmap, non-regulatory
- Product of CPW for all of Colorado
 - Developed with partners and stakeholders
- Outlines vulnerable habitats and species
 - Includes threats and conservation actions
- Updated every 10 years
 - 2015: 2ND version: included plants & climate change vulnerability of habitats
 - 159 vertebrate & mollusk species, 76 insects
- Allows eligibility for State Wildlife Grants



Introduction to the SWAP: Rare Plant Addendum

- Built on Rare Plant Conservation Strategy, 2009
 - RPCI: Partnership of 22 institutions
 - Funded by National Fish & Wildlife Foundation
 - 1st statewide strategy for rare plant conservation
- 117 Plants of Greatest Conservation Need (PGCN)
 - Tier 1: all G1, T&E (43 species)
 - Tier 2 (G2 plants)
- Includes:
 - Key Habitats
 - General and PGCN-specific threats and conservation actions
 - Important Plant Areas



Acknowledgements: We thank the National Fish and Wildlife Foundation (Native Plant Conservation Initiative) for providing primary funding for this project.

Colorado Rare Plant Conservation Initiative Partners

Betty Ford Alpine Gardens	Colorado Open Lands	The Nature Conservancy
Bureau of Land Management	Colorado State University	University of Colorado Denver
Center for Native Ecosystems	Denver Botanic Gardens	University of Colorado Herbarium
Colorado Department of Agriculture	Elliott Environmental Consulting	University of Northern Colorado
Colorado Department of Transportation	National Center for Genetic Resources Preservation	USDA Forest Service
Colorado Federation of Garden Clubs	Natural Resources Conservation Service	U.S. Fish and Wildlife Service
Colorado Native Plant Society	Rocky Mountain Society of Botanical Artists	
Colorado Natural Areas Program		
Colorado Natural Heritage Program		

We thank all of the RPCI partners for providing additional funding and/or in-kind services.

Rare Plant Addendum: Habitats

- 8 Key Habitats

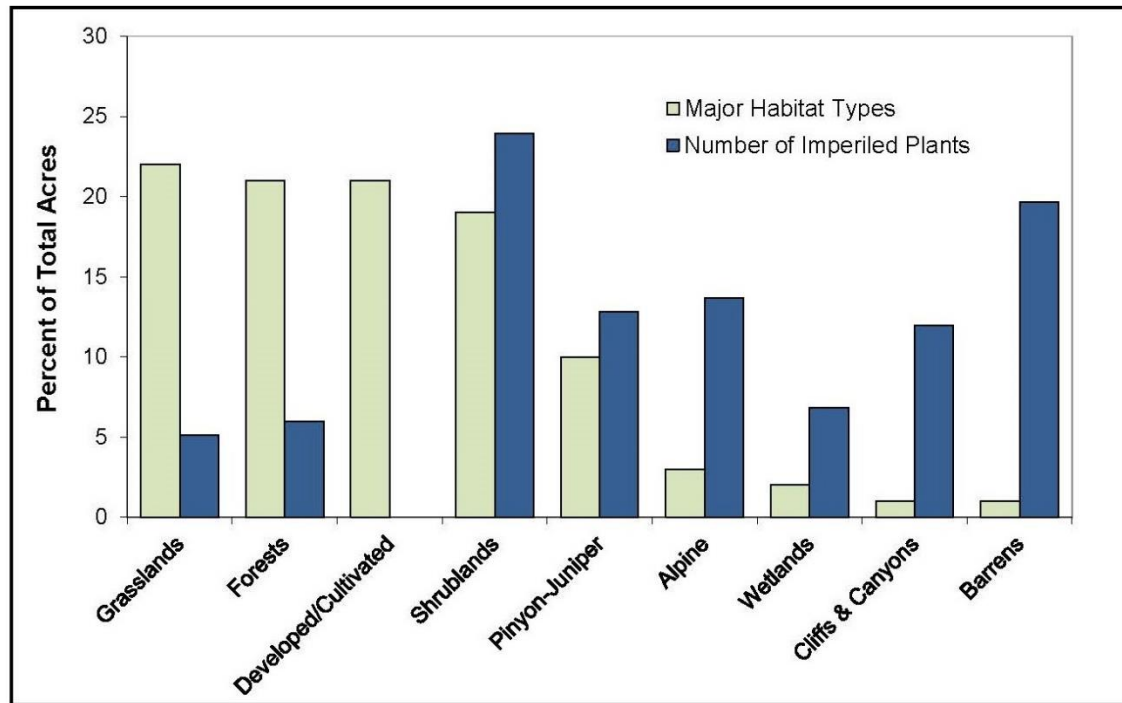


Figure 2. Key habitats as percentage of Colorado and the number of PGCN within each habitat type.

