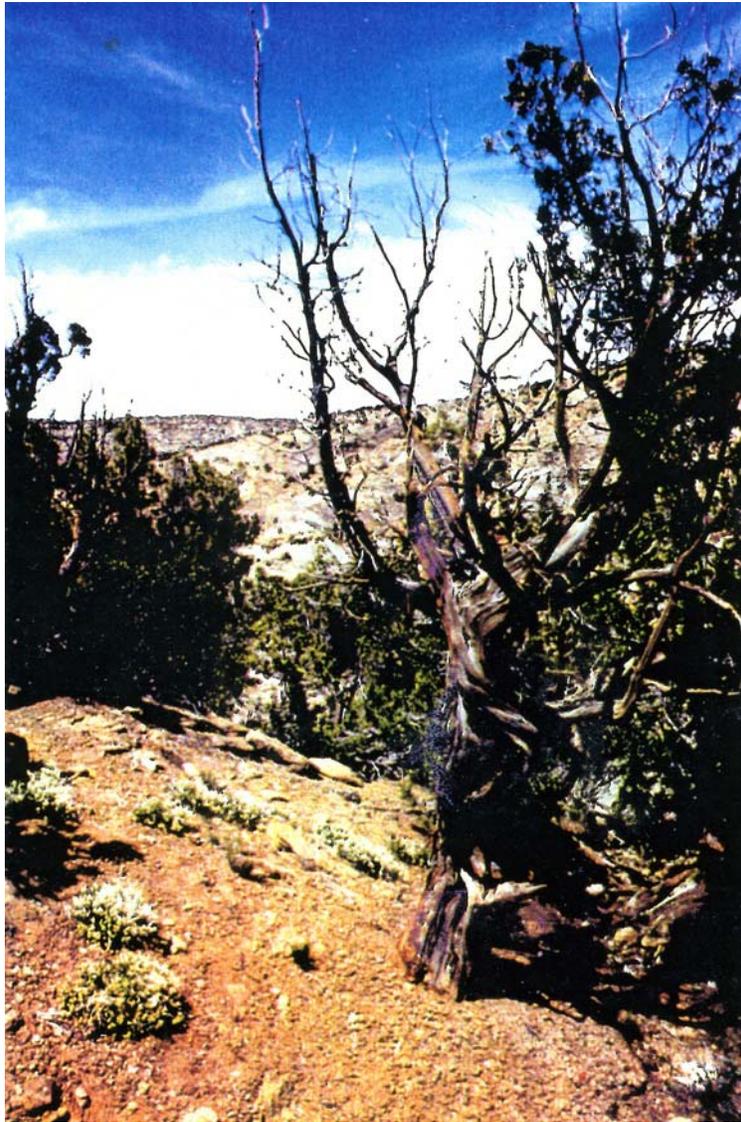


NATURAL HERITAGE INVENTORY OF MESA COUNTY, COLORADO



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**Prepared for: Mesa County Commissioners
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Executive Summary

In 1995, The Nature Conservancy proposed to the Mesa County Commissioners that a natural heritage inventory for Mesa County be conducted by the Colorado Natural Heritage Program (CNHP). This would continue and expand upon work that was begun that year by the Nature Conservancy in the Glade Park area. The goal of the inventory was to systematically identify the localities of rare, threatened, or endangered species and the locations of significant natural communities. The Commissioners recognized the need for complete and updated information on the significant flora and fauna of the county, and unanimously approved the project. Funds were applied for and granted by Great Outdoors Colorado, and matched by The Nature Conservancy.

CNHP began preliminary research immediately, by updating the biodiversity and conservation database with all existing information. This was drawn from previous studies by CNHP, the Colorado Division of Wildlife (CDOW) database, regional and local herbaria, local scientific experts, federal agencies and others. Based on these data, we identified over 300 targeted inventory areas (TIAs) for field research.

Inventory began in April, 1996, and continued through October, 1996. The inventory team consisted of Peggy Lyon, botanist/ecologist; Camille Richard, riparian ecologist; Lonnie Renner, vertebrate zoologist; and Charles Slater, invertebrate zoologist. Other CNHP staff members, local agencies and volunteers also contributed.

Results of the inventory confirm that Mesa County contains an extremely high number of endemic species. Due to unusual geological and soil substrates, the entire population of many of the county's species is restricted to a relatively small geographic area. Mesa County also represents the northern or western limits for many animals. Our study concludes that Mesa County is a biologically rich area worthy of conservation effort. Fortunately, a large percentage of the significant sites are protected on BLM land. We have identified seventy-eight conservation sites, containing 620 occurrences of rare or imperiled plants, animals, and natural communities. Two hundred thirty-five new occurrences were documented, in addition to the 600 records already in the database. Several plants and animals were found to be more common than had been thought. Riparian areas and native bunchgrasses were found to be the most threatened common communities. Results of the inventory are included here, with descriptions and recommendations for each conservation site.

The delineation of conservation boundaries in this report does not confer any regulatory protection on recommended areas. They are intended to be used to support wise planning and decision making for the conservation of these significant areas. Additional information may be requested from Colorado Natural Heritage Program, 254 General Services Building, Colorado State University, Fort Collins, CO 80523.

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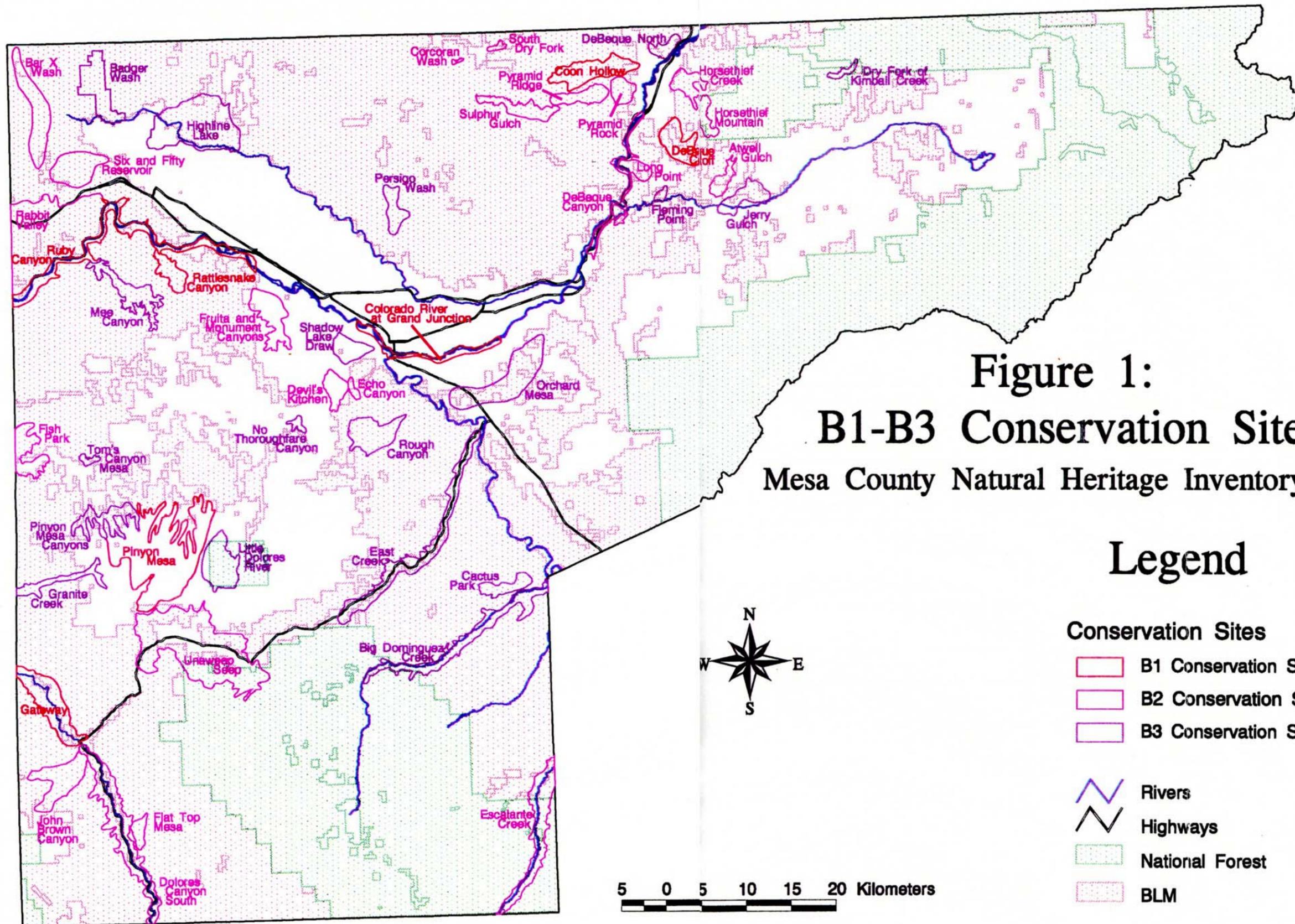


Figure 1:
B1-B3 Conservation Sites
 Mesa County Natural Heritage Inventory 1996

Legend

Conservation Sites

- B1 Conservation Site
- B2 Conservation Site
- B3 Conservation Site

- ~ Rivers
- ~ Highways
- National Forest
- BLM

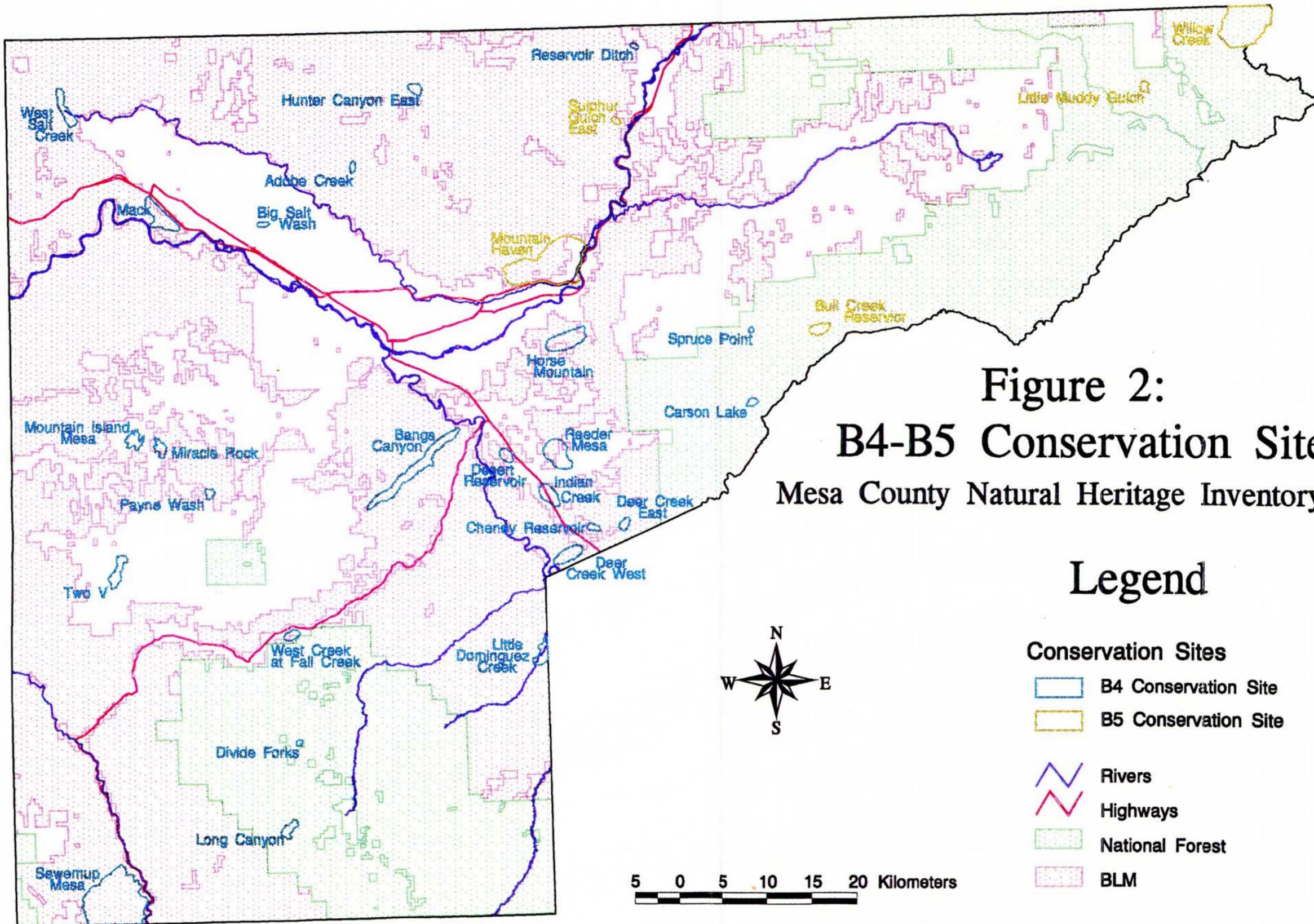
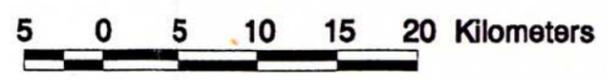


Figure 2:
B4-B5 Conservation Sites
 Mesa County Natural Heritage Inventory 1996

Legend

- Conservation Sites**
- B4 Conservation Site
 - B5 Conservation Site
 - ~ Rivers
 - ~ Highways
 - National Forest
 - BLM



