

Preliminary Conservation Action Plan: Rare Plants in the Gateway Priority Action Area



Dolores skeleton plant
(*Lygodesmia doloresensis*)



Fisher Towers milkvetch
(*Astragalus piscator*)



Horseshoe milkvetch
(*Astragalus equisolensis*)



Osterhout cat's-eye
(*Oreocarya osterhoutii*)

**Sponsored by the
Colorado Rare Plant Conservation Initiative**

**Planning workshop date: June 23-24, 2010
Report date: June 8, 2011**

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Cover photographs by Peggy Lyon.

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I. Introduction

This document identifies conservation strategies for the globally imperiled plants, Dolores skeleton plant (*Lygodesmia doloresensis*), Horseshoe milkvetch (*Astragalus equisolensis*), Osterhout cat's-eye (*Oreocarya osterhoutii*) and Fisher Towers milkvetch (*Astragalus piscator*) in the Gateway area in Colorado, based on an assessment of their viability and threats by participants in a June 23-24, 2010 workshop. The primary audience is intended to be the workshop participants and other stakeholders interested in helping to take action to conserve these imperiled plants.

Gateway is a Priority Action Area recognized by the Colorado Rare Plant Conservation Initiative (RPCI). The RPCI is a diverse partnership of public and private organizations dedicated to conserving Colorado's natural heritage by improving the protection and stewardship of the state's most imperiled plants. RPCI has developed a statewide strategy for the conservation of Colorado's most imperiled plant species (Neely et al. 2009). As part of this effort, the group is working with partners to identify site-specific strategies in areas supporting the most imperiled species. RPCI partners have identified ten Priority Action Areas around the state: Adobe Hills, Arkansas Valley Barrens, Middle Park, North Park, Pagosa Springs, Piceance Basin, Roan Cliffs, Big Gypsum Valley-Dry Creek Basin, Plateau Creek-Miramonte Reservoir, and Gateway (**Figure 1**). Thus far, RPCI has led workshops with local partners to identify priority conservation strategies for eight of these areas (Adobe Hills and Roan forthcoming).

A Priority Action Area is an area identified as needing immediate conservation action to prevent the need for listing, extinction, or further losses of imperiled plant species (Neely et al. 2009). Selection was based on the level of imperilment of rare plant species, quality of the occurrences, urgency of the management and protection actions, and other opportunities such as funding and land ownership patterns. These areas are based on the Potential Conservation Areas identified by the Colorado Natural Heritage Program (2010), at Colorado State University, with input by the RPCI and the Rare Plant Technical Committee.

Located in Mesa County, Colorado, the Gateway Action Area includes high quality occurrences of Dolores skeleton plant (*Lygodesmia doloresensis*, G1G2), Horseshoe milkvetch (*Astragalus equisolensis*, G2), Fisher Towers milkvetch (*Astragalus piscator*, G2), and Osterhout cat's-eye, (*Oreocarya osterhoutii*, G3), the primary targets of this action plan. All four species are included on the Bureau of Land Management's Sensitive Species List (BLM 2010). Several other significant elements of biodiversity add to the conservation values of this area, e.g., the Peregrine Falcon, Grey Vireo, Canyon treefrog, Wild privet shrublands, Hanging gardens, Kachina daisy, Utah penstemon, and Long-flower cat's-eye.