A-18

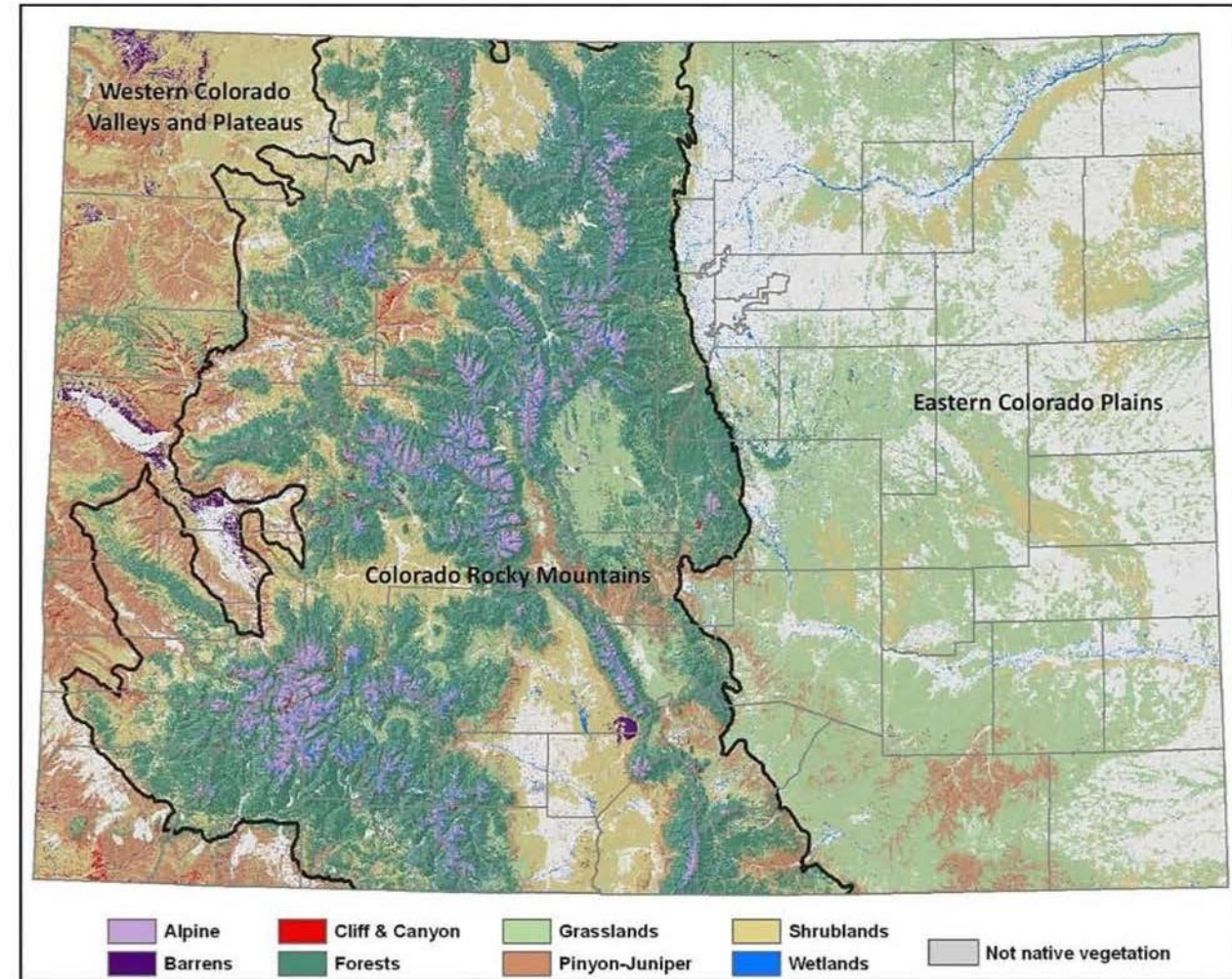


Figure 3. Distribution of major rare plant habitat types in Colorado.