Author: Pete Mahoney

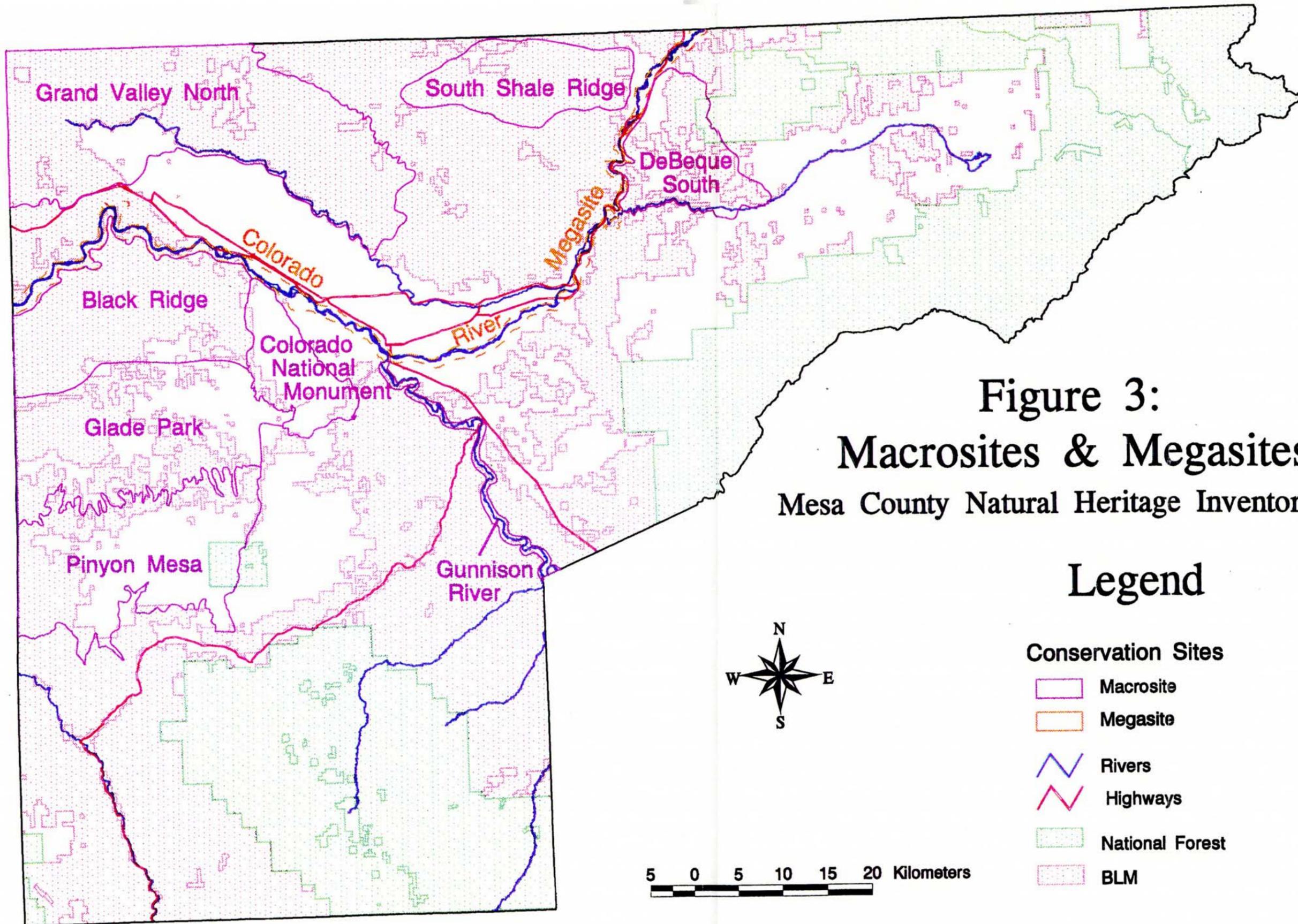


Figure 3:
Macrosites & Megasites
 Mesa County Natural Heritage Inventory 1996

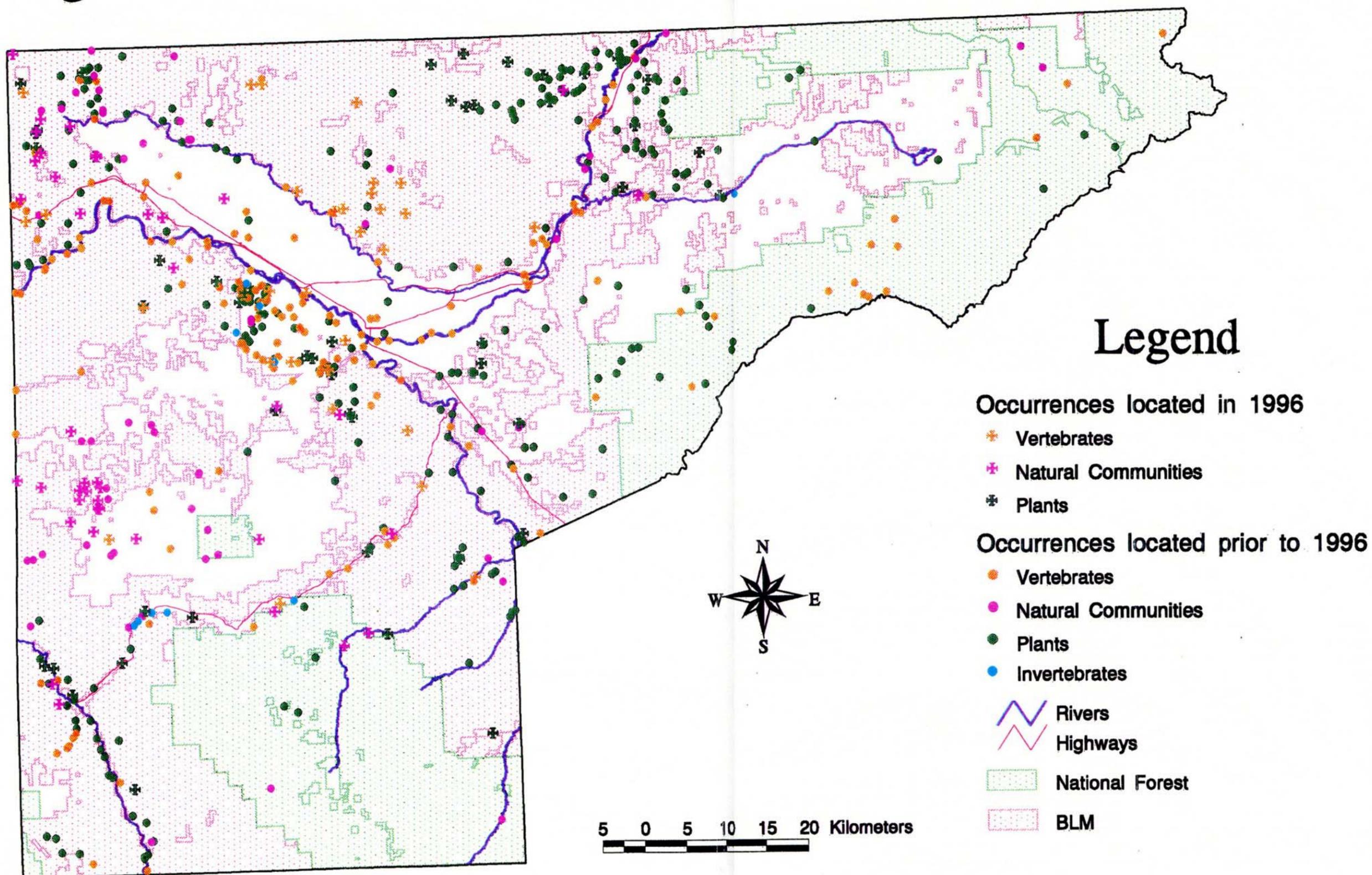
Legend

- Conservation Sites**
- Macrosite
 - Megasite
 - Rivers
 - Highways
 - National Forest
 - BLM



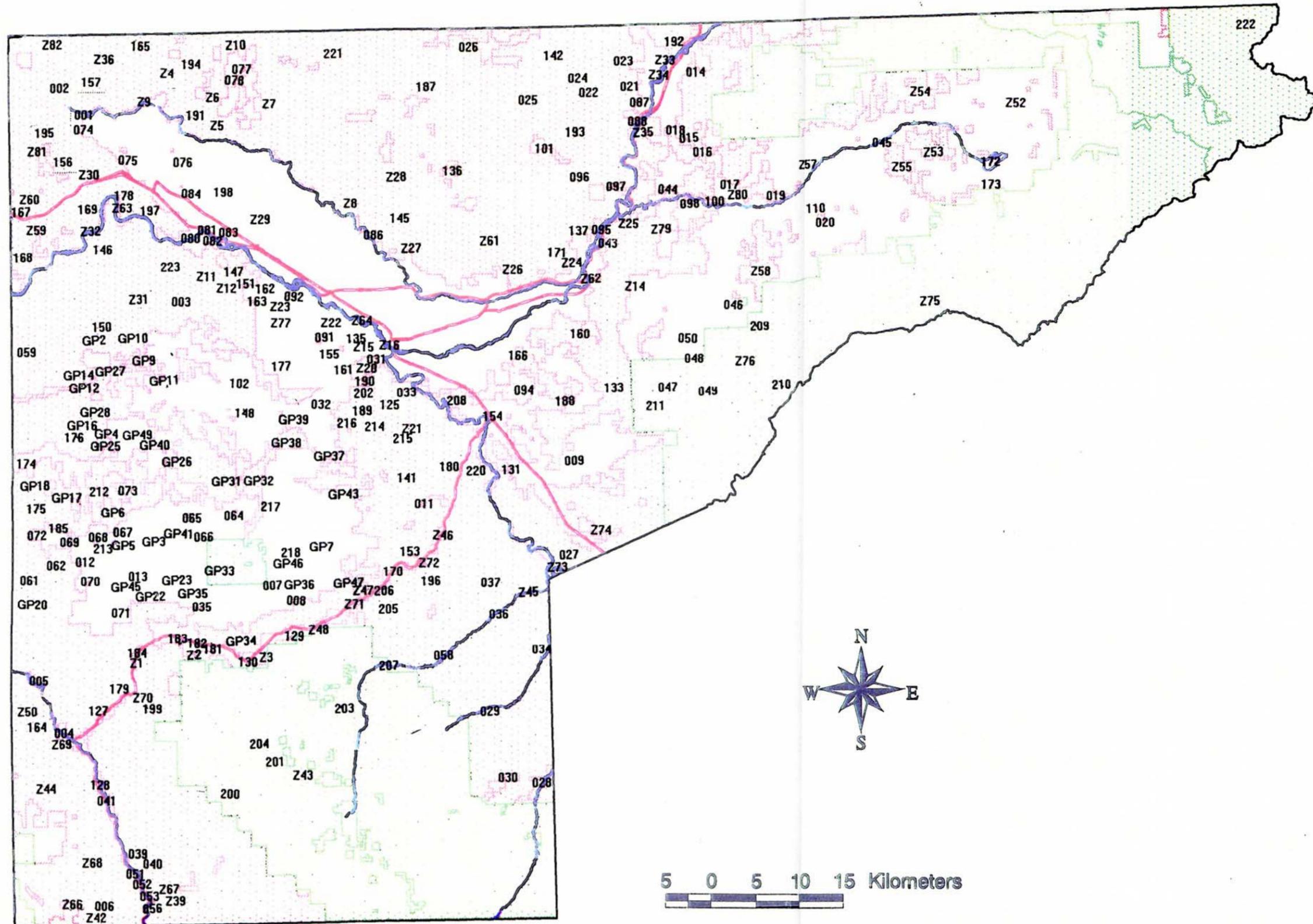
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Figure 4: Element Occurrences of Mesa County



Author: Pete Mahoney

Targeted Inventory Areas - 1996



TIA map

Table 1. Targeted Inventory Areas

(y/n indicates whether the site was visited. TIA numbers refer to the map on page x.)

<u>TIA number</u>	<u>y/n</u>	<u>TIA name</u>
1	y	West Salt Creek
2	y	Prairie Canyon
3	y	Black Ridge
4	y	Dolores R. Gateway
5	y	Dolores R. North
6	y	Sewemup Mesa
7	n	North Lobe Creek
8	n	Fall Cr.
9	y	Reeder Mesa
11	y	North East Cr.
12	y	Granite Cr.
13	y	North Fork Cr.
14	y	Horsethief Cr.
15	y	Debeque Cutoff N
16	y	DeBeque Cutoff S
17	y	Atwell Gulch
18	y	Sand Wash
19	y	Plateau Cr.
20	y	Cottonwood Cr.
21	y	Pyramid Rock NA
22	y	Coon Mesa
23	y	Mount Low
24	y	Coon Hollow
25	y	Sulphur Gulch
26	y	Corcoran Wash
27	y	Deer Creek
28	y	Escalante Cr.
29	y	Bar X bench
30	y	North Fk Escalante Cr.
31	y	White Cap
32	y	Upper No Thoroughfare
33	y	Billings Canyon
34	y	No Mans Mesa
36	y	Big Dominguez Cyn
37	y	Cactus Park/Horse Mesa
39	y	Maverick Canyon
40	y	Calamity Benches
41	y	Cottonwood Cyn
42	y	Long Point
43	y	Cameo Siding

44	y	Eddington
45	y	Plateau Cr. E.
46	y	Mesa Cr.
47	y	N Fk. Kannah Cr.
48	y	Lands End 1
49	y	Lands End 2
50	y	Lands End 3
51	n	Escalante Cr. Blue Spruce Forest NA
52	y	Sewemup outlet 1
53	y	Sewemup outlet 2
54	y	Sewemup outlet 3
55	y	Sewemup outlet 4
56	y	Sewemup outlet 5
57	n	Snyder Flats benches
58	y	Dominguez Canyon
59	n	Jones Canyon
60	n	Wrigley Mesa
61	y	Granite Creek
62	y	Haystack Peaks
63	y	E. Fk. EscalanteCr.
64	y	GD 311
65	y	GD 312
66	y	Payne Mesa
67	y	GD 339
68	y	GD 340
69	y	GD 342
70	y	GD343
71	y	North Fork
72	y	Renegade Cr.
73	y	Coates Cr. Canyons
74	y	GD 406
75	y	GD 408
76	y	GD 409
77	y	GD 403
78	y	GD 404
80	y	GM 415
81	y	GM 431
82	y	GM 432
83	y	GM 433
84	y	GD 413
86	y	GD 411
87	y	GD 157
88	y	GM 159
89	y	GM 158
91	y	GM 304
92	y	GD 305
93	y	GD 412