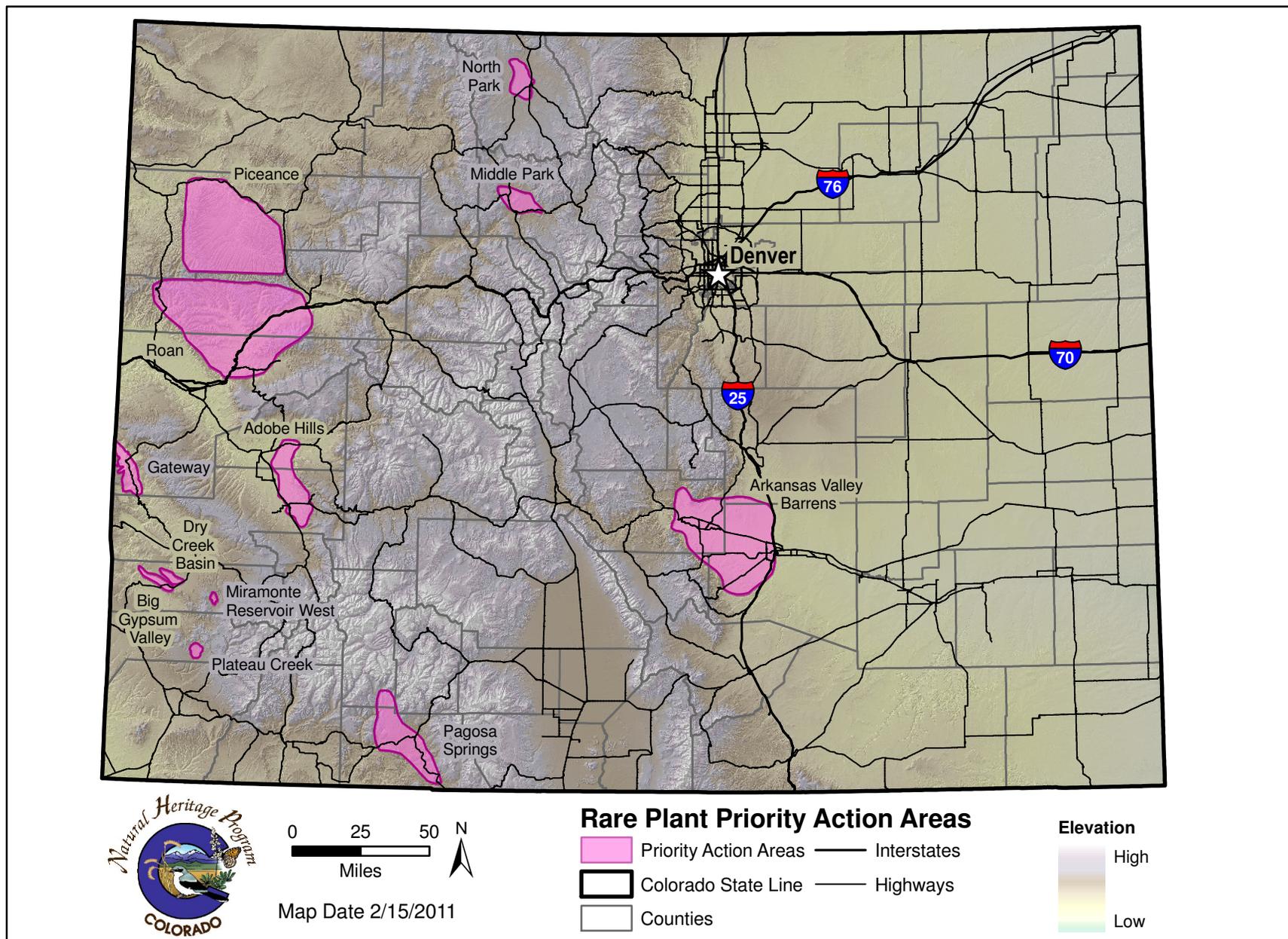


Figure 1. Priority Action Areas identified by the Colorado Rare Plant Conservation Initiative (RPCI, Neely et al. 2009). These areas are also recognized by RPCI as Important Plant Areas, and are based on Potential Conservation Areas developed by the Colorado Natural Heritage Program at Colorado State University (CNHP 2010). This report focuses on the Gateway site.

II. Imperiled Plants of the Gateway Priority Action Area

A. Dolores skeleton plant (*Lygodesmia doloresensis*)

Dolores skeleton plant (**Figure 2**) is a pink flowered, broomy plant in the Sunflower Family (Asteraceae). Although there are some taxonomic questions relative to the specific classifications within the genus *Lygodesmia*, this species is believed to be endemic to the Dolores River Valley in Colorado and Utah (USDA PLANTS 2010, Flora of North America 2010; Weber and Wittmann 2001; NatureServe 2010). It has been recently found in Rabbit Valley, Colorado (CNHP 2010), north of the Colorado River.

The Colorado Natural Heritage Program (2010) at Colorado State University and NatureServe (2010) consider the Dolores skeleton plant to be critically globally imperiled (G1G2) because it is only known from 17 locations in the world (12 in Colorado and five in Utah) within two counties (one in Colorado and one in Utah), and a total of about 3,700 individuals documented on approximately 1,000 acres (Colorado Natural Heritage Program 2010). None of the 17 known locations are considered to have excellent viability, two are estimated to have good viability, and the remaining 15 occurrences are either historical (not observed in over 20 years) or considered to be fair, or of unknown viability (CNHP 2010). The species, known from Bureau of Land Management (BLM) and private lands, is on the BLM State Sensitive Species List. The BLM manages special status species and their habitats to provide for their conservation and restoration, and works to protect all BLM Sensitive Species so that listing through the Endangered Species Act will not be required. Mesa County weed managers are aware of the occurrences of this species and are actively working to assure its viability on County rights of way (Sirota, Former Mesa County Weed Coordinator, pers. comm. 2010).

Non-technical description:

The plants have narrow, reduced leaves, and milky juice. Each flower head has (usually) five pink ray flowers, which distinguish it from the closely related *L. grandiflora* with 8 or more rays. It is similar to *L. grandiflora* var. *dianthopsis*, which is distinguished by being less branched and by having broader leaves (FNA 2007).

Phenology: Plants begin flowering in late May and early June.

Habitat: This species grows in sandy soils in the desert shrub and pinyon-juniper zone, on benches in the valley (**Figure 3**). Many of the known occurrences are along roads, and there are fewer plants away from disturbed roadsides.

Range: The species is known from the Dolores River Valley in Colorado and Utah, as well as the Rabbit Valley and Baxter Pass area in Colorado (**Figure 4**).

Conservation Issues: The primary threat at this time is considered to be road maintenance and construction (CNHP Scorecard 2008). Several of the Colorado occurrences are found along roadsides and are impacted by road maintenance activities, and the possible introduction of noxious weeds. Incompatible grazing is considered to be another potential threat to the species (CNHP 2010); however, Lyon (1996) indicates that the species seems to be surviving with grazing in its habitat. Conservation issues for the Dolores skeletonplant are discussed in greater detail on pages 19-21.



Figure 2. Close up photos of Dolores skeletonplant (*Lygodesmia doloresensis*) by Loraine Yeatts.



Figure 3. Full plant and habitat for Dolores skeletonplant (*Lygodesmia doloresensis*) taken in the Gateway area by Loraine Yeatts.

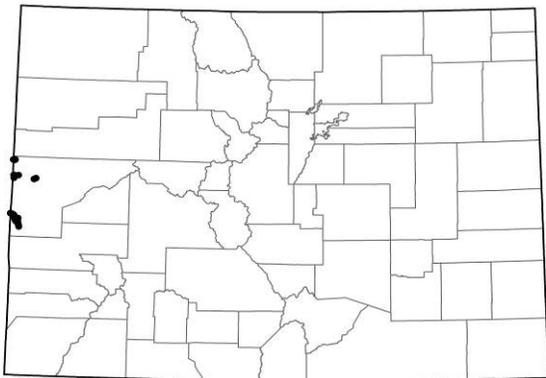


Figure 4. Distribution of Dolores skeletonplant (*Lygodesmia doloresensis*) in Colorado. This species is also known from 5 locations in Utah.

B. Horseshoe milkvetch (*Astragalus equisolensis*= *Astragalus desperatus* var. *neeseae*)

Horseshoe milkvetch (**Figure 5**) is a perennial plant, with bright purple flowers, in the Pea Family (Fabaceae).

The Colorado Natural Heritage Program (2010) at Colorado State University and NatureServe (2010) consider the Horseshoe milkvetch to be globally imperiled (G2) because it is only known from about ten locations in the world (eight in Colorado and two in Utah) within two counties (one in Colorado and one in Utah), and a total of about 30,000 individuals documented (Colorado Natural Heritage Program 2010). The species is known from Bureau of Land Management (BLM), private, and state lands, and is on the BLM State Sensitive Species List (BLM 2010). The BLM manages special status species and their habitats to provide for their conservation and restoration, and works to protect all BLM Sensitive Species so that listing through the Endangered Species Act will not be required.

Non-technical description: The plants have leafless flower stems and typical pea-shaped, flowers. The wings and keel are purple, while the banner (large top petal) is bicolored – purple with white stripes.

Phenology: This species generally flowers in late April and May, and sets fruit by the end of May.

Habitat: Horseshoe milkvetch is associated with mixed desert and salt desert shrub vegetation communities that are generally dominated by sagebrush, shadscale and horsebrush (**Figure 6**). The populations in Mesa County occur in an open juniper/blackbrush community on rocky convex slopes with red soils. Often the plants are found growing under the blackbrush shrubs.