Rare Plant Addendum: Habitats

- Key Habitats
 - Shrublands
 - Barrens
 - Wetlands/Cliff & Canyon



Piceance twinpod (*Physaria obcordata*)



Rollins twinpod (*Physaria rollinsii*)



Budding monkey flower (*Mimulus gemmiparus*)

Rare Plant Addendum: Primary Conservation Issues

- Energy Development
- Motorized Recreation
- Residential Development
- Road Construction & Maintenance
- Climate Change
- Lack of awareness



Rare Plant Addendum: General Conservation Actions

1. Secure on-the-ground, site-specific habitat protection/management
2. Minimize threats from specific land uses, and develop climate change adaptation strategies
3. Improve scientific understanding:
 - Reproductive, pollination, habitat parameters
 - Response to climate change, disturbance, threats
 - Taxonomic work
 - Complete distribution unknown (75% PGCN)
 - Majority of locations are historical (55% PGCN)
4. Develop and implement a state program and policies
5. Facilitate stewardship : education, outreach, coordination
6. Ex situ (off-site) conservation



Rare Plant Addendum: Tools

- Important Plant Areas
 - 290 areas identified
 - Area needed to support continued existence
 - B1 and B2 PCAs
 - Non-regulatory
 - 42 designated natural areas on 39 IPAs
 - 33 IPAs have BLM ACEC/WSA, or USFS RNA

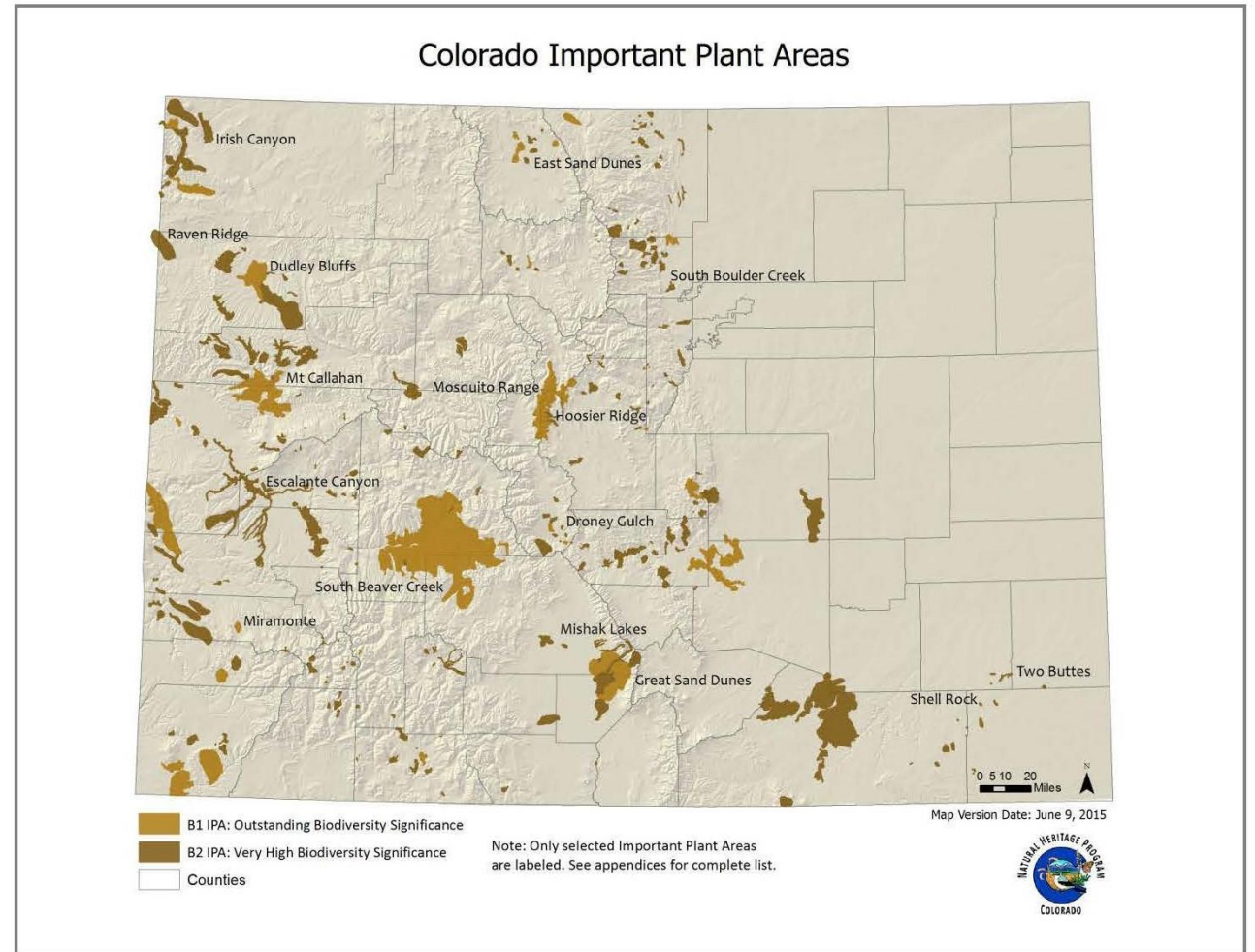


Figure 4. Map of Important Plant Areas (IPAs) in Colorado.