94	y	GD 412
95	y	GM 160
96	y	Cottonwood Cr/Cameo
97	y	Roberts Canyon
98	y	GD 44, 45, 46
100	y	GD 43
101	y	Deer Park
110	y	GD 30
127	y	Unaweep-W. Cr.
128	y	Dolores R. South
129	y	Wildcat Tr.
130	y	West Cr at Lobe Cr
131	y	Kannah Cr W.
132	y	Unaweep at N. Fk
133	y	GMS Whitewater Cr.
134	n	Lockhart Draw
135	y	Redlands
136	y	Cottonwood Canyon
137	y	Jerry Creek
138	y	Highline Canal
139	y	Rabbit Valley
141	y	Bangs Canyon
142	y	South Shale Ridge
144	n	Leon Creek
145	y	Twenty-five Road
146	y	Mee Canyon
147	y	Devil's Canyon north.
148	y	Sixteen point five Rd.
149	y	Gateway south
150	y	Knowles Canyon
151	y	Kodel Canyon
152	y	Shadow Lake
153	y	Nancy Hanks Gulch
154	y	Reeder Mesa
155	y	Red Canyon
156	y	E. McDonald Cr.
157	y	Badger Wash
158	y	Unaweep Seep
159	y	Red Canyon
160	y	Horse Mt.
161	y	Devil's Kitchen
162	y	Balance Rock
163	y	Black Ridge Trail
164	y	Gateway Canyon
165	y	Mitchell Road
166	y	GMS-Power Stn.
167	y	Crow Ridge (see Z-60)

168	y	Rabbit Valley
169	y	Ridge east of Rabbit V.
170	y	Jack's Canyon
171	y	Coal Canyon
172	y	Vega Res.
173	y	Park Creek
174	y	DS Rd. Burn
175	y	Spring Creek
176	y	King's Canyon
177	y	Ute Canyon
178	y	Mack South
179	y	West Narrows Seep
180	y	East Creek
181	y	J Massey
182	y	R Massey
183	y	Sollenbarger
184	y	Unawep Seep
185	y	Van Loan
186	y	State line
187	y	Hunter Canyon
188	y	Whitewater Cr.
189	y	Little Pk. Rd. S.
190	y	Lower No Thoroughfare Cyn
191	y	Douglas Pass Rd.
192	y	W-5 Rd.
193	y	Wagon Track Ridge
194	y	Baxter Pass
195	y	Two Road
196	y	Farmer's Canyon
197	y	Mary's Loop
198	y	N.5 and 16 Road
199	y	Casto Draw
200	y	Indian Creek
201	y	Massey's Bench
202	y	Echo Cyn-lower
203	y	La Fair Cr.
204	y	Ute Tr.
205	y	Jack's Canyon riparian
206	y	Jack's Canyon cliffs
207	y	Upper Big Dominguez
208	y	Old Spanish Tr.
209	y	Mesa Cr--GM
210	y	Carson Lk
211	y	Crater View
212	y	Shorty
213	y	Longshore
214	y	Rough Canyon-Billings

215	y	Cross Canyon
216	y	Bentonite site
217	y	Mud Springs
218	y	Enoch's Lake
219	y	Salt Cr. (Molina)
219	y	Salt Cr. (Molina)
220	y	Nine Mile Hill
221	y	Coal Gulch
222	y	East Divide Creek
223	y	Rattlesnake Canyon
GP3	n	Bieser Creek
GP4	n	Little Bieser Mesa
GP5	n	Canyon Pond
GP6	y	North Slopes
GP7	n	Ephemeral wetlands
GP9	n	Twenty-eight hole mesa
GP18	y	Haystack
GP20	y	Granite Creek South
GP22	y	Crawford Hill
GP23	y	King Wetlands
GP24	n	Bieser Flats
GP25	y	Tom's Mesa
GP26	y	The Falls
GP27	n	Sieber Sage
GP28	n	Middle Little Dolores
GP29	n	Sieber South Sage
GP30	y	Knowles Mesa
GP31	y	Payne Wash, BLM
GP32	y	Oak Hill
GP33	y	Lobe
GP34	n	North Lobe
GP35	n	Fish Creek Knoll
GP36	n	Snyder Ponds
GP37	y	Ladder Canyon
GP38	y	Cruse Hill
GP39	y	No Thoroughfare
GP40	y	Miracle Rock
GP41	n	Sheep Creek
GP42	n	Little Dolores River mesa
GP43	n	Thraikill Spring
GP45	y	Two V-Glade Park
GP46	y	Enoch's Lake Uplands
GP49	y	Mountain Island Mesa
Z1	y	North Fork
Z2	y	West Creek
Z3	y	Gill Meadows
Z4	y	East Salt Creek

Z5	y	South Coyote
Z6	y	Coyote Wash
Z7	y	Big Salt Wash
Z8	y	Adobe Creek
Z9	y	Bronco Flats West
Z18	y	No Thoroughfare
Z19	y	White Cap South
Z20	y	Echo Canyon
Z21	y	Billings Mesa
Z22	y	Limekiln
Z23	y	Hillside
Z24	y	Cameo
Z25	y	Big Wash
Z26	y	Mount Garfield
Z27	y	Leach Creek
Z28	y	South Persigo
Z29	y	Lower Big Salt Wash
Z30	y	In Between
Z31	y	Mee Canyon
Z32	y	Shale Island
Z33	y	Ashmead North
Z34	y	Ashmead
Z35	y	Ashmead South
Z36	y	Badger Wash
Z38	y	Knowles Canyon North
Z39	y	VABM East
Z40	y	Little Maverick Canyon
Z41	y	Bull Canyon
Z42	y	Sewemup
Z43	n	Cold Springs
Z44	y	John Brown Canyon
Z45	y	Dominguez
Z46	y	Snyder Cliffs
Z47	y	Flats Cliffs
Z48	y	Unaweeep Divide
Z49	y	Whitewater Creek
Z50	y	Gateway Cliffs
Z51	y	Palisade East
Z52	n	Slide Gulch
Z53	n	East of Red Mt.
Z54	n	Grassy Gulch
Z55	n	Red Mountain
Z56	y	Twin Peaks
Z57	y	Fuller Hill
Z58	y	Mule Spring
Z59	y	Rabbit Valley
Z60	y	Six and Fifty

Z61	y	Mine at Cameo
Z62	y	Colorado River-Palisade
Z63	y	Horsethief-Crow Bottom
Z64	y	Redlands Pit
Z65	y	Rosevale
Z66	y	Sinbad Valley
Z67	y	Blue Creek
Z68	y	Salt Creek
Z69	y	Gateway riparian
Z70	y	Ute Creek
Z71	y	Unaweeep Divide cliffs
Z72	y	Upper East Creek
Z73	y	Deer Creek
Z74	y	Cheney Reservoir
Z75	y	Whitewater Hill
Z76	y	Upper Kannah Creek
Z77	y	Gold Star Canyon
Z78	y	Big Creek
Z79	y	Little Wash
Z80	y	Sunnyside
Z81	y	Two Road
Z82	y	West Salt Creek
Z83	y	South Dry Fork

Chapter I. The Project: A Natural Heritage Inventory of Mesa County

Background Information

The Mesa County Inventory began with a request from a Mesa County landowner for the Nature Conservancy to develop a detailed conservation plan for the Glade Park area. This work was begun in 1995, and has resulted in the Glade Park/Dolores River Triangle Conservation Plan dated April 30, 1996 (The Nature Conservancy 1996). In May of 1995, The Nature Conservancy proposed to Great Outdoors Colorado that it fund a Natural Heritage Inventory and Conservation Plan for Mesa County to expand the Glade Park effort to include the entire county. The Conservancy pointed out the need of land use planners to have current, site specific information on the ecological diversity of the county. This proposal had the full support of the Mesa County Commissioners, as well as many public and private partners in the county. The proposal was approved, and the Colorado Natural Heritage Program (CNHP) began work in early 1996. This document reports the results of that project.

Methods

1. All available existing information on the significant flora and fauna of the county was compiled and entered in the Colorado Natural Heritage Program's Biological and Conservation Database (BCD), and all occurrences were mapped. This included research by Colorado Natural Heritage Program staff, and records from the Colorado Division of Wildlife (CDOW), U. S. Bureau of Land Management (BLM), and National Forest (USFS). Herbaria were searched for collections of rare or imperiled plant species from Mesa County.
2. Using the above data, in conjunction with aerial photographs, topographic maps, geology and soil maps, and available information on the habitat requirements of targeted species and natural plant communities, we identified and mapped Targeted Inventory Areas (TIAs). These included previously reported locations to be confirmed, and predicted new locations of the targeted elements. Local experts such as the CDOW, BLM wildlife and range management staff, and local naturalists, were consulted for additional suggestions. Additional TIAs were added during the field season, as we learned more about the natural heritage characteristics of the county.
3. When TIAs occurred on private land, ownership information was obtained from the County Assessor's office, and owners were contacted for permission to inventory their land. Nearly all owners contacted were cordial, although some were wary. Only a handful refused access.
4. Inventory work began in April, and continued through October, 1996. The inventory team included one botanist/ecologist, a vertebrate zoologist and an invertebrate zoologist. A number of other CNHP scientists also spent time in the field. Several local residents volunteered their time, both in the field and in the office. Over 300 TIAs were visited and examined, usually requiring about a half day of hiking. In some cases, it was possible to see from a distance whether the habitat was suitable for our targeted elements. Observations on vegetation, natural features, and condition of the site were recorded. When targeted plants, animals and natural communities were located, they were photographed, and element occurrence records were prepared.
5. Results were analyzed and entered in the BCD. Proposed conservation sites for the protection of rare or imperiled species were delineated. Descriptions of significant conservation sites and recommendations for conservation are presented in this document. Exact locations of rare species are not included. However, additional, more specific information, is available from CNHP as needed.

Results

Significant Elements

Mesa County has a rich flora and fauna, with more local or regional endemic species than any other county in Colorado. CNHP tracks thirty-four rare or imperiled plant species which have been found here (Table 3). Several of these are restricted to very narrow geographic areas and habitats. Thirty natural communities are recognized (Table 2). Animal species of the county tend to be more common globally, but rare in Colorado (Tables 5 and 6).

During this survey, two hundred seventy-six targeted inventory areas were visited (Table 1). Seventy eight sites, ranging in size from 66 to 19,072 acres, are recommended as conservation sites, based on the presence and quality of significant elements of natural diversity. These sites are ranked as to their biodiversity significance, B1 through B5, with B1 being the most significant. Each site is also given a rank for Protection Urgency (P1-P5) and Management Urgency (M1-M5), with comments when appropriate. More information on ranking is given in Appendix I.

Two hundred thirty-five new occurrences of significant elements of natural diversity (i.e., rare plants, animals, and natural communities) were documented from field work in 1996. These were added to the approximately 600 occurrences that were already on record, or were acquired, as part of this project, from CDOW, BLM and USFS. Six hundred twenty of the element occurrences are included in the seventy-eight conservation sites.

In several instances, species were found to be more common than had been thought, and CNHP has removed them from the species of special concern list, or reduced their ranks. Eastwood's desert parsley (*Lomatium eastwoodiae*), a regional endemic, was previously ranked G3S2S3 (See Appendix I for an explanation of Global and State ranks). It was found in abundance in many habitats throughout the county, and will no longer be tracked by CNHP. The Grand Junction milkvetch (*Astragalus linifolius*) was also documented many times. Its rank was therefore reduced from G2S2 to G3S3. The state rank for the white-tailed antelope squirrel (*Ammospermophilus leucurus pennipes*) was reduced from S1 to S2S3, and that of Botta's pocket gopher (*Thomomys bottae howellii*) from S1 to S3.

Location of significant elements

Many of the sites identified fall partly or wholly on BLM land. There are several reasons for this. First, about 76 percent of the county's land is publicly owned. Much of the private land is located in the valley bottoms, and has been developed as residential or irrigated agricultural land. A large part of the remaining private land is used for livestock grazing, and has been intensively used over the last century, resulting in significant changes from the native vegetation. This is especially evident in the reduction in native grasses and forbs, and an increase in exotic species. The aggressive invader, cheatgrass (*Bromus tectorum*), and intentionally cultivated forage such as crested wheatgrass (*Agropyron cristatum*), have replaced large areas of native grasses. Although many plant communities on BLM land are in a degraded condition, resulting from the same impacts that have affected private lands, they are generally in better condition than similar private lands.

Another reason for the predominance of BLM land represented is that many of the sites were selected because of the presence of rare or imperiled plant species that grow in habitats found only on BLM land. Several of these plants, such as the DeBeque phacelia (*Phacelia submutica*), are particularly adapted to the harsh conditions found on barren shale areas, sometimes known as badlands, which are unsuitable for agriculture. Many of the animal species of concern, likewise, are found in areas that have historically been less desirable for agriculture or development. For example, the area between the Highline Canal and the Bookcliffs is particularly rich in rare or imperiled species of small mammals, reptiles, and birds. We conclude that Mesa County's BLM lands are an important component of our natural heritage, and efforts by the agency to protect these lands deserve our fullest support.

Legal implications

Federal and state legal status is given following the species name in each of the conservation sites (Chapter 4). Most of the rare or imperiled species in Mesa County have no legal protection. Three of the rare fish of the Colorado River (the humpback chub, Colorado squawfish and razorback sucker) and the peregrine falcon, are listed as endangered by the U. S. Fish and Wildlife Service, under the Endangered Species Act . Two species are listed as threatened under the act: the bald eagle and the Uinta Basin hookless cactus. All known locations of these species are included in conservation sites listed here. One plant, the DeBeque phacelia, is a candidate for listing (former Category I). Other species, which were formerly candidates for listing, are shown with their former status in parentheses, as (C2) or (3C). These no longer have any official status, but are shown for information only. The State of Colorado, Division of Wildlife, under Colorado Statutes 33-2-105 Article 2, lists the same three fish as endangered, and the bald eagle and peregrine falcon as threatened. No rare plant species are protected by the state. Natural Heritage rarity ranks, and the potential conservation sites in this document, do not imply any legal designation.