Range: Horseshoe milkvetch is known only from eight occurrences (two of these are imprecisely mapped historical occurrences and so not counted above) in the Gateway area in Colorado, and from the Green River Valley in Utah (**Figure 7**). The Colorado populations are estimated to total about 3,000 individuals in six occurrences covering only about 10 acres.

Conservation Issues: Road construction and maintenance may impact the plants in the Gateway area. Both motorized and non-motorized recreation may also damage some sites. Conservation issues for the Horseshoe milkvetch are discussed in greater detail on pages 19-21.



Figure 5. Horseshoe milkvetch (*Astragalus equisolensis*) by Peggy Lyon.



Figure 6. Habitat for Horseshoe milkvetch (*Astragalus equisolensis*) by Peggy Lyon.

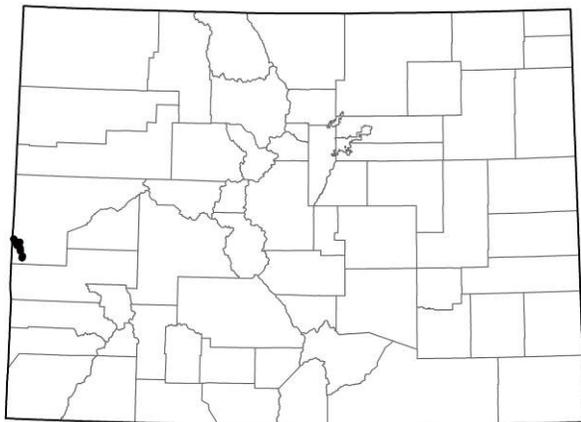


Figure 7. Distribution of Horseshoe milkvetch (*Astragalus equisolensis*) in Colorado (the species is also known from two locations in Utah).

C. Fisher Towers milkvetch (*Astragalus piscator*)

Fisher Towers milkvetch (**Figure 8**) is a low-growing, pink flowered, short-lived perennial of the Pea Family (Fabaceae).

The Colorado Natural Heritage Program (2010) at Colorado State University and NatureServe (2010) consider the Fisher Towers milkvetch to be globally imperiled (G2) because it is only known from approximately 9 locations in the world (three in Colorado and six in Utah) within four counties (one in Colorado and three in Utah), and a total of several thousand individuals estimated (Colorado Natural Heritage Program 2010). The species, known from Bureau of Land Management (BLM) and private lands, is on the BLM State Sensitive Species List. The BLM manages special status species and their habitats to provide for their conservation and restoration, and works to protect all BLM Sensitive Species so that listing through the Endangered Species Act will not be required.

Non-technical description: Plants have three to ten pink “pea type” flowers on leafless stems. Stems are erect when in flower, and often spread out at the base of the leaves when in fruit. The foliage is covered with appressed hairs and is yellowish-green on top and gray-green below. *Astragalus piscator* is similar to *A. amphioxys*, which is also common in the Gateway area. The Fisher Towers milkvetch can be distinguished in the field by its narrower, more pointed leaflets and lighter flower color.

Phenology and reproductive ecology: Plants flower in April, and by the end of the month, many are already in fruit.

Habitat: The plants grow on sandy, slightly gravelly soils with mixed red and white particles on valley benches and in gullied foothills (**Figure 9**).

Range: Fisher Towers milkvetch is found in Utah (San Juan, Grand and Wayne counties), and Mesa County, Colorado (**Figure 10**). It has been reported, but not confirmed, from Arizona.

Conservation Issues: The primary issue in Colorado at this time is considered to be road construction and maintenance (CNHP Scorecard 2008). The Colorado occurrences are partially within the BLM Palisade Wilderness Study Area, the Palisade Area of Critical Environmental Concern (ACEC), and along a road. However, the area is heavily grazed and includes many exotic species (e.g., cheatgrass and Russian knapweed). A portion of one occurrence is also near the Gateway Community Center. Motorized recreation poses a threat at this location. Conservation issues for the Fisher Towers milkvetch are discussed in greater detail on pages 19-21.



Figure 8. Close up photos of Fisher Towers milkvetch (*Astragalus piscator*) by Loraine Yeatts.



Figure 9. Habitat for Fisher Towers milkvetch (*Astragalus piscator*) by Loraine Yeatts



Figure 10. Distribution of Fisher Towers milkvetch (*Astragalus piscator*) in Colorado. This species is also known from 11 locations in Utah.

D. Osterhout cat's-eye (*Oreocarya osterhoutii*)

Osterhout cat's-eye is a low growing, white flowered plant in the Borage family (Boraginaceae).

The Colorado Natural Heritage Program (2010) at Colorado State University and NatureServe (2010) consider Osterhout cat's-eye to be globally vulnerable because it is only known from fewer than 100 locations in the world (seven in Colorado and approximately 52 in Utah) within five counties (one in Colorado and four in Utah). The species is known from Bureau of Land Management (BLM) and private lands, and is listed on the BLM State Sensitive Species List (BLM 2010). The BLM manages special status species and their habitats to provide for their conservation and restoration, and works to protect all BLM Sensitive Species so that listing through the Endangered Species Act will not be required.

Non-technical description: Plants are densely caespitose with many rosettes of basal leaves and flowering stems occurring together. The inflorescence is short and broad. Flowers are white, with a yellow eye and short corolla tube. Leaves and stems have white appressed hairs.

Phenology: Flowering is typically in May and early June, and fruits are mature by mid-June.

Habitat: The plants grow in dry, sandy soils of the desert with sagebrush (*Artemisia*), blackbrush (*Coleogyne*), or Juniper (*Juniperus*). In the Gateway area plants occur on dark red sandy soils of the Moenkopi Formation.

Range: Osterhout cat's-eye is known from Mesa County, Colorado and 4 counties in southeastern Utah. It is currently unknown whether this species occurs in adjacent northeastern Arizona.

Conservation Issues: The primary threat at this time is considered to be recreation/hiking (CNHP Scorecard 2006). The Gateway site is along a dry wash which could be used by ATVs, although no evidence of this was seen in 2008. Conservation issues for Osterhout cat's-eye are discussed in greater detail on pages 19-21.

III. Gateway Priority Action Area

This document focuses on globally imperiled plants within the Gateway Priority Action Area (**Figures 11 and 12**).