Rare Plant Addendum: Tools- 117 PGCN Tables

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

Aletes latilobus

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	7.2 Alliance & Partnership	Engage in collaborative, proactive	M

Rare Plant Addendum: Status Review

- 31 Tier 1 species
- Includes all T&E

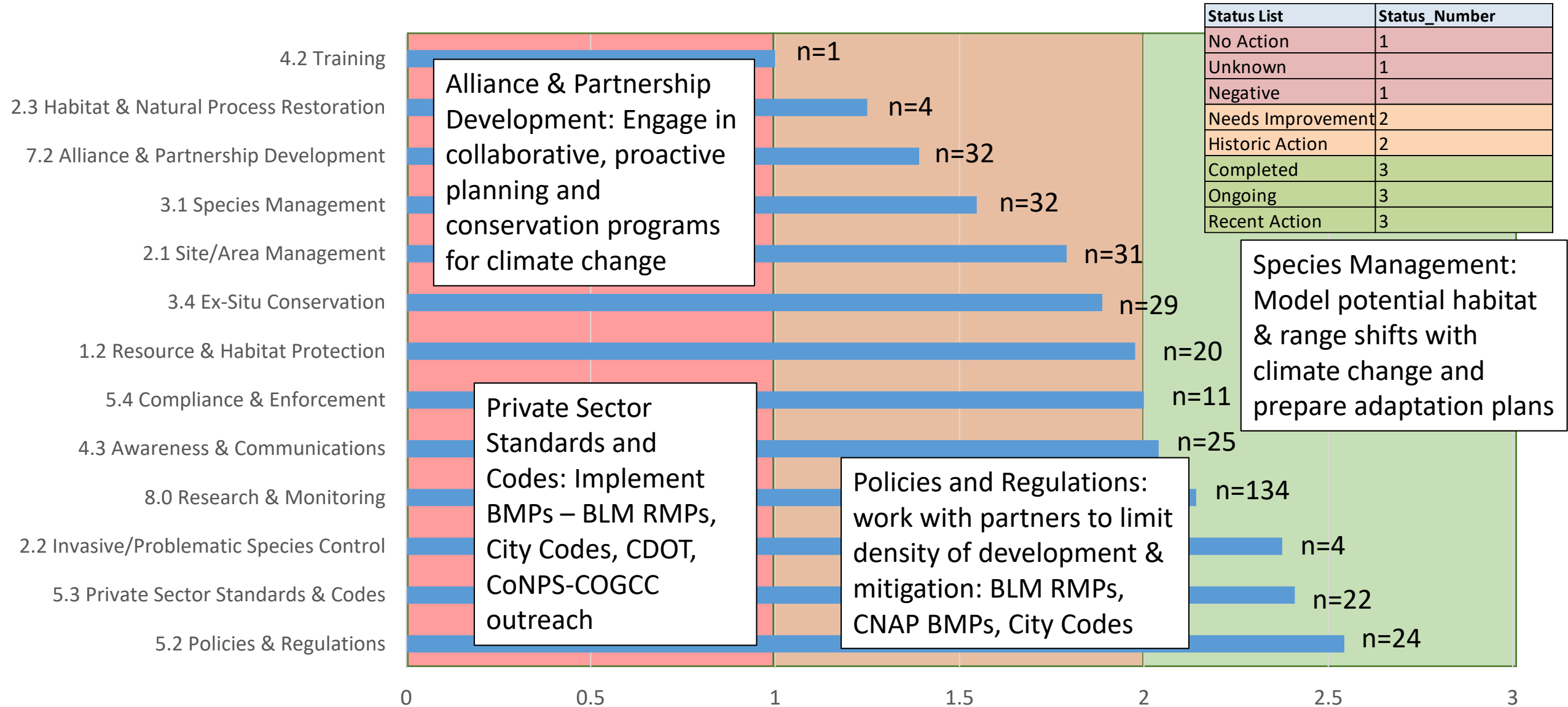
Specific Conservation Action Ranked

Status List	Status Number
No Action	1
Unknown	1
Negative	1
Needs Improvement	2
Historic Action	2
Completed	3
Ongoing	3
Recent Action	3

GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
01 Residential & Commercial Development	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H	2008 acquisition of Wacker Ranch by CPW, CNAP/TNC involvement
02 Incompatible Agriculture	Conversion to cropland	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H	2008 acquisition of Wacker Ranch by CPW, CNAP/TNC involvement
04 Transportation Corridors	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H	not included in CNHP Roadside BMP project; Fairview South closed to motor vehicle use (2020); Fairview north closed to motor vehicle use by fencing (~2009)
11 Climate Change & Severe Weather	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	No action
11 Climate Change & Severe Weather	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	soil moisture and temperature probes installed by BLM with rare plant monitoring; BLM CCV assessment: species EV to climate change
11 Climate Change & Severe Weather	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	CNAP funded DBG in 2009 for seed collection of this species
11 Climate Change & Severe Weather	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	Fairview South grazing allotments retired (2020), will help with resiliency; planning for range shifts needed
13 Lack of knowledge	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M	No action
13 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Expand and continue long term monitoring	M	BLM monitoring began in 2012; plot added at Wacker in 2015; assisted by CNAP as time allows
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	
03 Energy Production & Mining	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	NSO on ACEC; ROW exclusion area in ACEC; CoNPS advocacy to include plants in COGCC 2019 Rulemaking, SB-191
03 Energy Production & Mining	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	Fairview South ACEC expanded to 610 acres (2020)

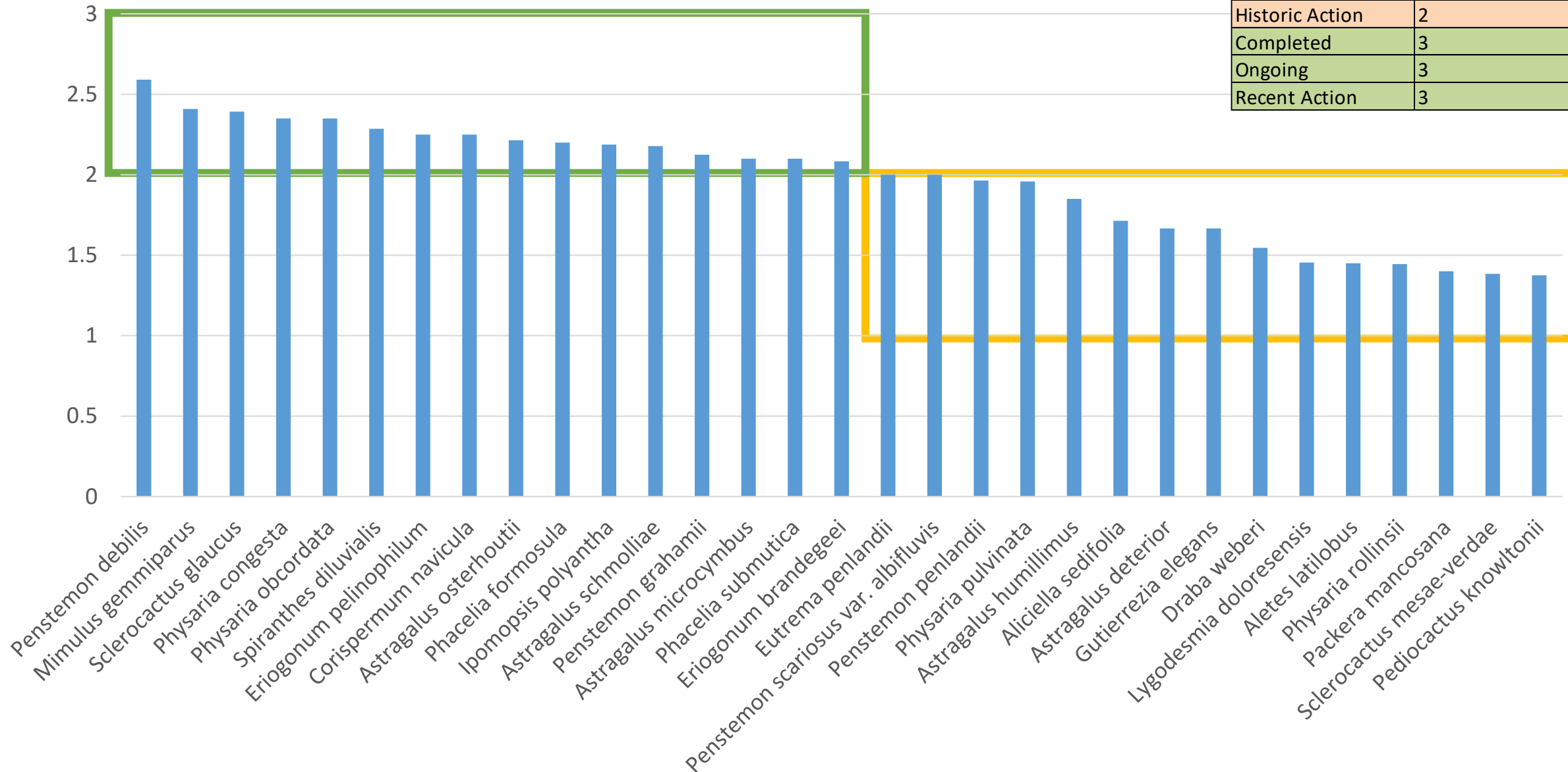
General Conservation Action Categories

Average of General Conservation Actions for 31 SWAP Tier 1 Species



Average of Conservation Actions, 31 SWAP Tier 1 Sp.