Conservation Sites

Preliminary boundaries drawn for conservation sites are based on the known locations of the rare or imperiled species or communities, including a buffer zone, where required to protect them from potentially detrimental land uses, and any additional area that protects the ecological processes necessary to perpetuate the elements. They often include several clustered occurrences, where the area between known occurrences may or may not be likely habitat. More exact information on the location of the elements within the site is available from CNHP as needed. However, the entire site should be considered as at least potentially significant. Additional inventory could result in modifications to site boundaries.

Conservation sites recommended here are based on the presence of rare or imperiled plant and animal species, and rare, or especially good examples of more common, natural plant communities. This does not diminish the importance of areas that were not selected, when other values, such as recreation and open space, are considered. Another important consideration for the county's land use planning, which may not be reflected in the conservation sites, is the indirect impact of private land development on adjacent natural areas. Colorado National Monument, in particular, is a high priority site which lacks an adequate buffer zone to protect its natural values. Residential areas have already encroached right up to its boundary. The Park Service has noted impacts that nearby subdivisions may have on Monument lands (Rodgers, personal communication). These include: creation of new trails that can damage sensitive soils and degrade the wilderness experience; noise from lawnmowers, dogs and vehicles; loose pets having a negative effect on wildlife; increased fire danger; degradation of air quality by wood smoke; and potential increase of exotic species. These concerns should be considered in the approval of new housing developments. Any opportunities to protect private lands adjacent to the monument for open space or recreation, whether or not they contain rare or imperiled species, should be given priority.

Private lands which were found to be most significant for biodiversity were the unirrigated lands along the Dolores River north of Gateway, Glade Park, Pinyon Mesa, Unaweep Canyon, and the Colorado and Gunnison River corridors. Although small parcels of private land adjacent to BLM land may contain the same significant elements as the BLM lands, these elements are, for the most part, adequately represented and protected on the public lands, assuming proper management. The importance of the major river corridors to humans and wildlife cannot be overemphasized. Although the riparian zones along the Colorado and Gunnison River have been severely impacted, there is potential for restoration to a more natural state. The river corridors should receive top priority among areas to be protected.

No regulatory protection is conferred by the delineation of conservation sites in this report. They are intended as suggestions to support wise planning. CNHP is available for assistance to the county in ensuring protection of these areas on request.

Recommendations

Specific protection and management needs are addressed under the descriptions of individual sites. However, some general recommendations for conservation of biodiversity in the county can be given here:

- Large natural areas should not be fragmented unnecessarily.
- Trails and roads should be located to minimize impacts on native plants and animals.
- Expand public and staff awareness of the county's natural heritage and its need for protection. Mesa County can be a leader by providing community education, and forums where protection of our natural heritage is discussed.
- Inventory efforts should be continued, especially in areas where construction or habitat alteration is proposed. Even an exhaustive inventory such as this one cannot fully explore the biodiversity of the entire county. However, it is hoped that the information presented here will guide county planners by identifying likely resources in areas similar to those described.
- Take a proactive approach to weed control in the county. Give additional support, in funding and manpower, to the Pest Inspector's office for weed control. Do not limit targeted weeds to those covered by the state weed control act. There are many equally or more noxious weeds which have not been listed. Recognize that weeds affect natural communities as well as agriculture. See recommendation 32 of the Interregional Council on Smart Growth and Development for additional comments on weed management (Colorado Department of Local Affairs 1995). Pursue state funding to create a Weed Management District consisting of private, state and federal land managers.
- When disturbance of the land cannot be avoided, it may be necessary to prevent weed invasion by reseeding. In these cases, only native plants should be used. Ideally, seed should be locally harvested. This includes any seeding done on county road right-of ways.
- Encourage cluster developments that designate large common areas for preservation of natural communities, as an alternative to scattering residences over the landscape with a house on each 35 acres. This has been addressed in the County's Land Use Plan. Work with developers early in the planning process to educate them about the benefits of retaining natural areas.
- Support organizations, such as the Mesa County Land Conservancy, in acquiring conservation easements. Explore opportunities to form partnerships to access federal funding for conservation projects. For example, the 1996 Farm Bill provides moneys for easement acquisitions and other conservation projects, such as fencing of riparian areas.
- Continue to promote cooperation among local entities to preserve the county's biodiversity. Many cooperative undertakings are already underway in Mesa County. The management of the Grand Mesa Slopes area, and development of the river corridor for open space and trails by the Riverfront Project, are excellent programs that should receive continued support. The Colorado River Corridor is a top priority site, and has already been recognized as such by the county. We particularly commend efforts to protect and regenerate cottonwoods and other native vegetation in the riparian zone. We urge Mesa County to invest in this project to the fullest extent possible.
- Consider the natural heritage values of each site for which land use decisions are made. Use this report as a guide for values to be considered. Also consider the impacts developments may have on adjacent natural areas.
- Provide the vision to protect Mesa County's Natural Heritage for future generations.

Chapter II. Mesa County's Natural Heritage

Mesa County has a highly significant natural heritage. With its wide range of elevation, and its variety of geology and soils, it is home to a combination of plants and animals found nowhere else on earth. The species found here evolved over millions of years, in response to a specific environment, and many are suited to thrive in areas where no other species can exist. Much of our natural heritage has been lost, an inevitable result of increased human population and development; however, much remains. In fact, Mesa County has

more sites of very high or outstanding significance than any other county in Colorado. The purpose of this report is to identify remaining natural areas that contain the special plants, animals and communities that are unique to our region, and to provide some direction for land use planning that will conserve them.

Physical characteristics

Mesa County comprises 3,334 square miles, or 2,133,760 acres, of west central Colorado. It is located in the Colorado Plateaus Province, Canyonlands section, of Bailey's Ecoregions, at the border with Southern Rocky Mountains Province (Bailey 1994). Major physiographic features are the Colorado River and its tributaries, including the Gunnison and Dolores Rivers; the Uncompahgre Plateau, dissected by Unaweep Canyon; Grand Mesa; the Bookcliffs; and the Grand Valley. Elevations range from about 4,400 ft. to 11,236 ft.

The area lies in a rain shadow caused by mountain ranges to the east, west and north. Precipitation in Grand Junction is about 8 inches per year, but significantly higher at the upper elevations on the mesa tops. Precipitation is highest in August. Grand Junction is frost free for about 185 days (USDA 1989). Temperatures vary as much as 20 degrees with elevation, with mean lows in January ranging from 0 to 16 degrees F. and highs in July from 70 to 95 degrees F. Summer temperatures over 100 degrees F. are common. Humidity is generally 22 % in midsummer. Prevailing winds are from the southwest, but are influenced by local topography (U. S. Dept. of Interior 1979.)

Mesa County is underlain by geologic formations ranging in age from Precambrian metamorphic rocks, through Triassic, Jurassic and Cretaceous sedimentary rocks, to the Tertiary basalt of Grand Mesa, and Quaternary alluvial deposits of the valleys. Soils of the area may be alluvial, wind deposited, or weathered in place. They are derived from sandstone (sandy), shale (clay) or both (loam). Some soils at the lowest elevations may have excess salt or sodium. A very special situation in the semi-desert is the presence of cryptobiotic crusts on the soils. This living soil, containing mosses, lichens, algae and bacteria is important for stabilizing the sandy soils and adding to the long-term stability of desert grasslands (USDI 1989).

Various combinations of these environmental factors are associated with characteristic plants, animals and natural communities. In order to fully preserve the biological diversity of the county, representatives of each of these unique assemblages of living things should be protected. Often, rare species are indicators of very specific habitats. For instance, the DeBeque milkvetch, *Astragalus debequaeus*, grows only between 5,100 and 6,400 feet on the Atwell Gulch member of the Wasatch formation (CNHP 1996).

Mesa County is fortunate to have the 17,923 acres of Colorado National Monument under the protection of the National Park Service. It encompasses a rich and spectacular part of the county. However, its sandstone canyons represent only one of several important ecosystems found here. Other, very different, areas worthy of protection are the semi-desert shrublands on Mancos shale north and east of the Grand Valley, the riparian corridors of the Colorado River and its tributaries, the barren shale slopes around South Shale Ridge, and the highlands of Grand Mesa and the Uncompahgre Plateau.

Biological characteristics: Vegetation Zones and Plant Communities

The Colorado Natural Heritage Program keeps records on native plant communities which represent recurring patterns on the landscape, including those that are common, rare, or about which too little information is known to assess their rarity (Table 1). Communities can tell us much about both common and rare plants and animals. These communities, or plant associations, are often given two-part names, based on the dominant plant species in each of two layers, i.e., the tree, shrub or grass layer. An example is Gardner saltbush/Salina wildrye, which names the dominant shrub (Gardner saltbush) and dominant grass (Salina wild rye) of the community. **(Note: for the remainder of this document, common names will be used for species. Scientific names can be found in Appendix II.)** Classification of vegetation in this way enables ecologists to communicate, and study the combination of environmental factors that are associated with a particular community. CNHP assigns a global and state rank to each community, based on its degree of imperilment (Appendix I).

TABLE 2. Natural Communities of Mesa County

Scientific Name	Common Name	G-Rank	S-Rank
<i>Abies lasiocarpa</i> / <i>Carex geyeri</i>	Subalpine fir/Elk sedge	G5	S2S3
<i>Acer negundo</i> / <i>Hippochaete hyemalis</i>	Box elder/Scouring rush	GU	SU
<i>Alnus incana</i> / <i>Cornus sericea</i>	Thinleaf alder/Red-osier dogwood	G4	S3
<i>Alnus incana</i> /Mesic forb	Thinleaf alder/Mesic forb	G3	S?
<i>Aquilegia micrantha</i> - <i>Mimulus eastwoodiae</i>	Hanging gardens	GU	SU
<i>Arctostaphylos patula</i>	Greenleaf manzanita	GU	SU
<i>Artemisia cana</i> - <i>Symphoricarpos oreophilus</i> / <i>Festuca thurberi</i>	Silver sage-Snowberry/Thurber fescue	G2G3	S2S3
<i>Artemisia nova</i> / <i>Elymus salinus</i>	Black sage/Salina wild rye	G?	S?
<i>Artemisia tridentata</i> / <i>Stipa comata</i>	Big sagebrush/Needle and thread	G5	S4
<i>Artemisia tridentata</i> / <i>Symphoricarpos oreophilus</i>	Big sagebrush/Snowberry	G3?	S3?
<i>Atriplex confertifolia</i> / <i>Elymus salinus</i>	Shadscale/Salina wild rye	G3G5	S3
<i>Atriplex confertifolia</i> / <i>Hilaria jamesii</i>	Shadscale/Galleta	G3	S2
<i>Atriplex confertifolia</i> / <i>Oryzopsis hymenoides</i>	Shadscale/Indian rice grass	G2	S2
<i>Atriplex corrugata</i> /Shale barren	Mat saltbush/Shale barren	G5	S2?
<i>Atriplex gardneri</i> / <i>Elymus salinus</i>	Gardner's mat saltbush/Salina wildrye	G2?	S2?
<i>Atriplex gardneri</i> / <i>Hilaria jamesii</i>	Gardner's mat saltbush/Galleta	G3G5	S1?
<i>Betula occidentalis</i> / <i>Cornus sericea</i>	River birch/Red osier dogwood	G3	SU
<i>Betula occidentalis</i> /Mesic forb	River birch/Mesic forb	G2G3	S?
<i>Cornus sericea</i>	Red-osier dogwood	G4	S3
<i>Eleocharis palustris</i>	Common spikerush wetlands	G5	S3S4
<i>Festuca idahoensis</i> - <i>Elymus trachycaulus</i>	Idaho fescue/Slender wheatgrass	G3	S1
<i>Forestiera pubescens</i>	New Mexican privet	GU	SU
<i>Hilaria jamesii</i> grassland	Galleta grassland	G3	S1
<i>Juniperus osteosperma</i> / <i>Cercocarpus ledifolius</i>	Utah juniper/Curl-leaf mountain mahogany	G3	S3
<i>Juniperus osteosperma</i> / <i>Cercocarpus montanus</i>	Utah juniper/Mountain mahogany	G?	S?
<i>Juniperus osteosperma</i> / <i>Coleogyne ramosissima</i>	Utah juniper/Blackbrush	G?	S?