Located in Mesa County, the Action Area includes a large portion of the known the occurrences of Dolores skeletonplant, Horseshoe milkvetch, Fisher Towers milkvetch and Osterhout cat's-eye in a spectacular landscape with red sandstone cliffs forming a dramatic back-drop. The Gateway Priority Action Area is adjacent to and contains a small portion of the Palisade BLM Wilderness Study Area. The Area is also adjacent to and contains part of the Palisade BLM Area of Critical Environmental Concern and the Palisade State Natural Area.



Figure 11. Map of the Gateway Priority Action Area showing the topographic setting. Action Area boundaries are based on Potential Conservation Areas developed by the Colorado Natural Heritage Program (2010) and are recognized by the Colorado Rare Plant Conservation Initiative as Important Plant Areas (Neely et al. 2009).

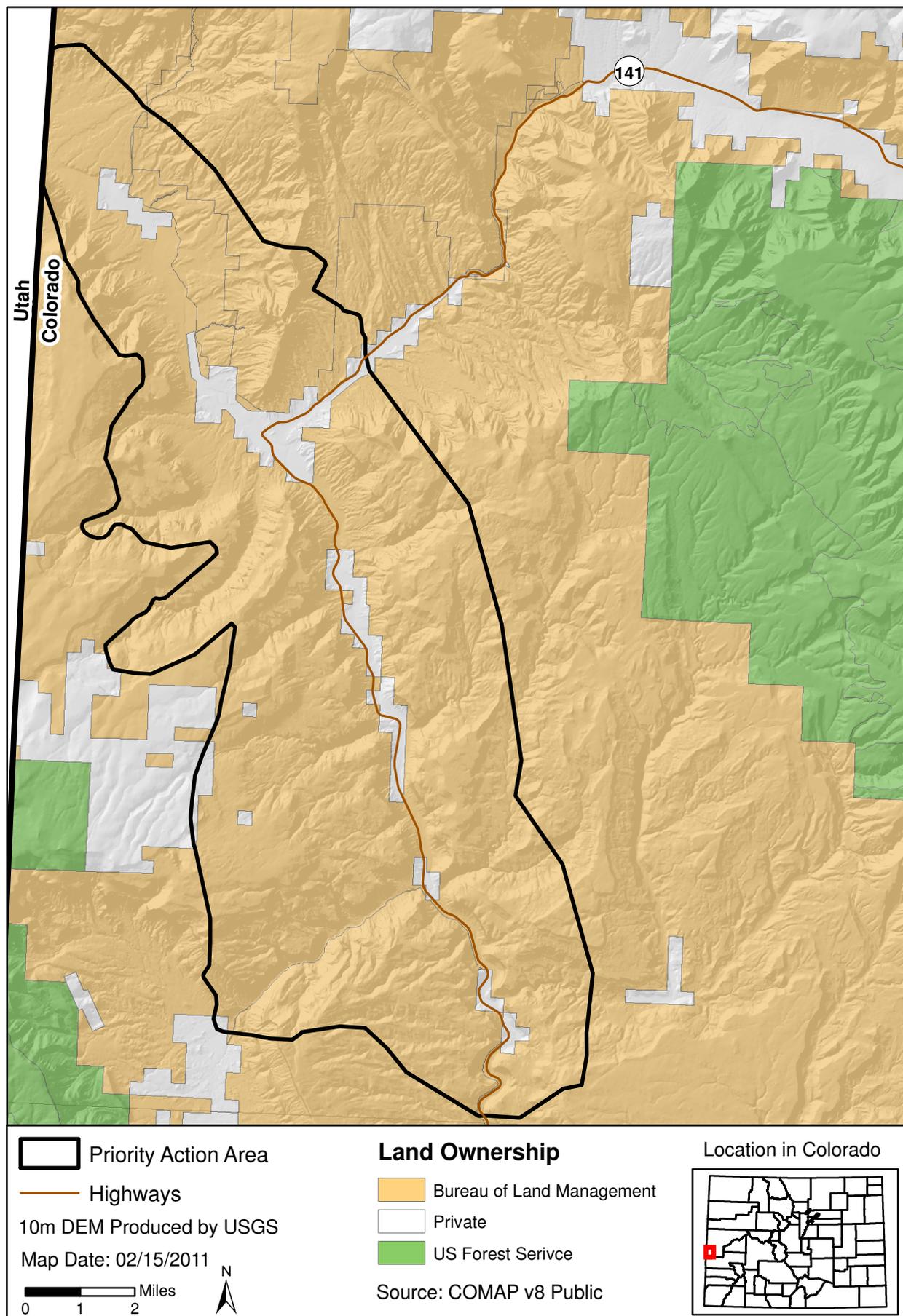


Figure 12. Map of the Gateway Priority Action Area showing local land ownership. Action Area boundaries are based on Potential Conservation Areas developed by the Colorado Natural Heritage Program (2010) and are recognized by the Colorado Rare Plant Conservation Initiative as Important Plant Areas (Neely et al. 2009).

Although the primary focus of this meeting is on the four species described above, there are eleven additional plants in the Gateway area that are tracked by the Colorado Natural Heritage Program (Table 1). These species and associated communities should be integrated into the conservation objectives of future workshops, and warrant consideration in land use and management activities in the Gateway area (see also Attachment 1).

Table 1. Plants of Focus in the Gateway Priority Action Area (Colorado Natural Heritage Program 2010). A list of other significant taxa from this area is provided in Attachment 1.