Status List	Status_Number
No Action	1
Unknown	1
Negative	1
Needs Improvement	2
Historic Action	2
Completed	3
Ongoing	3
Recent Action	3



Penstemon debilis: Parachute penstemon

GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
03 Energy Production & Mining	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	CNAP designation with Laramie Energy and OOSI
03 Energy Production & Mining	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	CNAP designation with Laramie Energy and OOSI; BLM: NSO, mitigation for roads; COGCC rulemaking changes with CoNPS advocacy
11 Climate Change & Severe Weather	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	BLM CCV Assessment; Species is EV
11 Climate Change & Severe Weather	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	DBG (CNAP funded) 2009; Betty Ford Alpine Garden
13 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H	Logan Wash (CNHP/CNAP); Anvil Points (BLM); Mt. Callahan (CNHP/CNAP)
03 Energy Production & Mining	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	CNAP working with Laramie Energy to conserve population
11 Climate Change & Severe Weather	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	Maxent model of likely habitat; no adaptation plan or potential range shifts mapped
11 Climate Change & Severe Weather	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	BMPs in natural areas designation; BLM ACEC road closure should help resiliency; more needed
13 Lack of knowledge	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M	Drone (CNHP, Aridlands, LLC, EcoloGIS, National Fish & Wildlife Foundation)
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	work on pollinators, genetics (McMullen thesis; Wolfe et al. 2015 paper)
13 Lack of knowledge	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	L	USFWS SSA

Aletes latilobus: Canyonlands aletes

GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
11 Climate Change & Severe Weather	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	BLM CCV Assessment: Species is EV to CC; more details on response needed
11 Climate Change & Severe Weather	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	seed and tissue collection in 2010
11 Climate Change & Severe Weather	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	No action
11 Climate Change & Severe Weather	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	populations are in National Monument and NCA designations
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	No action
06 Human Intrusions & Disturbance	Non-motorized recreation; climbing.	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	M	Unknown
06 Human Intrusions & Disturbance	Non-motorized recreation	2.1 Site/Area Management	Manage public use to minimize habitat disturbance	M	Unknown
13 Lack of knowledge	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	L	2009 surveys by CNHP paid for by CNAP
13 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	L	No action
06 Human Intrusions & Disturbance	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	L	Online Rare Plant Guide Entry; Need education to address recreational effects

Corispermum navicula: boat-shaped bugseed

GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
06 Human Intrusions & Disturbance	Motorized recreation	2.1 Site/Area Management	Manage public use to minimize surface disturbance and off trail use	H	BLM RMP: manage North Sand Hills ACEC for protection: fence, restore, sign the area; close routes and limit to designated OHV routes
11 Climate Change & Severe Weather	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	BLM CCV Assessment; Species is EV to CC; more details on response needed
11 Climate Change & Severe Weather	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	DBG collected 2009 (CNAP funded)
13 Lack of knowledge	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	H	UNC surveys as part of genetic research
13 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Implement demographic monitoring	H	BLM monitoring at North Sand Dunes
06 Human Intrusions & Disturbance	Motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M	Online Rare Plant Guide; specific education in habitat area for recreational users unknown
06 Human Intrusions & Disturbance	Motorized recreation	5.4 Compliance & Enforcement	Enforce off-road travel restrictions	M	CPW manages East Sand Dunes as no access for motorized vehicles; BLM RMP calls for fencing and closing North Sand Dunes
11 Climate Change & Severe Weather	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	No action
11 Climate Change & Severe Weather	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	unknown
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	recent taxonomic work by DBG (CNAP/BLM funded), and genetics (UNC, USFWS funded)