<i>Juniperus osteosperma/Elymus salinus</i>	Utah juniper/Salina wildrye	GU	SU
<i>Juniperus osteosperma/Pseudoroegneria spicata</i>	Utah juniper/Blue bunch wheatgrass	G4	SP
<i>Juniperus osteosperma/Stipa comata</i>	Utah juniper/Needle and thread	GU	S1
<i>Juniperus scopulorum/Cornus sericea</i>	Rocky Mountain juniper/Red-osier dogwood	G4	SU
<i>Oryzopsis hymenoides/Shale barren</i>	Indian ricegrass grassland	G2	S2
<i>Picea pungens/Amelanchier alnifolia-Cornus sericea</i>	Blue spruce/Serviceberry-Red-osier dogwood	GUQ	S2?
<i>Picea pungens/Cornus sericea</i>	Blue spruce/Red-osier dogwood	G2	S2
<i>Pinus edulis/Artemisia tridentata</i>	Pinyon pine/Big sagebrush	G5	S3?
<i>Pinus edulis/Cercocarpus ledifolius</i>	Pinyon pine/Curl-leaf mountain mahogany	G3	S3
<i>Pinus edulis/Cercocarpus montanus</i>	Pinyon pine/Red-osier dogwood	G5	S4
<i>Pinus edulis/Coleogyne ramosissima</i>	Pinyon pine/Blackbrush	G3	S3
<i>Pinus edulis/Cowania mexicana</i>	Pinyon pine/Cliffrose	G5	S3?
<i>Pinus edulis/Peraphyllum ramosissimum</i>	Pinyon pine/Squawapple	GU	SU
<i>Pinus edulis/Quercus gambelii</i>	Pinyon pine/Gambel's Oak	G5	S5
<i>Populus angustifolia/Betula occidentalis</i>	Narrowleaf cottonwood/River birch	G3	SP
<i>Populus angustifolia/Cornus sericea</i>	Narrowleaf cottonwood/Red-osier dogwood	G3	S2?
<i>Populus angustifolia/Salix exigua</i>	Narrowleaf cottonwood/Coyote willow	G3	S3
<i>Populus deltoides ssp. wislizenii/Rhus trilobata</i>	Fremont's cottonwood/Skunkbush	G2	S2
<i>Populus tremuloides/Carex geyeri</i>	Quaking aspen/Elk sedge	G4	S4
<i>Populus tremuloides/Cornus sericea</i>	Quaking aspen/Red-osier dogwood	G3	S3
<i>Populus tremuloides/Symphoricarpos oreophilus</i>	Quaking aspen/Snowberry	G5	S5
<i>Populus tremuloides/Tall forbs</i>	Quaking aspen/Tall forbs	G5	S5
<i>Pseudotsuga menziesii/Populus angustifolia</i>	Douglas fir/Narrowleaf cottonwood	G?	S?
<i>Quercus gambelii/Amelanchier utahensis</i>	Gambel's oak/Utah serviceberry	G3G5	S3S5
<i>Quercus gambelii-Cercocarpus montanus</i>	Gambel's oak/Mountain mahogany	G3	S3
<i>Quercus gambelii/Pachystima myrsinites</i>	Gambel's oak/Mountain lover	GU	S?
<i>Quercus gambelii-Padus virginiana/Poa agassizensis</i>	Gambel's oak-chokecherry/Plains bluegrass	GU	SU
<i>Quercus gambelii/Poa agassizensis</i>	Gambel's oak/Plains bluegrass	GU	SU
<i>Quercus gambelii-Symphoricarpos oreophilus</i>	Gambel's oak/Snowberry	GU	S3S4
<i>Salix exigua/Hippochaete hyemalis</i>	Coyote willow/Horsetail	G?	S?
<i>Salix exigua/Mesic graminoid</i>	Coyote willow/Mesic graminoid	G4	S4
<i>Salix monticola/Mesic forb</i>	Rocky mountain willow/Mesic forb	G3	SU
<i>Sarcobatus vermiculatus/Distichlis spicata</i>	Greasewood/Saltgrass	G3	S1
<i>Sarcobatus vermiculatus/Suaeda torreyana</i>	Greasewood/Seablight	GU	S?
<i>Scirpus validus Seep Meadows</i>	Softstem bulrush seep meadows	G?	S?
<i>Stipa comata - West</i>	Needle and thread grasslands	G2	S2

Vegetation classification and inventory in our area are in their infancy, as can be seen by the number of ranks denoting lack of information (GU SU, or G#?). Inventories such as this one are useful in revising our assessment of the rarity of particular communities. In addition to recording the presence of communities, we evaluate each occurrence on a scale of A to D, based on its **quality** (abundance and health of the typical species), its **condition** (largely based on the presence or absence of alien species; its **viability**; and **defensibility** (see Appendix I for additional information on occurrence ranks). In general, riparian areas with good stands of trees, especially cottonwoods, and an understory of native shrubs, grasses and forbs, are among the most rare

and threatened plant communities in Mesa County. A close second is any community with a good stand of native bunchgrasses such as Indian rice grass, needle and thread, or blue-bunch wheatgrass.

Vegetation in Mesa County can be classified into six broad types, each containing several plant associations. These types more or less correspond to elevation: from lowest to highest, 1.) semi-desert shrublands; 2.) sagebrush; 3.) pinyon-juniper woodlands; 4.) mountain shrublands; 5.) aspen forests; 6.) coniferous forests. Within each of these zones, the addition of water (streams, rivers, or springs) creates additional vegetation types. The only major types of vegetation in Colorado that are not represented in Mesa County are plains grasslands and alpine tundra.

Semi-desert shrubland is found at the lowest elevations in the county, often on saline or alkaline shale soils (Fig. 1). The entire Grand Valley falls within this zone, including the majority of private land in the county. It also represents over 30% of BLM lands. Most of this type is north of the Colorado River or in the Gunnison Valley. Low shrubs of the Chenopod family such as shadscale (*Atriplex confertifolia*), saltbushes (*Atriplex spp.*), and greasewood (*Sarcobatus vermiculatus*), are the dominant life form. These plants are indicators of both climatically dry areas and physiologically dry soils. Within this zone are several characteristic, more or less distinct, plant associations, which can often be correlated with specific differences in soils, slope, aspect, and moisture (Singh and West 1971).

Vulnerable plant associations tracked by Colorado Natural Heritage Program which were documented in Mesa county include shadscale/galleta; shadscale/Salina wildrye; shadscale/Indian rice grass; mat saltbush/shale barren; Gardner saltbush/Salina wildrye; Gardner saltbush/galleta; and Greasewood/sea-blight.

Imperiled plant species found in this zone include Grand buckwheat, tall cryptanth, Ferron milkvetch, and Uinta Basin hookless cactus. Rare animals of the zone include Ord's kangaroo rat, white-tailed antelope squirrel, Botta's pocket gopher, kit fox, and a variety of birds and lizards. Species are described in Chapters III and IV.

Semi-desert shrublands have been used primarily as livestock range for about a century. Before irrigation projects were developed, they were unsuited for homesteading, and so remained largely in public ownership. Most of this range was misused for about a half century by overgrazing domestic livestock, prior to Taylor Grazing Act. Although the range has generally improved in recent years, much of it remains in poor condition. BLM has estimated that the condition of the majority of its land in this zone is fair to poor (USDI 1985). This is most noticeable in the absence of native perennial grasses. Bunch grasses which are a natural part of this ecosystem include galleta, Indian rice grass, needle and thread, and Salina wild rye. Weedy species such as cheatgrass, halogeton, and Russian thistle have invaded much of this land. Under good grazing management, it is possible for recovery to occur. Chances are best when native species are least depleted; the poorer the condition, the slower the recovery (Blaisdell and Holmgren 1984). Remnants of plant associations with a good stand of native bunch grasses have been identified here, and are included in several conservation sites. Whenever good native grass communities are encountered, they should be valued and protected. They can supply the seed source, and the nucleus for the improvement of adjacent areas.

Present uses, in addition to grazing, include oil and gas developments, wildlife habitat, and recreation. The largely uninhabited landscapes provide unique areas for camping and solitude. Most people do not perceive this ecosystem to be as aesthetically pleasing as other parts of the county, and it is therefore less heavily used for hiking and camping. It also seems to suffer from a lack of respect and appreciation, and many areas have been heavily altered. Off-road vehicle use is very popular. Unfortunately, the wheels of off road vehicles (ORVs) can destroy vegetation and damage the soil. This can cause accelerated wind and water erosion, or create favorable conditions for the invasion of exotic species. Erosion is a serious problem for users of the Colorado River downstream, and great effort and expense have been put into reducing the salinity that results from it. The shale badlands in the salt desert shrub areas yield about 85% of sediments, but only 1% of the water in the Colorado River.



Figure 6. Semi-desert shrubland, with Shadscale/Salina wild rye community, near Mack.

Our recommendations for Mesa County sites in the semi-desert zone are to use the best available information to manage grazing, assessing range condition on an annual basis; to use exclosures to monitor grazing impacts; to try experimental treatments for range improvement on a small scale; to consider some reseeding with locally harvested native grass seed; to limit off-road vehicle use and other surface disturbing activities such as oil and gas exploration, pipelines and road building, especially in the remaining stands of good native bunchgrasses, and in sites with rare or imperiled plant species.

Sagebrush in Mesa County is often found on deep, well-drained sandy soils of valley bottoms and mesas, where adjacent steeper slopes are covered with pinyon-juniper woodlands or mountain shrubs (Figure 7). Four species of sagebrush are found here: big sage (*Artemisia tridentata* ssp. *tridentata*); mountain big sage (*A. tridentata* ssp. *vaseyana*); black sage (*A. nova*) and silver sage (*A. cana*). Each has its own ecological requirements, and they rarely mix. The most abundant species in Mesa County is mountain big sage, followed by black sage. The potential natural vegetation of these sites is a mixture of sagebrush (about 10% cover) and native grasses and forbs (USDA 1978). Common associated graminoid species are Western wheatgrass, Indian ricegrass and muttongrass. Forbs include lupine, penstemon and Indian paintbrush. There may be a scattering of other shrubs such as rabbitbrush, winterfat and four-wing saltbush. At higher elevations, sagebrush is mixed with oak and snowberry. Heavy grazing and other disturbances will increase the sagebrush cover and decrease perennial bunch grasses. Shrubs such as rabbitbrush and snakeweed will increase, and cheat grass and other annual weeds may invade (USDA 1978). In some cases, removal of herbaceous species has left a “sagebrush desert”, with only bare soil under the shrubs. When burned, big sagebrush, mountain big sagebrush, and black sagebrush do not resprout, and are often replaced by pure stands of cheatgrass. This, in turn, makes the area much more susceptible to fire.

Sagebrush areas account for 8% of the BLM lands of the Grand Junction Resource Area. The majority of these were judged by BLM to be in poor to fair condition (BLM 1987.) Observations during this survey indicate that the majority of the sagebrush remaining on private lands in Mesa County is in the Glade Park-Pinyon Mesa area, and in the area west of DeBeque. In both locations, the community has been largely altered by grazing and planting of non-native grasses. According to Tisdale (1969), “The balance between sagebrush and grass has been upset over vast areas. Affected areas now support either dense stands of sagebrush with

scant understories or, where unrestricted grazing has been accompanied by repeated fires, vegetation composed primarily of annual species.” Recovery of this vegetation type, once altered, is difficult to achieve. In some cases, restricting grazing for twenty-five years has failed to change the composition back to a more desirable mix of shrubs, grass and forbs (Tisdale 1969). Partial removal of dense shrub cover is usually ineffective, because remaining shrubs will compensate by increasing their canopy cover, and take up all available resources. Complete removal of shrubs usually results in the invasion of weedy species like cheatgrass. It may be necessary to seed with native grasses, and even then, success is not assured.



Figure 7. Sagebrush shrubland occupies the deep soils at the bottom of No Thoroughfare Canyon.

A species dependent on the sagebrush zone in Mesa County is the Gunnison sage grouse. Its population has declined in recent years, probably because of loss of suitable habitat. In some of its range, pinyon and juniper has invaded the sagebrush flats. The sage grouse needs abundant grasses and forbs, in addition to the shrubs. Nearly all manipulations of sagebrush for grazing improvements (e.g., chaining, burning and planting of crested wheat), have been detrimental to the birds (Woods and Braun 1995).

Sagebrush dominated communities found in Mesa County and tracked by Colorado Natural Heritage Program documented during this survey included Black sage/Salina wildrye; Mountain big sage/needle and thread; Mountain big sage/snowberry; and Silver sage/snowberry.

Pinyon-Juniper Woodlands are a major vegetation type dominating much of Mesa County. Also known as “pygmy forests,” pinyon-juniper woodlands cover the slopes of the Uncompahgre Plateau, Grand Mesa, South Shale Ridge and other areas from 4,600 to 8,900 ft., with their highest development between 5,000 and 7,000 ft. At higher elevations they occur on south and west facing slopes. This type accounts for more than half of the BLM lands in the county. It occupies the zone between sagebrush and Ponderosa pine or aspen, often on rocky hillsides. Trees are typically short and widely spaced, with an understory ranging from almost barren to a diverse mixture of shrubs, forbs and grass. Soils are usually coarse, sandy, and shallow, with low fertility. With increased moisture the canopy can become more dense, with a resulting



Figure 8. Pinyon and juniper on sandstone outcrops at Pyramid Ridge conservation site, west of DeBeque.

decrease in understory vegetation. It is thought that the pinyon-juniper zone has expanded over the last century, perhaps as a result of grazing (Miller and Wigand 1994). Decreasing the grass cover both reduces competition for the tree seedlings and lowers the frequency of fire. The pinyon-juniper type is widespread throughout the western United States, with different species of pinyon pine and juniper in different areas. The species found in Mesa County are *Pinus edulis* and *Juniperus osteosperma*, with *Juniperus scopulorum* occurring mostly in riparian areas. In most of the region pinyon pine and juniper are co-dominant. However, of the two tree species, pinyon is more tolerant of cold, and juniper more tolerant of drought (Mutel and Emerick 1992). Juniper therefore occurs at lower elevations, where it is often mixed with sagebrush and desert shrubs, while pinyon is found at the higher elevations, where it may occur with ponderosa pine and oak. Sites are usually warm and dry, with a mean annual temperature between 45 and 55° F, annual precipitation between 10 and 20 in., and at least 80 frost free days (Mutel and Emerick 1992). Erdman (1970) found that in Mesa Verde, pinyons in climax pinyon-juniper woodlands were often over 400 years old, and junipers much older.

The shrub understory depends on site characteristics such as slope, aspect, and disturbance history. Shrubs may include saltbushes and other species discussed above under the semi-desert shrub vegetation type at the lower elevations; and mountain mahogany, Gambel's oak, seviceberry, snowberry, and other shrubs discussed below under oak and mountain shrub vegetation types, at the higher elevations.

The herbaceous understory is usually sparse, especially where grazed by cattle. Typical native grasses are Indian rice grass, galleta, mutton grass and bottlebrush squirreltail. Cheatgrass is the most frequent non-native invader. Common forbs are hairy golden aster, twin bladderpod, yellow cat's-eye, and scarlet globemallow. Many of Mesa County's rare plants are found in this zone: Canyonlands lomatium, Dolores skeleton-plant, Fisher Towers milkvetch, Grand Junction milkvetch, San Rafael milkvetch, Jones blue-star, Naturita milkvetch, and Wetherill milkvetch.

Plant associations in the pinyon-juniper zone which are tracked by Colorado Natural Heritage Program and were documented in Mesa County include: Utah juniper/curl-leaf mountain mahogany, /mountain mahogany, /Salina wildrye, /blackbrush, /bluebunch wheatgrass, and /needle and thread; Pinyon pine/ mountain big sagebrush, /mountain mahogany, /curl-leaf mountain mahogany, /blackbrush, /cliffrose, /squaw apple, and /Gambel's oak.