Common name	Scientific name	Known occurrences	Global rank*	Status	CNHP Rare Plant Field Guide Link
Focus of the workshop and this document					
Dolores skeleton plant	<i>Lygodesmia doloresensis</i>	12 CO occurrences, 7 in Gateway area +UT	G1G2/S1S2	BLM sensitive	http://www.cnhp.colostate.edu/rareplants/
Fisher Towers milkvetch	<i>Astragalus piscator</i>	3 CO occurrences, all in Gateway area, +UT	G2/S1	BLM sensitive	http://www.cnhp.colostate.edu/download/projects/rareplants/PDFAB0FA90.html
Horseshoe milkvetch	<i>Astragalus equisolensis</i>	8 CO occurrences, all in Gateway area, +UT	G2/S2	BLM sensitive	Not included
Osterhout cat's-eye	<i>Oreocarya osterhoutii</i>	7 CO occurrences	G3/S2	BLM sensitive	http://www.cnhp.colostate.edu/download/projects/rareplants/PDBOR0A270.html
Other important rare plants in or near the Gateway Priority Action Area, the focus of future efforts					
Kachina daisy	<i>Erigeron kachinensis</i>	3 CO occurrences	G2/S1	BLM	http://www.cnhp.colostate.edu/download/projects/rareplants/pdfs/23346.pdf
Southern maidenhair fern	<i>Adiantum capillus-veneris</i>	13 CO occurrences	G5/S2	none	http://www.cnhp.colostate.edu/download/projects/rareplants/PPADI03010.html
Colton's milkvetch	<i>Astragalus coltonii</i> var. <i>moabensis</i>	1 CO occurrence (also in UT, AZ, WY)	G5T3?/S2	none	Not included
Eastwood's milkvetch	<i>Astragalus eastwoodiae</i>	7 CO occurrences (also UT)	G3/S3	none	Not included
Naturita milkvetch	<i>Astragalus naturitensis</i>	40 CO occurrences (also UT and NM)	G2G3/S2S3	BLM sensitive	http://www.cnhp.colostate.edu/download/projects/rareplants/PDFAB0F5T0.html
San Rafael milkvetch	<i>Astragalus rafaensis</i>	7 CO occurrences (also UT)	G2G3 (G3Q)?/S1	BLM sensitive	http://www.cnhp.colostate.edu/download/projects/rareplants/PDFAB0F7D0.html
Spike pappusgrass	<i>Enneapogon desvauxii</i>	2 CO occurrences (several other states)	G5/S1	none	Not included
Giant helleborine	<i>Epipactis gigantea</i>	26 principal CO occurrences, 9 subs, widespread	G4/S2	USFS sensitive	http://www.cnhp.colostate.edu/download/projects/rareplants/PMORC11010.html
San Juan gilia	<i>Gilia haydenii</i>	11 CO occurrences, +UT and NM	G3/S2	None	Not included

Common name	Scientific name	Known occurrences	Global rank*	Status	CNHP Rare Plant Field Guide Link
Long-flower cat's-eye	<i>Cryptantha (Oreocarya) longiflora</i>	42 CO occurrences, + UT	G3/S3	none	Not included
Osterhout's cat's-eye	<i>Cryptantha (Oreocarya) osterhoutii</i>	7 CO occurrences + UT	G2G3 (G3?)/S2	BLM sensitive	http://www.cnhp.colostate.edu/download/projects/rareplants/PDBOR0A270.html
Utah penstemon	<i>Penstemon utahensis</i>	18 CO occurrences, + CA, UT, NV and AZ	G4/S2	none	Not included

*G1 = critically imperiled; G2 = imperiled. For more detail on global ranks please visit the Colorado Natural Heritage Program's website at <http://www.cnhp.colostate.edu/heritage.html>.

IV. Vision and Goals

Vision: Populations of the imperiled Dolores skeletonplant, Horseshoe milkvetch, Osterhout cat's-eye and Fisher Towers milkvetch thrive within a mosaic of native plant communities and the ecological processes are functioning. A coalition of partners is working together to ensure the plant's long-term survival and stewardship.

Long-term Goals:

1. Conserve all viable and restorable occurrences of the Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat's-eye and Horseshoe milkvetch in the Gateway Priority Action Area (total of 20 occurrences in this Area).
2. Conserve habitat for the Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat's-eye and Horseshoe milkvetch (at least 640 acres for each species).
3. Maintain/restore a mosaic of high quality plant communities (indicated by low levels of fragmentation and low cover of non-native species) in the vicinity of the plants to support ecological processes such as pollination ecology.

IV. About the Workshop

Workshop Purpose: To identify conservation strategies for the Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat's-eye and Horseshoe milkvetch and their habitats, based on an assessment of the species' viability and conservation issues in the Gateway Priority Action Area.

Methods: The planning process, known as Conservation Action Planning (CAP), used at the Workshop was developed by The Nature Conservancy and has been applied across the US and the world. Due to time constraints, we followed a rapid version of the CAP process by: 1) identifying conservation targets, 2) assessing viability of the targets, 3) identifying conservation issues (threats, stresses, sources of stress), and 4) detailing specific strategies to address the conservation issues.

For additional information about TNC's Conservation Action Planning methods, please see: <http://conserveonline.org/workspaces/cbdgateway/> and <http://conserveonline.org/workspaces/cbdgateway/cap/index.html>

Workshop Date: June 23-24, 2010

Workshop Participants:

Name	Affiliation
Attended	
Rob Bleiberg	Mesa Land Trust
David Gann	The Nature Conservancy
Kate Graham	Colorado Environmental Coalition
Barbara Hawke	Wilderness Society
Jim Kelleher	Mesa County Division of Transportation
Bernadette Kuhn	Colorado Natural Heritage Program
Anna Lincoln	Bureau of Land Management
Peggy Lyon	Colorado Natural Heritage Program
Ellen Mayo	U.S. Fish and Wildlife Service
Ilana Moir	Mesa Land Trust
Betsy Neely (co-facilitator)	The Nature Conservancy
Susan Panjabi (co-facilitator)	Colorado Natural Heritage Program
Jeff Peterson	Colorado Department of Transportation
Jude Sirota	Mesa Co. Weed Management (at the time)
Lorraine Yeatts	CNAP and CoNPS
Unable to Attend	
Steve Aquafresca	Mesa County Commissioner
Carol Dawson	Bureau of Land Management
Brian Kurzel	Colorado Natural Areas Program
Megan Mueller	Center for Native Ecosystems
Other Contacts	
Otis R. Darnell	Mesa County Division of Transportation
Al Sisson	Gateway Canyons Resort
Botany Department	Mesa State College

V. Workshop Results

A. *Conservation Targets*

Using The Nature Conservancy’s (TNC) site conservation planning workshop methodology, “conservation targets” are a limited suite of species, communities, and/or ecological systems, or specific locations of these elements of biodiversity (e.g., occurrences, sub-occurrences, or other areas) that are the basis for setting goals, identifying conservation strategies, and measuring conservation effectiveness. At the Gateway Priority Action Area our targets are specific locations of the threatened plants, identified more specifically based on land ownership.

At the Gateway workshop, we organized the occurrences of the Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat’s-eye and Horseshoe milkvetch into six targets based on land

ownership within one Priority Action Area, or Potential Conservation Area (PCA) as identified by the Colorado Natural Heritage Program (**Table 2**). A PCA represents CNHP biologists’ best estimate of the primary area required to support the long-term survival of species or communities of interest or concern. Distinguishing between different landowners enabled us to effectively evaluate threats and identify meaningful strategies later in the Workshop.