Eriogonum pelinophilum: clay-loving wild buckwheat

GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
01 Residential & Commercial Development	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H	2008 acquisition of Wacker Ranch by CPW, CNAP/TNC involvement
02 Incompatible Agriculture	Conversion to cropland	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	H	2008 acquisition of Wacker Ranch by CPW, CNAP/TNC involvement
04 Transportation Corridors	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H	not included in CNHP Roadside BMP project; Fairview South closed to motor vehicle use (2020); Fairview north closed to motor vehicle use by fencing (~2009)
11 Climate Change & Severe Weather	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	No action
11 Climate Change & Severe Weather	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	soil moisture and temperature probes installed by BLM with rare plant monitoring; BLM CCV assessment: species EV to climate change
11 Climate Change & Severe Weather	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	CNAP funded DBG in 2009 for seed collection of this species
11 Climate Change & Severe Weather	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	Fairview South grazing allotments retired (2020), will help with resiliency; planning for range shifts needed
13 Lack of knowledge	Reproductive and/or pollination biology and specific habitat parameters unknown	8.0 Research & Monitoring	Research critical life history/habitat components	M	No action
13 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Expand and continue long term monitoring	M	BLM monitoring began in 2012; plot added at Wacker in 2015; assisted by CNAP as time allows
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	
03 Energy Production & Mining	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	NSO on ACEC; ROW exclusion area in ACEC; CoNPS advocacy to include plants in COGCC 2019 Rulemaking, SB-191
03 Energy Production & Mining	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	Fairview South ACEC expanded to 610 acres (2020)

Mimulus gemmiparus: budding monkeyflower

GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
06 Human Intrusions & Disturbance	Non-motorized recreation	2.1 Site/Area Management	Manage public trail use to avoid surface disturbance and fragmentation of habitat	H	Design of Elk Creek Falls trail to protect habitat, CNAP Natural Areas Designation aided in awareness
06 Human Intrusions & Disturbance	Non-motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	H	Interpretive signs, Staunton State Park
11 Climate Change & Severe Weather	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	2014 EcoMetrics study of habitat condition assessment in relation to plant density (CNAP funded)
11 Climate Change & Severe Weather	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	2017 bulbil collection, propagation, and research into cold storage by EcoMetrics, CSU; no genetic material has been stored in a long-term bank.
13 Lack of knowledge	Current population status unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution, abundance, and threat status	H	EcoMetrics Inventory with population viability and updated EOs for each population, 2017 (CNAP, USFS, USFWS funding)
13 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H	surveys at known locations by EcoMetrics, funded by CNAP, USFS, USFWS
11 Climate Change & Severe Weather	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	CNHP Maxent model of likely habitat (unknown funding); no adaptation plan or potential range shifts mapped
11 Climate Change & Severe Weather	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	No action
13 Lack of knowledge	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M	EcoMetrics Inventory and surveys, 2015-2017, 3 new populations (one with estimated over 3 million plants), funded by CNAP, USFS, USFWS
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	2018, 2019 Genetics Work: UNC and Miami University
13 Lack of knowledge	Threats are poorly understood	8.0 Research & Monitoring	Research species/habitat response to management or disturbance	L	No Action

Spiranthes diluvialis: Ute ladies'-tresses



GenThreat	SpecThreatDetail	GenCons	SpecCons	Priority	Action Notes
04 Transportation Corridors	Fragmentation and/or ROW maintenance	5.2 Policies & Regulations	Establish mitigation requirements for developments and other projects that impact species/habitats	H	OSMP 2013- current mitigation for US 36; City of Fort Collins Land Use Code
04 Transportation Corridors	Fragmentation and/or ROW maintenance	5.3 Private Sector Standards & Codes	Implement Best Management Practices for transportation projects	H	OSMP 2013- current mitigation for US 36
06 Human Intrusions and Disturbance	Non motorized recreation	2.1 Site/Area Management	Manage public use to be compatible with biodiversity	H	Jeffco fencing off recreation use; OSMP visitor use plan
07 Natural Systems Modification	Altered hydrological regime (surface or aquifer)	2.3 Habitat & Natural Process Restoration	Restore natural hydrologic regime	H	Jeffco protecting hydrologic regime; Pitkin County protecting late summer river flows; restoration unknown
07 Natural Systems Modification	Altered hydrological regime (surface or aquifer)	5.4 Compliance & Enforcement	Enforce 404 wetlands regulations	H	South Boulder population threatened by flood mitigation project; highway expansion impacts; enforcement occurs sometimes
11 Climate Change & Severe Weather	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	SWAP CCV Assessment completed; Species EV to climate change; more needed
11 Climate Change & Severe Weather	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 Lack of knowledge	Long term population trends unknown	8.0 Research & Monitoring	Continue long term monitoring	H	OSMP monitoring ongoing; population status checks: BLM, Jeffco, NPS, City of Fort Collins
01 Residential & Commercial Development	Urban, suburban, and ex-urban development	1.2 Resource & Habitat Protection	Acquire conservation easement for habitat protection	M	2016 Conservation Easements, Aspen Valley Land Trust & CPW
06 Human Intrusions and Disturbance	Non motorized recreation	4.3 Awareness & Communications	Publish educational material/sponsor educational programs to raise public awareness	M	CNHP Rare Plant Guide; specific education in habitat area unknown
11 Climate Change & Severe Weather	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	CNHP developed maxent model (USFWS/CNAP Sec 6 funded); no adaptation plan or potential range shifts mapped
11 Climate Change & Severe Weather	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	multi-agency collaboration, uncertain on climate change planning
13 Lack of knowledge	Complete distribution in Colorado unknown	8.0 Research & Monitoring	Conduct field inventory to refine known distribution	M	field inventory expanded known occurrences: Gypsum Ponds SWA (2017), BLM (2019)
14 Natural Factors	Globally rare and/or small population size	8.0 Research & Monitoring	Research critical life history/habitat components	M	1998 genetics investigations (Arft & Ranker)