Gambel's oak-Mountain shrub. Between the pinyon-juniper zone and the lower limits of the ponderosa pine, there may be a band of mountain shrubs, usually dominated by Gambel's oak. Often this zone is not well defined, and there is oak mixed with both the pinyon- juniper and the ponderosa pine. It occurs on hillsides, upland benches, and well-drained lowlands, with 15 to 27 inches of precipitation per year (Johnston 1987). It is widespread in central and western Colorado and Utah, but reaches its northern limit in south-central Wyoming, due to spring frosts and summer drought (Knight 1994). In addition, Gambel's oak often forms a band of thick vegetation just above the riparian zone, where pinyon and juniper occupy the drier slopes above.

Gambel's oak occurs between 5,100 and 9,200 ft. and is most common between 7,000 and 9,000 ft. It may occur as shrubland where it is the dominant species, or associated with ponderosa pine, aspen, and other mountain shrubs such as mountain mahogany, serviceberry, and snowberry. It often displays its greatest stature in riparian areas, on slopes and benches above streams.

Gambel's oak is a clonal species, and may live to be very old. Stands in Utah exceed 4000 years of age (Mutel and Emerick 1992). It is an important invader after fire. In disturbed ponderosa pine forest, it may prevent the re-establishment of pine. Many of the stands here may represent seral stages where the climax community will be pinyon-juniper. Erdman (1970) found that in Mesa Verde, oak and the other mountain shrubs became established in only a few years after a fire, and remained dominant for one hundred years before being replaced by pinyon and juniper.



Figure 9. Gambel's oak and mixed mountain shrubs on the slopes of Unaweep Canyon.

Another notable shrub community, less common in Colorado, occurs in the region. Along the northwest part of the Uncompahgre Plateau, at about 8,000 ft., are hundreds of acres dominated by greenleaf manzanita (*Arctostaphylos patula*). This shrub is also found as an understory in ponderosa pine forest on the Uncompahgre Plateau, but on the exposed slopes here, it occurs without the trees.

Mountain shrub communities that were documented in Mesa County, and are tracked by the Colorado Natural Heritage Program are: Gambel's oak/Utah serviceberry, /mountain mahogany, /mountain lover, /chokecherry, /snowberry; and /greenleaf manzanita.

Aspen forests. Aspen, the only deciduous forest tree in the region, is the most widespread tree in North America, due to its great genetic variability. Although deciduous, aspen is effectively evergreen, because its bark is able to perform photosynthesis, even at freezing temperatures

Aspen occurs in Mesa County between elevations of 7,200 and 10,200 ft. At lower elevations it is associated with Gambel's oak and ponderosa pine, where it occurs in relatively mesic sites, often in draws with cool air drainage, on north-facing slopes, in riparian zones, or in areas with snowdrifts or seeps. At upper elevations it may be dominant, or mixed with Engelmann's spruce and subalpine fir. Table 17 shows the occurrences of aspen with other major vegetation types.

Aspen, like Gambel's oak, is clonal. Although individual stems live for about 100 years, their root systems can live for 1000 or more years (Peet 1988). They are able to thrive in sunny places with poor soils. They are thus adapted for colonizing disturbed or burned sites. The other tree which is a major colonizer after fire in the Rocky Mountains, lodgepole pine (*Pinus contorta*), is conspicuously absent from the county. Aspen is especially plentiful in sites once heavily disturbed by mining, logging, and grazing. After disturbance, colonization can be completed within five to ten years. Maximum density is reached in 25 to 50



Figure 10. Aspen forest on Pinyon Mesa.

years, after which shade tolerant species such as Douglas fir and subalpine fir may increase. Whether or not aspen is sometimes the climax, rather than a seral species, is a matter of some debate. Presumed climax forests are characterized by large trees, a lush understory, and soil which is loamy, porous, and moist throughout the season (Mutel and Emerick 1992).

Once established, aspen forests are the most species rich of all the vegetation types. This may be due to the increased fertility and moisture holding capacity of the soil with the addition of the deciduous leaf litter (Peet 1988). Aspen leaves decompose readily, since they are low in the tannins and resins which retard decomposition in conifer needles (Mutel and Emerick 1992).

Aspen is most abundant in Mesa County in the National Forests, both on the Uncompahgre Plateau and Grand Mesa. Outside the forest service lands, the Glade Park-Pinyon Mesa area has the most aspen. Communities in this type that were documented during this survey include Aspen/elk sedge, /Red-osier dogwood, /snowberry, and /tall forbs.

Coniferous Forests. Forested areas dominated by conifers--ponderosa pine, Douglas fir, Engelmann's spruce and subalpine fir-- occur above or intermixed with aspen forests. In Mesa County, they occur on the Uncompahgre Plateau, both north and south of Unaweep Canyon, and on Grand Mesa.

Ponderosa pine tends to occupy lower elevation and drier sites, between 7000 and 8500 ft, with coarse, shallow and rocky soils. Ponderosa pines are the largest conifers in the Southern Rocky Mountains. The trees are adapted to withstand drought, with taproots up to 35 feet and lateral roots as long as 100 feet (Mutel and Emerick 1992). Their thick, corky bark protects them from the frequent ground fires to which they are adapted. Much of the pine in Mesa County has been logged, and has been replaced by Gambel's oak (USDA 1972). Some of the manzanita stands may have once had Ponderosa pine as an overstory. In their natural state, Ponderosa pine landscapes are open and park-like, with widely spaced trees and a rich understory of native grasses. Removal of grass by grazing reduces fire frequency. Grazing may also increase tree density by removing competition for seedlings. The result is a more closed canopy, with dense stands of weaker trees. Because these trees do not get adequate sun and nutrients, they are unable to produce enough resins, and are susceptible to beetle infestation (Mutel and Emerick 1992).

Douglas fir is found in cooler and more mesic sites within the ponderosa pine zone, and extending to somewhat higher elevations. It typically occurs in patches on north-facing slopes, in draws, and in riparian areas. It does not form large stands here as it does farther east in the Central Rocky Mountains. Douglas fir, like ponderosa pine, has thick bark that has adapted it to survive fire. Mature stands have an open structure, maintained by fire. When dense, it is susceptible to spruce budworm and Douglas fir bark beetle. It is cold tolerant and can perform photosynthesis even under snow (Mutel and Emerick 1992).

Spruce and fir forests are found at the highest elevations in the National Forest land of Mesa County. They are most highly developed between 9,000 and 10,500 ft. The forest typically has a closed canopy, with a sparse understory of shade tolerant species. Interspersed with the forests, and becoming more common at higher elevations, are subalpine meadows or "parks." Soils are acidic, and often shallow and infertile, due to leaching and the acidic foliage. There is little bacterial activity at the low temperatures of this zone, and much of the carbon in the ecosystem is locked up in humus. Some compensation for this is achieved through mycorrhizal associations that increase nutrient uptake. Of the two species, spruce is longer lived and has a higher survival rate, whereas fir is shade tolerant, and is able to become established beneath spruce. Subalpine fir is considered by many to be the climax species. However, Aplet *et al.* (1988) have found that, in forests studied in Colorado, spruce and fir can co-exist indefinitely. Stand development is dependent on a broad range of disturbances, interacting with the life histories of the two species.

In the Mesa County Inventory, coniferous forests received the least amount of attention of the vegetation zones. Preliminary studies indicated that forest service lands contained more common and less imperiled communities and elements than the BLM and private lands at lower elevations, so they were given lower priority. Plant associations documented were Douglas fir/narrowleaf cottonwood and Subalpine fir/ elk sedge.

Riparian vegetation. The most threatened of the vegetation types in Mesa County occurs along rivers and streams, where the vegetation is affected by and dependent on the additional water. Riparian areas are found within all of the zones discussed above, at all elevations in the county. At the lowest elevations, along the major rivers, the dominant native vegetation is the plains cottonwood. Above about 5500 ft., the plains cottonwood is replaced by narrowleaf cottonwood. At middle elevations, along tributary streams, narrowleaf cottonwood is dominant, and is replaced at higher elevations by birch, alder, aspen, Douglas fir, and blue spruce. The understory along streams is typically willow and red-osier dogwood. Other common species are chokecherry, wild rose, sedges, horsetails and scouring rushes.

Much of the riparian zone in the county has been invaded by exotic species, the most damaging of which is tamarisk, a native of the middle east which was probably introduced here around the turn of the century. It is salt tolerant, and has displaced much of the native vegetation along the major rivers, and continues to extend its range upstream along the tributaries. Unfortunately, it has proved almost impossible to eradicate it. Other common weeds in the lower riparian zone are Russian olive, tumble mustard, Canada thistle, Russian knapweed, alfalfa, and sweet clover. Upstream, red top and Kentucky bluegrass are frequent exotics.

Disruption of the natural flood regime of the rivers by dams and alteration of the river channel have severely impacted regeneration of cottonwoods. Large cottonwood trees are important for nesting and roosting of bald eagles, great blue herons, and other birds. Protection of young cottonwoods, and planting new trees along the Colorado River may be necessary to ensure replacement of older trees for the future.

Smaller streams in the canyons and mountains are essential for wildlife. It has been estimated that riparian areas, which account for only 1% of the landscape, are used by greater than 70% of wildlife species (Knopf 1988). In Colorado, 27% of the breeding bird species depend on riparian habitats for their viability (Pague and Carter 1996.) The denser riparian vegetation provides a protected corridor for migration of deer and elk, as well as cover for smaller animals. Riparian areas generally have a greater diversity of plant species than surrounding uplands. Rare or imperiled plants of Mesa County found in riparian zones are the canyon bog orchid and the giant helleborine orchid. Along the smaller streams, grazing has altered much natural riparian vegetation. Protection of some riparian areas by fencing out cattle has improved some formerly degraded areas.

Because they are so important, much attention was paid to riparian areas during this survey. The following communities which are tracked by the Colorado Natural Heritage Program were documented:

- Blue spruce/red-osier dogwood
- Blue spruce/serviceberry
- Box elder/scouring rush
- Coyote willow/scouring rush
- Douglas fir/narrowleaf cottonwood
- Narrowleaf cottonwood/coyote willow
- Narrowleaf cottonwood/red-osier dogwood
- Narrowleaf cottonwood/river birch
- Plains cottonwood/skunkbush
- Red osier dogwood
- River birch/mesic forb
- River birch/red-osier dogwood
- Rocky mountain willow/mesic forb
- Thinleaf alder/mesic forb
- Thinleaf alder/red-osier dogwood

Weeds

Invasion of exotic species, and their replacement of native species, is one of the biggest threats to Mesa County's natural diversity (James 1993; D'Antonio and Vitousek 1992). As mentioned above, most of the major river corridors, and many of their tributaries have been invaded by tamarisk and Russian olive. Native bunchgrasses have been largely replaced by cheatgrass (Figure 11). Disturbed areas are quickly colonized by weedy mustard species, Russian thistle, Russian knapweed, and halogeton. In general, lower elevations of the county are more affected by weeds than higher elevations, and level valley bottoms more than steep slopes.

Weeds presently addressed in Mesa County under the pest control act are White top, Russian knapweed, purple loosestrife, leafy spurge, toadflax, and scotch thistle (Leupschen 1995). Some of these are not yet established in the county, and it is proper to remain vigilant to prevent their invasion. A more difficult problem is suppression of already established weeds.

Although complete eradication of weeds is not possible, some efforts can pay off. One important guideline is that when a plant is removed, something will take its place. "Ecological voids do not exist" (Young 1981). Simply killing weeds, unless there is a seed source for desirable replacements, will result in more weeds, perhaps even more noxious than those removed. Seeding of desirable plant species is usually necessary. When seeding, it is important to consider seedbed characteristics including rock cover, and the potential of the soil to support the planted species. A first step is to assess the current vegetation, in relation to the potential of the site. Former attempts to control halogeton were given up because land managers were unable to come up with a desirable species to replace it, especially on saline or alkaline soils (Young 1981). Our recommendation is to experiment on a small scale to determine the potential success of a weed control/seeding project, using native plant species. Ideally, seed should be harvested locally. There are several native bunchgrasses for which seed is available commercially, including galleta, needle and thread (Figure 12), alkali sacaton, and Indian rice grass. According to research conducted in Canyonlands, where these four species are frequent, Galleta tends to grow in warmer sites with finer clay soils, whereas needle and thread prefers slightly cooler sites with more sandy soils. Indian rice grass and alkali sacaton were more often associated with needle and thread than galleta (Kleiner and Harper 1976). A mixture of native grasses and forbs is desirable, so that each species may succeed in the microhabitat for which it is best suited.



Figure 11. Cheatgrass (*Bromus tectorum*), an aggressive non-native annual grass, has invaded much of Mesa County's grassland.



Figure 12. Needle and thread grass (*Stipa comata*), a native bunch grass, thrives in a small patch west of Mack.

Chapter III. Rare or Imperiled Plants of Mesa County

TABLE 3. Rare and Imperiled Plants of Mesa County

(This list does not include species which were reported only once or twice, more than ten years ago.)