Table 2. Total of eight targets based on landownership and presence of Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat’s-eye and Horseshoe milkvetch. For example, there are two targets identified for the Dolores skeletonplant at Gateway: Gateway BLM and Gateway private.

Target area (Potential Conservation Area (PCA) as identified by CNHP; Biodiversity significance rank follows the PCA name)	Associated landownership	Targets
Gateway, B1	<ul style="list-style-type: none"> • BLM • Private 	<ul style="list-style-type: none"> ▪ Dolores skeletonplant ▪ Fisher Towers milkvetch ▪ Horseshoe milkvetch ▪ Osterhout cat’s-eye

* CNHP assigns a rank to each occurrence using the following codes: A = Very good; B = good; C = fair; D = poor; E=extant/viability unknown; H = possibly extirpated/ possibly extinct; X presumed extirpated/presumed extinct

**B1= Area of Outstanding Biodiversity Significance; B2=Area of Very High Biodiversity Significance.

B. Viability

“Viability” per TNC terminology is the “health” or “ecological functionality” of the conservation targets. During the Workshop we attempted to answer two key questions through the viability assessment: *How do we define ‘health’ (viability) for each of our targets?* and *What is the current status of each of our targets?* Following Natural Heritage Program methods (CNHP 2010) we define viability based on three factors: landscape context, condition, and size (**Table 3**).

Table 3. Basis for viability ratings of Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat's-eye and Horseshoe milkvetch.

		Indicator rating criteria			
Key Attribute	Indicator	D – Poor	C - Fair	B - Good	A - Very Good
LANDSCAPE CONTEXT: Intactness of occurrence and surrounding area	% Fragmentation	Highly fragmented	Moderately fragmented	Limited fragmentation	Un-fragmented
CONDITION: Population structure & recruitment	Evidence of reproduction	Little or no evidence of successful reproduction (few seedlings and/or no flowering or fruiting)	Less productive, but still viable with evidence of flowering and/or fruiting and mixed age classes	Good likelihood of long-term viability as evidenced by flowering, fruiting, and mixed age classes.	Excellent viability as evidenced by high % flowering and fruiting, and mixed age classes
CONDITION: Species composition / dominance	Percent ground cover of invasive species	>50% cover	11-50% cover	1-10% cover	<1% cover
SIZE: Population size & dynamics	# Individuals	<10	10-300	300-1,000	>1,000

Table 4 shows the viability for each occurrence as previously identified by the Colorado Natural Heritage Program (CNHP), and confirmed by the group at the Workshop. We do not indicate viability by *land ownership* because CNHP identifies viability by *occurrence* across jurisdictional boundaries. Any one occurrence can occur on multiple land ownerships.

Table 4. Viability of the 18 occurrences of Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat's-eye and Horseshoe milkvetch in the Gateway Priority Action Area.

Target Species	Viability Rank*	Occurrence ID # (CNHP)
Dolores skeletonplant		
	Good (B)	14
	Fair (C)	4
	Fair (C)	19
	Fair (C)	8
	Historical (H)	7
	H Historical (H)	1
	Historical (H)	11
Fisher Towers milkvetch		
	Very good (A)	2
	Very good (A)	8
	Fair (C)	9
Horseshoe milkvetch		
	Very good (A)	2
	Very good (A)	1
	Good (B)	8
	Good (B)	5
	Good (B)	6
	Fair (C)	7
	Historical (H)	3
	Historical (H)	4
Osterhout cat's-eye		
	Fair (C)	5
	Historical (H)	11

* CNHP assigns a rank to the viability of each occurrence using the following categories: Very good (A); Good (B); Fair (C); Poor (D); E=extant/viability unknown; H = possibly extirpated/ possibly extinct; X presumed extirpated/presumed extinct.

C. Conservation Issues

With the viability analysis complete, the Workshop participants then identified the primary conservation issues (threats, stresses, sources of stress) at each site. Conservation issues include the stresses that impair, degrade or destroy the viability of the targets (e.g., trampling) as well as the stressors, the causes or sources of the stress (e.g., incompatible cattle grazing, OHV traffic). The participants identified and ranked the issues based on their expertise, local knowledge, and sense of the key issues facing each target (**Table 5**).

Although most of the known occurrences currently appear to be in fair to excellent condition, the primary conservation issues for the habitat of the Dolores skeletonplant, Fisher Towers milkvetch, Osterhout's cat's-eye, and Horseshoe milkvetch are road construction and maintenance, un-authorized motorized recreation, private land development and associated infrastructure, invasive plant species, mining developments, non-motorized recreation, car-camping, incompatible grazing, and climate change. Of particular concern is how a combination of these issues could significantly disrupt the ecological processes of the cliff and canyon system for example: erosion rates, overland flow of water, gullying in rare plant habitat, impacts to soil chemistry and crypto biotic crusts, etc.

Road construction: New roads or widening existing roads may damage roadside populations. Additionally, roads have secondary impacts such as spreading invasive and non-native plant species, bringing humans and vehicles closer to areas of concern, effecting hydrology, introducing dust, etc.

Road maintenance: The Dolores skeletonplant, and to a lesser extent, Fisher Towers milkvetch and Horseshoe milkvetch are found along roadsides that are periodically graded. Plants may be uprooted or buried in soil. See also secondary impacts listed above under road construction.

Invasive Species: Non-native species compete with the rare plants for space and nutrients. Measures to control invasive species such as herbicide spraying, may damage the rare plants.

Motorized recreation: Unmanaged vehicle use is potentially damaging to the plants, their pollinators, and habitat. Currently, the damage from motorized recreation is rare and localized, but actions need to be taken to assure that further damage to the plants does not occur.

Private land development: Private lands that support the plants do not currently have protection measures in place, such as conservation easements or management agreements. Further inventories on private lands may also reveal additional areas needing protection.

Grazing: If managed properly, domestic livestock grazing may not be an issue. Cattle don't appear to be eating the plants but they can trample and uproot them.