Review of Selected Short Term Goals

1. Select targeted PGCN for site-specific conservation action each year (*No Action*)
2. Prioritize the 33 Important Plant Areas ranked (B1)
 - Convene working groups, develop and implement conservation action plans (*7 IPAs done prior to 2015, No recent action*)
 - Add Natural Areas, ACEC, or RNA in B1 Important Plant Areas. (*At least 3 since 2015: Troublesome Creek ACEC; Pagosa Skyrocket NA, Laramie River ACEC*)
 - 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 (*Updated BLM, USFS Resource Management Plans*)
4. Develop and implement BMPs; pursue special agency designations. (*CNHP/CNAP project on BMPs for roadside rare plants; CNHP/Dept. Ag BMPs for weed management in rare plants populations*)
5. Educate development industries about avoiding and/or mitigating impacts to PGCN; raise public awareness of PGCN. (*CoNPS outreach to COGCC, Online Rare Plant Guide, Rare Plant Symposium*)





6. Develop a plant policy for the CO DNR, General Assembly, and Governor's executive order; Develop a bill for a state plant statute (*No Action*)
7. Integrate the PGCN into other statewide conservation planning and protection efforts (*Unknown*)
8. Improve scientific understanding (*Average score of 2.13 for PGCN reviewed for the Research and Monitoring General Conservation Action *would be lower if included Tier 2 species*)
9. Adopt measures for ex situ (off site) conservation (High priority for all PGCN) (*~60% of PGCN reviewed had seed collection at some point*)
10. Research on rare plant and pollinator responses to changing climate (*Needs Improvement: BLM & SWAP Climate Change Vulnerability Assessment gives a cursory look; Some rare plant monitoring including soil moisture and temperature data collection, few pollinator studies*)
11. Conduct taxonomic and/or genetic research (*2017 work on *Packera mancosana* confirmed species; genetics research on 14 of 31 species reviewed*)

Next Steps

- Review the SWAP conservation action table specific to “your” species
- Collaborate on reviewing actions*
- CODEX: CNHP’s new tool for conservation review – coming soon
 - Include PGCN known locations
 - Distribution models for Tier 1 PGCN, some Tier 2
- Working groups to target some of these actions?



- To provide feedback on species reviewed, contact Jessica Smith:
jp.smith@colostate.edu

- *Aletes latilobus*
- *Aliciella sedifolia*
- *Astragalus deterior*
- *Astragalus humillimus*
- *Astragalus microcymbus*
- *Astragalus osterhoutii*
- *Astragalus schmolliae*
- *Corispermum navicula*
- *Draba weberi*
- *Eriogonum brandegeei*
- *Eriogonum pelinophilum*
- *Eutrema penlandii*
- *Gutierrezia elegans*
- *Ipomopsis polyantha*
- *Lygodesmia doloresensis*
- *Mimulus gemmiparus*
- *Packera mancosana*
- *Pediocactus knowltonii*
- *Penstemon debilis*
- *Penstemon grahamii*
- *Penstemon penlandii*
- *Penstemon scariosus* var. *albifluvis*
- *Phacelia formosula*
- *Phacelia submutica*
- *Physaria congesta*
- *Physaria obcordata*
- *Physaria pulvinata*
- *Physaria rollinsii*
- *Sclerocactus glaucus*
- *Sclerocactus mesae-verdae*
- *Spiranthes diluvialis*

check out all the PGCN here:
<https://cpw.state.co.us/Documents/CNAP/Rare-Plant-SWAP-2015.pdf>



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