Common Name	Scientific Name	G rank	S rank
Canyon bog-orchid	<i>Platanthera sparsiflora</i> var. <i>ensifolia</i>	G4T3	S2
Canyonlands lomatium	<i>Lomatium latilobum</i>	G1	S1
Debeque milkvetch	<i>Astragalus debequaeus</i>	G2	S2
Debeque phacelia	<i>Phacelia submutica</i>	G4T2	S2
Different groundsel	<i>Senecio dimorphophyllus</i> var. <i>intermedius</i>	G4T2	S1
Dolores skeletonplant	<i>Lygodesmia doloresensis</i>	G1Q	S1
Eastwood monkeyflower	<i>Mimulus eastwoodiae</i>	G3	S1S2
Ferron milkvetch	<i>Astragalus musiniensis</i>	G3	S1
Fisher towers milkvetch	<i>Astragalus piscator</i>	G1?	S1
Giant helleborine	<i>Epipactis gigantea</i>	G4	S2
Grand buckwheat	<i>Eriogonum contortum</i>	G3	S3
Grand Junction milkvetch	<i>Astragalus linifolius</i>	G3	S3
Grand Mesa penstemon	<i>Penstemon mensarum</i>	G3	S3
Great Basin centaury	<i>Centaurium exaltum</i>	G5	S1
Jones blue star	<i>Amsonia jonesii</i>	G4	S1
Large-flowered breadroot	<i>Pediomelum megalanthum</i>	G3	S3
Long-flowered cat's-eye	<i>Cryptantha longiflora</i>	G3	S2
Mesa dropseed	<i>Sporobolus flexuosus</i>	G5	S1S2
Mountain whitlow-grass	<i>Draba rectifruca</i>	G3	S?
Narrow-stem gilia	<i>Gilia stenothyrsa</i>	G3	S1
Naturita milkvetch	<i>Astragalus naturitensis</i>	G2	S2S3
Nevada onion	<i>Allium nevadense</i>	G4	S1
Northern twayblade	<i>Listera borealis</i>	G4	S2
Osterhout cryptanth	<i>Cryptantha osterhoutii</i>	G3	S1S2
Osterhout penstemon	<i>Penstemon osterhoutii</i>	G3G4	S3S4
Palmer buckwheat	<i>Eriogonum palmerianum</i>	G4	S1
Paradox breadroot	<i>Pediomelum aromaticum</i>	G3	S2
Piceance bladderpod	<i>Lesquerella parviflora</i>	G3	S3
Red alum-root	<i>Heuchera rubescens</i>	G4	S1
Rocky mountain thistle	<i>Cirsium perplexans</i>	G3	S1
San Rafael milkvetch	<i>Astragalus rafaensis</i>	G3	S1
Southern maidenhair fern	<i>Adiantum capillus-veneris</i>	G5	S2
Strigose easter daisy	<i>Townsendia strigosa</i>	G4	S1
Sun-loving meadowrue	<i>Thalictrum heliophilum</i>	G3	S3
Tall cryptanth	<i>Cryptantha elata</i>	G3	S2
Uinta basin hookless cactus	<i>Sclerocactus glaucus</i>	G3	S3
Utah penstemon	<i>Penstemon utahensis</i>	G4	S1
Wetherill milkvetch	<i>Astragalus wetherillii</i>	G3	S3

Descriptions of some of the more important rare or imperiled plant species in Mesa County.

Canyon bog orchid (*Platanthera sparsiflora* var. *ensifolia*) G4G5T3S2

Platanthera sparsiflora var. *ensifolia* occurs in moist or wet soil in mountain meadows, marshes, swamps, bogs, open or dense forests, on stream banks and open seepage, frequently about springs. It has a wide range, from Oregon to Mexico, but good habitat is limited. The genus is also classified by some botanists as *Habenaria* or *Limnorchis*. In Mesa County, the species was found in the Unaweep Seep, No Thoroughfare Canyon, Big Dominguez Canyon, and Granite Creek conservation sites. This species occurs in areas currently used for grazing, camping and hiking. The orchids' survival depends upon a reliable year-round supply of moisture. The combination of grazing and trampling by domestic livestock in the mucky areas where the orchid grows will ordinarily eradicate the plant (CNHP 1996).



Figure 13. Canyon bog orchid (*Platanthera sparsiflora*)

Canyonlands Lomatium (*Lomatium latilobum*) G1S1

Lomatium latilobum is arguably the most biologically important rare plant in Mesa County, and one of the rarest plants in Colorado. It is known only from thirteen locations in Grand and San Juan Counties in Utah, and three locations in Mesa County (Franklin 1995). It is distinguished from other members of its genus by its once-pinnate leaves with broad leaflets, and yellow flowers which bloom in April. It is a regional endemic, which occurs in pinyon-juniper and desert shrub communities between 4800 to 6855 feet elevation (Atwood 1991; Welsh 1987). Two of the three Colorado locations are in Colorado National Monument, in the Devil's Kitchen and Fruita Canyon conservation sites, where it grows at the contact of the Wingate and Chinle geological formations. The third and largest Mesa County population is in the Rattlesnake Canyon site, where it grows in soil pockets on the Entrada sandstone. Other canyons with similar habitat between these locations have been searched unsuccessfully. The species is relatively well protected by its occurrence in Colorado National Monument. However, trampling by hikers has been a problem in Arches National Park, and increased visitor use in the monument and Rattlesnake Canyon could be detrimental to the plants. As traffic increases, it will be important to encourage hikers to stay on well marked trails.



Figure 14. Canyonlands lomatium (*Lomatium latilobum*)

Debeque milkvetch (*Astragalus debequaeus*) G2S2

This Colorado endemic plant is known only from Mesa and Garfield Counties, in the DeBeque area, and then only from the Atwell Gulch member of the Wasatch formation. Although in some places it is abundant, its total global range is only about twenty square miles. It grows in sandy areas on otherwise bare, seleniferous clay slopes between 5100 and 6400 ft. Most plants are found on toe slopes and along drainages, but they may also occur on steep side slopes. It is closely related to *Astragalus eastwoodiae*, which is found farther west, (in Rabbit Valley), but *A. debequaeus* has pure white flowers, rather than the purple of *A. eastwoodiae*. Some botanists doubt that the two species are distinct. Associated species include yellow milkvetch, spiny hopsage, bahia, sagebrush, and DeBeque Phacelia. *Astragalus debequaeus* occurs in an area near significant oil-shale potential. Should the price of oil go up enough to make oil shale development profitable, this species would be significantly threatened. Other potential threats in the area include off-highway-vehicles, as populations occur

near existing roads. Underground oil and gas exploration is also ongoing in the area where this species occurs. This may or may not directly influence occurrences of *A. debequaeus*; however roads built to service drill sites may open up more areas for recreational vehicles, and invasive non-native species. Most of the land *A. debequaeus* grows on is used for grazing; however, the impact of grazing is unknown. BLM is aware of the species and attempts to minimize impacts on it. It has specific protection in the Pyramid Rock Area of Critical Environmental Concern (ACEC) and State Natural Area. It occurs in several of the conservation sites identified here: Coon Hollow, DeBeque Cutoff, DeBeque North, Horsethief Creek, Horsethief Mountain, Pyramid Ridge, Pyramid Rock, and Sulphur Gulch.



Figure 15. DeBeque milkvetch (*Astragalus debequaeus*)

Debeque Phacelia (*Phacelia submutica*) G2S2

This annual plant has a small rosette, and deep red stems covered with stiff hairs. The tiny tube-shaped flowers are light yellow or cream colored. The species is restricted to an area of about seventeen square miles in Mesa and Garfield Counties, in the vicinity of DeBeque. *Phacelia submutica* is found in some of the same sites as *Astragalus debequaeus* (see above), although the specific substrates are different. *Phacelia submutica* is found on shrink-swell clay soils, where it utilizes the water at the bottom of cracks in the dried clay. Late in the summer, *P. submutica* shrivels up and may be washed or blown away. No evidence of this annual plant remains from one year to the next. During drought years, such as 1996, the seeds may fail to germinate. CNHP records of the sites are from previous years, and could not be updated in 1996, as the plants were completely absent from former known sites. The plant is also known as *P. scopulina* var. *submutica*; however, CNHP botanists feel that it is sufficiently distinct to be given species status. Threats are the same as those for *Astragalus debequaeus*. Trampling by livestock is a problem in some areas.



**Figure 16. (left)
DeBeque phacelia
(*Phacelia submutica*)**

**Figure 17. (below)
Habitat of the DeBeque
milkvetch (*Astragalus
debequaeus*) and
DeBeque phacelia,
South Shale Ridge
macrosite.**



Dolores skeletonplant (*Lygodesmia doloresensis*) G1S1

Lygodesmia doloresensis is an attractive, pink-flowered member of the Asteraceae, or sunflower family. It is known only from Mesa County (Figure 18). It occurs on the reddish alluvial soils on both sides of the Dolores River between Gateway and the Utah border. It has also been reported from the Dolores Canyon south of Gateway, John Brown Canyon, Bar X Wash and Rabbit Valley. The Gateway populations were confirmed during this survey. The Dolores Canyon South site was searched in 1996, but the plants were not located. The collections from Bar X Wash and Rabbit Valley were small isolated occurrences outside the main population center, and warrant further taxonomic study. The plant is similar in appearance to the more common *Lygodesmia grandiflora*, but differs in the involucre having 5 or 6 principal bracts (not 8 or 9) per head, and in its very narrow leaves (Tomb 1980).

Ferron milkvetch (*Astragalus musiniensis*) G3S1

This regional endemic is found on gullied bluffs, knolls, benches and open hillsides, mostly in juniper or pinyon-juniper woodland but descending into the edge of the desert shrub community (Figure 19). It occurs mostly on shale, sandstone, or alluvia derived from them. In Mesa County, *A. musiniensis* was located in two conservation sites, Badger Wash and Bar X Wash.

Fisher Towers milkvetch (*Astragalus piscator*) G1S1

Astragalus piscator was first described from Grand and San Juan counties in Utah in 1986 (Figure 20). It has been found in three counties in eastern Utah, and in Mesa County. In Colorado it is known only from the Dolores River Canyon north of Gateway. It grows on alluvial soils derived from the Cutler sandstone. It is found in similar habitats to *Lygodesmia doloresensis*, along the gravel roads and in small dry washes on both sides of the river. Vegetation in the area is widely scattered Utah juniper, with sagebrush, four-wing saltbush, cheatgrass, galleta, and prickly pear cactus. Other associated species are blanket flower and black brush. It is similar to a more common species, *Astragalus amphioxys*, but can be distinguished in the field by its light purple, rather than bright pink-purple flowers.

Giant Helleborine (*Epipactis gigantea*) G4S2

Epipactis gigantea is one of the few orchids which grows in the desert (Figure 21). It is readily identified by its conspicuous greenish flowers with purple-brown markings. It grows along streambanks and near springs and seeps in the pinyon-juniper zone. Some common associates are scouring rush, horsetails, starry Solomonseal, Coyote willow, and skunkbush. Although the species is widespread in the southwestern region, its specific habitat requirements limit its numbers. In Mesa County, it was found in the Echo Canyon, Escalante Creek, Mee Canyon and Unaweep Seep conservation sites.



Figure 18. Dolores skeleton plant
(Lygodesmia doloresensis)

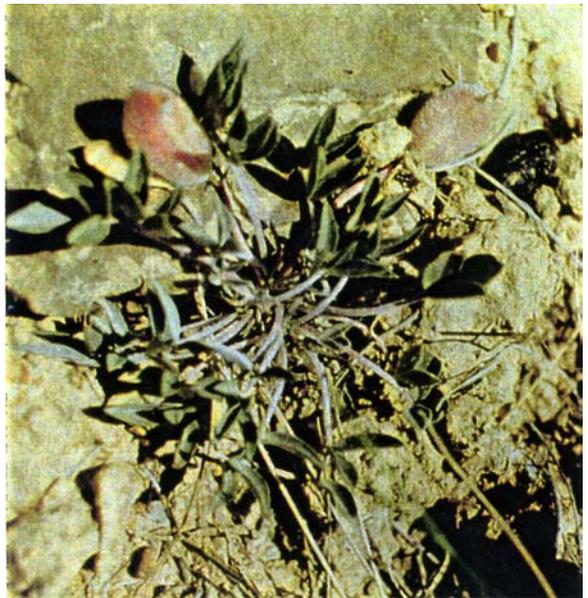


Figure 19. Ferron milkvetch
(Astragalus musiniensis)



Figure 20. Fisher Towers milkvetch
(Astragalus piscator)

Grand buckwheat (*Eriogonum contortum*) G3S2

This woody stemmed perennial is a regional endemic, found in Mesa County in the salt desert shrub communities between the Highline Canal and the Bookcliffs (Figure 22). Its yellow flowers are unmistakable when it is in bloom, from March to May. It occurs in six of the conservation sites identified here: Badger Wash, Bar X Wash, Highline Lake, Hunter Canyon, Persigo Wash, and Six and Fifty Reservoir. Associated species include Gardner saltbush, shadscale, Salina wild rye, galleta, bahia, Indian ricegrass, and prickly gilia.

Grand Junction milkvetch (*Astragalus linifolius*) G3S3

Astragalus linifolius is an attractive, bushy plant of the pea family (Figure 23). It grows with pinyon and juniper, on dry clay slopes and gullies of the Morrison formation, between 4800 and 6200 ft. Associated species include Indian rice grass, hairy golden aster, low rabbitbrush, and snakeweed. It is very closely related to *A. rafaensis*, which is found on the west side of the Uncompahgre Plateau, while *A. linifolius* is confined to the eastern side, in Mesa, Delta and Montrose counties. In Mesa County, it occurred in Big Dominguez Canyon, Echo Canyon, Escalante Creek, Cactus Park, and Rough Canyon conservation sites. During this survey, it was found to be more abundant than had been previously thought, and is being considered for lower global and state ranks. No threats to the plant are known, but the impacts of cattle grazing are not understood.

Jones blue star (*Amsonia jonesii*) G4S1

This bushy plant with powder blue flowers is unlike any other in the county (Figure 24). It is known from scattered locations in Mesa and Montezuma Counties in Colorado, and from Utah and northern Arizona. It grows in sandy, gravelly soils in rocky draws of the pinyon-juniper, sagebrush or desert shrub zones. It was previously known from Rabbit Valley, and was discovered in 1996 in the Shadow Lake site, not far from The Ridges subdivision.

Long-flower cat's eye (*Cryptantha longiflora*) G3S2

Cryptantha longiflora is a short-lived perennial, endemic to this region (Figure 25). It lives on sandy or clay soils in the desert shrub zone. In Mesa County, it was found in several of the conservation sites identified: DeBeque Cutoff, DeBeque North, East Creek, Orchard Mesa, Horsethief Creek, Reeder Mesa, Rough Canyon, Fruita and Monument Canyons, and Sulphur Gulch.