Climate change: 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. In Colorado, temperatures have already increased by approximately 2 degrees

F between 1977 and 2006 (Ray et al. 2008). Climate models project Colorado will warm by 2.5 degrees F by 2025 and 4 degrees F by 2050 (Ray et al. 2008). There will likely be more frequent and severe droughts and other extreme weather events in the future. Colorado will likely become hotter and drier with shorter snow seasons, earlier snow melt, and longer fire seasons. These potential impacts will likely interact with other stresses to rare plants, e.g., loss or fragmentation of habitat from development, mining, and increase of invasive species. The impacts of climate change on imperiled plant species are likely to significantly reduce habitat, which is particularly problematic for rare plants that demand very specific growing conditions, such as the Dolores skeletonplant, Fisher Towers milkvetch, Osterhout's cat's-eye, and Horseshoe milkvetch.

Non-motorized recreation: The increasing popularity of the Gateway area for recreational activities such as hiking and horseback riding may cause direct damage from trampling, or indirect damage from increasing the invasion of non-native species.

Table 5. Conservation issues. H = high impact (red); M = medium impact (orange); L = low impact (yellow); N/A = not applicable

Species	Ownership or Mgmt	Road maintenance	Road construction	Invasive species	Motorized recreation	Non-motorized recreation	Car camping	Mining development	Private land development and associated infrastructure	Climate change	Cattle grazing
Dolores skeleton plant	BLM	H	H	H	H	M	M	L	N/A	M?	L
Dolores skeleton plant	Private	H	H	H	M	M	N/A	L	H	M?	L
Horseshoe milkvetch	BLM	H	H	L	M	M	N/A	L	N/A	M?	L
Horseshoe milkvetch	Private	H	H	L	M	M	N/A	L	L	M?	L
Fisher Towers milkvetch	BLM	M	M	M	H	M	N/A	L	N/A	M?	L
Fisher Towers milkvetch	Private	M	M	M	H	M	N/A	L	M	M?	L
Osterhout cat's-eye	BLM	L	L	L	L	M	N/A	L	N/A	M?	L
Osterhout cat's-eye	Private	L	L	L	L	M	N/A	L	N/A	M?	L

D. Strategies

Based on an understanding of the status of Dolores skeletonplant, Fisher Towers milkvetch, Osterhout cat's-eye and Horseshoe milkvetch in the Gateway area, participants identified strategies to support the long-term conservation of these species, focused on preliminary strategies needed to address key conservation issues (**Table 6**). After brainstorming strategies, participants prioritized them as high, medium, or low based on their anticipated effectiveness and level of impact. Specific to private land protection efforts, the RPCI is also evaluating opportunities to work with willing private landowners and local land trusts and local governments to conserve these species and their habitats on private lands using voluntary tools, such as conservation easements.

Table 6. Preliminary strategies for the Conservation of Dolores skeletonplant, Horseshoe milkvetch, Fisher Towers milkvetch and Osterhout cat's-eye. Highest priority strategies are listed first.

Owner/ mgr	Species	Conservation Issue/Threat	Strategy	Priority	Lead
All	All	Lack of awareness of the status and distribution of rare species	Education: continue proactive efforts in the local community to encourage awareness and local pride.	H	Needed
All	All	Lack of awareness of the status and distribution of rare species	Education: alert land owners and managers	H	Volunteer needed
All	All	Lack of awareness of the status and distribution of rare species	Explore the potential to work with landowners and other community entities on projects of mutual interest that would benefit the plant habitat.	H	Needed
BLM	All	All	Work with BLM and others on administrative protection measures such as Areas of Critical Environmental Concern, State Natural Areas, Special Recreation Management Areas, etc.	H	Needed

Owner/ mgr	Species	Conservation Issue/Threat	Strategy	Priority	Lead
BLM	All	All	Work with BLM and others on legislative protection measures such as Wilderness, National Conservation Areas, etc.	H	Needed
All	All	Climate change, invasive species, road maintenance	Monitor population trends	H	RPCI, BLM?, Denver Botanic Gardens?
All	All	Motorized recreation, road construction and maintenance, mining, developments	Study the ecological processes that support the cliff and canyon systems, especially issues related to hydrology, erosion, soils and other habitat features for the rare plants.	H	Needed
All	private	Motorized recreation	Meet with Gateway Canyon Resorts to help ensure protection of rare plants during motorized recreation activities.	H	Dave
BLM	All	Motorized recreation	Write comments to BLM on Resource Management Plans and Travel Management Plans (comment period is anticipated for late summer/fall 2011-Anna Lincoln will notify group)	H	RPCI, Anna Lincoln, Colorado Native Plant Society?
All	All	Motorized recreation	Communicate with OHV groups to help ensure protection of rare plants during motorized recreation activities.	H	Needed
All	All	Road construction	Communication with CDOT, BLM, and Mesa Co. regarding the rare plants and specific locations	H	RPCI

Owner/ mgr	Species	Conservation Issue/Threat	Strategy	Priority	Lead
	Dolores skeletonplant, horseshoe milkvetch, and Fisher Towers milkvetch	Road maintenance	Communication with CDOT, BLM, and Mesa Co. regarding the rare plants and specific locations	H	RPCI
All	Dolores skeletonplant, horseshoe milkvetch, and Fisher Towers milkvetch	Road maintenance	Research rare plant response to road maintenance activities (e.g., monitor)	H	RPCI, Denver Botanic Gardens?
	Dolores skeletonplant, Horseshoe milkvetch, and Fisher Towers milkvetch	Road maintenance and construction	Develop best management practices	H in longer term	Jeff Peterson (CDOT)
CDOT and Mesa County rights-of way	Dolores skeletonplant, Horseshoe milkvetch, and Fisher Towers milkvetch	Road maintenance and construction	Send Jeff and Mesa Co. Dept of Transportation a map of the rare plant locations along highways.	H	CNHP and Jeff
CDOT and Mesa County rights-of way	Dolores skeletonplant, Horseshoe milkvetch, and Fisher Towers milkvetch	Road maintenance and invasive species	Communicate no spray zones to contractors.	H	Mesa County Weed Department
CDOT and Mesa County rights-of way	Dolores skeletonplant, Horseshoe milkvetch, and Fisher Towers milkvetch	Road maintenance and invasive species	Educate contractors to identify plants.	H	Mesa County Weed Department
CDOT and Mesa County rights-of	Dolores skeletonplant, Horseshoe milkvetch, and Fisher	Road maintenance and invasive species	Document combination of rare plants with weeds and get info to Mesa County Weed	H	Mesa Co. Weed Dept. and Peggy

Owner/ mgr	Species	Conservation Issue/Threat	Strategy	Priority	Lead
way	Towers milkvetch		Department.		
Private	Dolores skeletonplant and Fisher Towers milkvetch	Private land development	Inventory private lands including Gateway Canyons Resort	H	Peggy and Dave
Private	All	Private land development	Educate private landowners/outreach	H	Bernadette and RPCI
Private	All	Private land development	Work with Mesa Land Trust on private parcel analysis	H	Susan, Betsy and MLT
Private	All	Private land development	Local brochure about the biodiversity or rare plants	H	Bernadette and RPCI
Private	All	Private land development	Pursue conservation easements	H	Mesa Land Trust
All	All	Motorized recreation	Educate resort guides	H	Loraine?
All	All	Motorized recreation	Local brochure about the biodiversity or rare plants	H	Bernadette, Loraine, and RPCI
All	All	Motorized recreation	Local field trip in May for ORV groups	H	Peggy, Loraine, Bernadette and Kate
All	All	All	Work with Gateway Canyons Resort on management plan- work with Dave Gann	H	Dave
All	All	All	Research pollination ecology	M	RPCI, FWS?
Private	All	Private land development	Review maps to determine distribution of private lands in relation to known and potential habitat for rare plants	M	MLT, TNC and Peggy

VI. Next Steps

Ongoing - The leads for all high- and medium-ranked strategies are responsible for ensuring their implementation. Need to identify specific leads for all strategies.

Ongoing - The group proposed to meet annually to: 1) gauge progress toward implementing strategies; 2) update understanding of the threats; and 3) update strategies (as funding allows). Ideally this meeting would be coordinated by the RPCI lead for the Gateway Priority Action Area. Until such a lead is established, Betsy Neely from TNC/RPCI will coordinate (as funding allows). Preferably this meeting would occur in the summer (May 2011 or 2012) so a field visit to the plants is also possible.

Ongoing – Develop a Conservation Action Plan for the Sinbad Valley area. Consider including Gateway, Sinbad Valley, and Dolores Canyon South in a Network of Conservation Areas at CNHP.

Ongoing – Pursue funding to implement this plan. Develop a specific time line relative to the strategies articulated above.

Winter 2010 - TNC/RPCI will organize a conference call to review comments on this conservation plan and identify leads for specific strategies.

VII. References

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Attachment 1. Additional key species and plant communities in the Gateway area.

Although the focus of the workshop was on the globally imperiled plants, other key species and plant communities are known from the Gateway area as shown in the table below (Colorado Natural Heritage Program 2008, <http://www.cnhp.colostate.edu/>). Specifically, the table identifies rare species and rare and/or high quality examples of plant communities in the Gateway area. These and other biodiversity values should be considered with more detailed planning efforts for this area.

Major group	Scientific Name	Common Name	Global Rank	State Rank	Federal Sensitive
Amphibians	<i>Hyla arenicolor</i>	Canyon Treefrog	G5	S2	BLM
Birds	<i>Falco peregrinus anatum</i>	American Peregrine Falcon	G4T4	S2B	USFS
Mammals	<i>Corynorhinus townsendii pallescens</i>	Pale Lump-nosed Bat	G4T4	S2	BLM/USFS
Mammals	<i>Myotis thysanodes</i>	Fringed Myotis	G4G5	S3	BLM/USFS
Natural Communities	<i>Aquilegia micrantha</i> - <i>Mimulus eastwoodiae</i> Herbaceous Vegetation	Columbine - Eastwood's Monkeyflower Hanging Garden	G2G3	S2S3	

Major group	Scientific Name	Common Name	Global Rank	State Rank	Federal Sensitive
Natural Communities	<i>Eleocharis rostellata</i> Herbaceous Vegetation		G3	S2	
Natural Communities	<i>Forestiera pubescens</i> Shrubland		G1G2	S1	
Natural Communities	<i>Phragmites australis</i> Western North America Temperate Semi-natural Herbaceous Vegetation	Western Reed Marsh	G5	S3	
Natural Communities	<i>Salix exigua / Mesic Graminoids</i> Shrubland		G5	S5	
Natural Communities	<i>Schoenoplectus maritimus</i> Herbaceous Vegetation	Alkali Bulrush Marsh	G4	S2	
Reptiles	<i>Crotalus oreganus concolor</i>	Midget Faded Rattlesnake	G5T4	S3?	BLM
Vascular Plants	<i>Abronia nana</i>	Dwarf Sand-verbena	G4	S1	
Vascular Plants	<i>Adiantum capillus-veneris</i>	Southern Maidenhair Fern	G5	S2	
Vascular Plants	<i>Astragalus eastwoodiae</i>	Eastwood's Milkvetch	G3	S3	
Vascular Plants	<i>Astragalus rafaelensis</i>	San Rafael Milkvetch	G2G3	S1	BLM
Vascular Plants	<i>Cryptantha gypsophila</i>	Gypsum Valley Cateye	G1G2	S1S2	BLM
Vascular Plants	<i>Cryptantha longiflora</i>	Long-flowered Cat's-eye	G3	S3	
Vascular Plants	<i>Enneapogon desvauxii</i>	Nine-awned Pappus Grass	G5	S1	
Vascular Plants	<i>Erigeron kachinensis</i>	Kachina daisy	G2	S1	BLM
Vascular Plants	<i>Gilia haydenii</i>	San Juan Gilia	G3	S2	
Vascular Plants	<i>Mimulus eastwoodiae</i>	Eastwood's Monkeyflower	G3G4	S1	BLM
Vascular Plants	<i>Pediomelum aromaticum</i>	Aromatic Scurf Pea	G3	S2	BLM
Vascular Plants	<i>Penstemon utahensis</i>	Utah Beardtongue	G4	S2	
Vascular Plants	<i>Phacelia constancei</i>	Constance's Phacelia	G4	S1	
Vascular Plants	<i>Platanthera sparsiflora</i>	Canyon Bog Orchid	G4G5T4?	S3	

Major group	Scientific Name	Common Name	Global Rank	State Rank	Federal Sensitive
	<i>var. ensifolia</i>				
Vascular Plants	<i>Sporobolus nealleyi</i>	Nealley's Dropseed	G5	S1	

For more information about these and other biodiversity values, see reports including but not limited to the following:

- Colorado Wildlife Action Plan
<http://wildlife.state.co.us/WildlifeSpecies/ColoradoWildlifeActionPlan/>
- The Nature Conservancy Ecoregional Assessments.
http://conserveonline.org/workspaces/cbd/era/reports/index_html
- Southern Rockies Ecosystem Project: <http://www.restoretherockies.org/reports.html>