Naturita milkvetch (*Astragalus naturitensis*) G2G3S2S3

Astragalus naturitensis is an inhabitant of sandstone ledges and flat rimrock areas, where it often grows in cracks in the rock (Figure 26). It is found in association with pinyon and juniper woodlands, between 5000 and 7000 ft. It is restricted to the Four Corners area, with known locations in San Juan County, New Mexico; Utah (only one collection); and Mesa, Montezuma, San Miguel, Montrose and Dolores Counties in Colorado. Mesa County represents the northern extremity of its range. Most known populations are small, making the species vulnerable to extinction. Plants flower in April, through early June. In Mesa County, it occurs in five of the conservation sites identified: Coon Hollow, DeBeque Cutoff, Dolores Canyon South, Fleming Point, and Long Point.

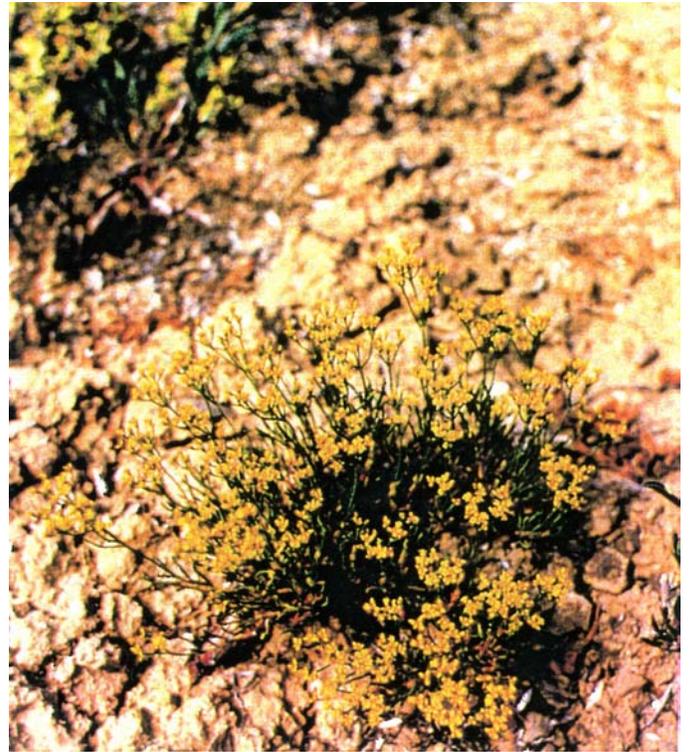


Figure 21. (upper left) Giant helleborine (*Epipactis gigantea*)

Figure 22. (above) Grand buckwheat (*Eriogonum contortum*)

Figure 23. (below) Grand Junction milkvetch (*Astragalus linifolius*)





F
Figure 24 (above). Jones blue star (*Amsonia jonesii*). Figure 25 (left). Long-flowered cat's eye (*Cryptantha longiflora*). Figure 26 (below right). Naturita milkvetch (*Astragalus naturitensis*).

Nevada onion (*Allium nevadense*) G4S1

Allium nevadense is a small onion which grows in sandy, gravelly, or occasionally clay soils in xeric shrubland or woodland habitats. It is widespread, occurring in western states from southeastern Oregon to California, and is at the eastern edge of its range in Mesa County. Associated species may include Utah juniper, needle and thread, and June grass. It has been found in four of the conservation sites identified here: Badger Wash, Devil's Kitchen, Fruita and Monument Canyons, and Highline Lake.

Osterhout cryptanth (*Cryptantha osterhoutii*) G3S1S2

Cryptantha osterhoutii is one of the smallest local members of its genus, a low taprooted perennial plant. It grows on dry sandy soils of the desert, often with pinyon, juniper, sagebrush, or blackbrush. It is known only from Mesa County in Colorado, and from adjacent southeastern Utah. In Colorado National Monument it was found on the Chinle formation. Conservation sites which have Osterhout cryptanth are Fruita and Monument Canyons, Gateway, Rabbit Valley and Rattlesnake Canyon.

San Rafael milkvetch (*Astragalus rafaensis*) G3S1

Astragalus rafaensis' deflexed pod (Figure 27) distinguishes this species from *Astragalus linifolius*, which has erect pods. *A. rafaensis* is known from Utah, and in Colorado from Montrose county, the Dolores River Canyon, and one questionable specimen from La Plata County. It was found in the Flat Top Mesa site in Mesa County, with pinyon and juniper, in soils derived from the Morrison formation, overlying Entrada sandstone.

Tall cryptanth (*Cryptantha elata*) G3S2

Cryptantha elata, another regional endemic, grows on clay soils in open, desert shrub communities (Figure 28). Common associated species are shadscale, Gardner saltbush, Indian rice grass, galleta, and Grand buckwheat. Its global range extends from Mesa County just east of Grand Junction, to eastern Grand County, Utah. It was found in the Badger Wash, Bar X Wash, Orchard Mesa, Highline Lake, Six and Fifty Reservoir and West Salt Creek sites, always on Mancos shale.

Uinta Basin hookless cactus (*Sclerocactus glaucus*) G3S3

Sclerocactus glaucus (Figure 29) is the only rare plant in Mesa County to have federal protection under the Endangered Species Act. Because of this, it has been the subject of more inventory and study than other plant species, and this has resulted in 43 Mesa County records of the species in CNHP's Biodiversity and Conservation database. Because of its federal status, conservation sites were identified for all occurrences of the plant, although many are ranked B4, or of only moderate significance. The cactus is similar to a more common species, *S. whipplei*, but is distinguished by a straight, rather than hooked, central spine, and usually smaller size. More taxonomic research is needed to clarify its relationship to other species in the genus. Plants are usually only visible when flowering, during April and May. After blooming, the cactus may shrink below the surface or become a dull grayish green color, making it difficult to see. It is found on gravelly alluvial soils or in clay, between 4500 and 6000 ft. Associated vegetation includes shadscale, sagebrush, greasewood, galleta grass, black sage, Indian ricegrass, prickly pear cactus, saltbrush, winterfat, yucca, low rabbitbrush and sand

dropseed (Scheck 1994). It is known from Montrose, Delta, Gunnison, Garfield and Mesa Counties in Colorado, and from Uintah and Grand Counties in Utah. In Mesa County, it has been located in the following conservation sites: Orchard Mesa, Atwell Gulch, Big Dominguez Canyon, Big Salt Wash, Cactus Park, Coon Hollow, DeBeque Cutoff, DeBeque North, Deer Creek (East and West), Gunnison River, Jerry Gulch, Little Dominguez Canyon, Pyramid Ridge, Pyramid Rock, Rabbit Valley, Reeder Mesa, and Sulphur Gulch.

Wetherill milkvetch (*Astragalus wetherillii*) G3S3

Astragalus wetherillii (Figure 30) grows on steep slopes, canyon benches, and talus under cliffs, in sandy clay soils derived from shale or sandstone. (Barneby 1964). It is often the only plant growing in small dry washes on rocky clay hillsides, where its very light-weight seeds seem to be dispersed downhill by seasonal surface water. Associated plant species are pinyon, juniper, sagebrush. Threats to the species include oil and gas development, overgrazing, road construction and other habitat modifications (O'Kane 1988). In Mesa County, it occurs in the Atwell Gulch, Fleming Point, Horsethief Creek, and Long Point conservation sites.

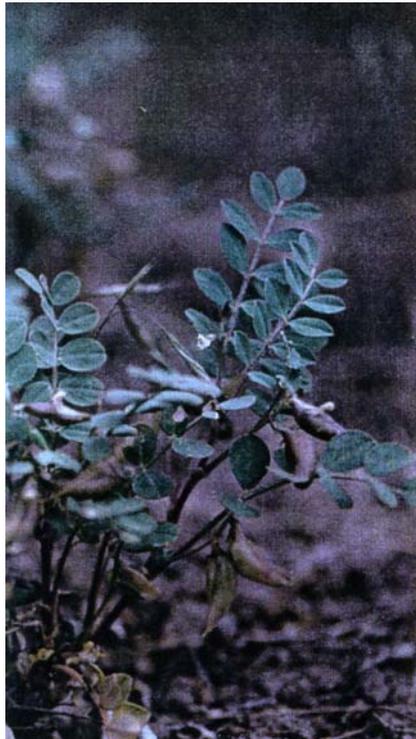
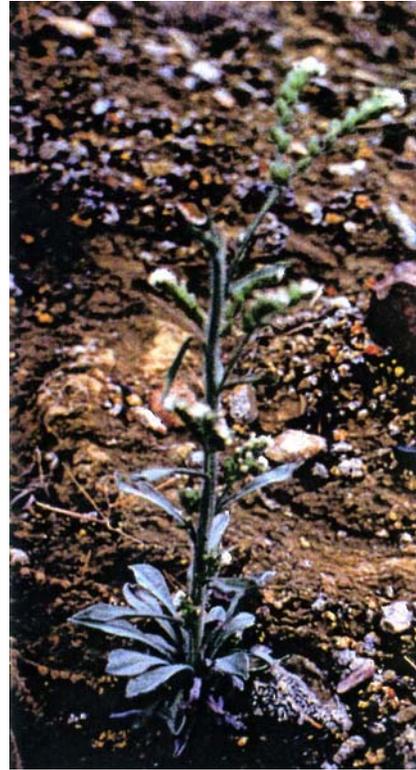


Figure 27 (above left). San Rafael milkvetch (*Astragalus rafaensis*). Figure 28 (above right). Tall cryptanth (*Cryptantha elata*). Figure 29 (below left). Uinta Basin hookless cactus (*Sclerocactus glaucus*). Figure 30 (below right). Wetherill milkvetch (*Astragalus wetherillii*).

Chapter IV. Rare or Imperiled Animals of Mesa County

TABLE 4. Rare and Imperiled Vertebrates of Mesa County

(Species for which there are only one or two records, more than ten years old, are not included)

Common Name	Scientific Name	G Rank	S Rank
Amphibians			
Boreal toad (Southern Rocky Mountain)	<i>Bufo boreas</i> pop 1	G5T2Q	S1
Canyon treefrog	<i>Hyla arenicolor</i>	G5	S2
Great basin spadefoot	<i>Scaphiopus intermontanus</i>	G5	S2
Northern leopard frog	<i>Rana pipiens</i>	G5	S3
Red spotted toad	<i>Bufo punctatus</i>	G5	S3S4
Birds			
American peregrine falcon	<i>Falco peregrinus anatum</i>	G4T4	S2B,SZN
Bald eagle	<i>Haliaeetus leucocephalus</i>	G4	S1B,S3N
Bendire's thrasher	<i>Toxostoma bendirei</i>	G5	S1B
Black-throated sparrow	<i>Amphispiza bilineata</i>	G5	S3B,SZN
Boreal owl	<i>Aegolius funereus</i>	G5	S2
Burrowing owl	<i>Athene cunicularia</i>	G4	S3S4
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>	G5	S2B,SZN
Cooper's hawk	<i>Accipiter cooperii</i>	G4	S3S4
Gray vireo	<i>Vireo vicinior</i>	G5	S2B
Great blue heron	<i>Ardea herodias</i>	G5	S3B,SZN
Great egret	<i>Ardea albus</i>	G5	S1B
Greater sandhill crane	<i>Grus canadensis tabida</i>	G5	S2B, S4N
Green-backed heron	<i>Butorides virescens</i>	G5	S3B,SZN
Gunnison sage grouse	<i>Centrocercus minimus gunnisonii</i>	G1?	S1?
Loggerhead shrike	<i>Lanius ludovicianus</i>	G4G5	S3B,SZN
Long-billed curlew	<i>Numenius americanus</i>	G5	S2B,SZN
Northern goshawk	<i>Accipiter gentilis</i>	G5	S3B,S4N
Purple martin	<i>Progne subis</i>	G5	S3B
Sage sparrow	<i>Amphispiza belli</i>	G5	S3B,SZN
Scott's oriole	<i>Icterus parisorum</i>	G5	S2B
Short-eared owl	<i>Asio flammeus</i>	G5	S2B,SZN
Snowy egret	<i>Egretta thula</i>	G5	S2B,SZN
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	G5T3	S1B
Fish			
Colorado squawfish	<i>Ptychocheilus lucius</i>	G1	S1
Humpback chub	<i>Gila cypha</i>	G1	S1
Razorback sucker	<i>Xyrauchen texanus</i>	G1	S1
Roundtail chub	<i>Gila robusta</i>	G3	S2

Mammals			
Botta's pocket gopher subspecies	<i>Thomomys bottae howellii</i>	G5T?	S3
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>	G5	S1
Desert woodrat	<i>Neotoma lepida</i>	G5	S1
Kit fox	<i>Vulpes macrotis</i>	G5	S1
Ord's kangaroo rat subsp.	<i>Dipodomys ordii sanrafaeli</i>	G5T?	S2
Pale lump-nosed bat	<i>Plecotus townsendii pallescens</i>	G4T4	S3
Townsend's big-eared bat	<i>Plecotus townsendii</i>	G4	S3
White-tailed antelope squirrel subsp.	<i>Ammospermophilus leucurus pennipes</i>	G5T?	S1S2
Yuma myotis	<i>Myotis yumanensis</i>	G5	S3
Reptiles			
Corn snake	<i>Elaphe guttata</i>	G5	S3S4
Longnose leopard lizard	<i>Gambelia wislizenii</i>	G5	S2
Southwestern blackhead snake	<i>Tantilla hobartsmithi</i>	G5	S1
Utah milk snake	<i>Lampropeltis triangulum taylori</i>	G5T4	S2
Western yellowbelly racer	<i>Coluber constrictor mormon</i>	G5T5	S2S3

TABLE 4. Rare and Imperiled Invertebrates of Mesa County

Common Name	Scientific Name	G Rank	S Rank
A tiger beetle	<i>Cicindela marutha</i>	G5	S3?
Comstock's hairstreak	<i>Callophrys comstocki</i>	G3	S1
Fragile ancyliid	<i>Ferrissia fragilis</i>	G4	SH
Great basin silverspot butterfly	<i>Speyeria nokomis nokomis</i>	G4T2	S1
Great purple hairstreak	<i>Atlides halesus</i>	G5	S2
Great spreadwing	<i>Archilestes grandis</i>	G5	S3
Hot springs physa	<i>Physa cupreonitens</i>	G?	S2
Lance-tailed darner	<i>Aeshna constricta</i>	G5	S1?
Rhesus skipper	<i>Polites rhesus</i>	G4	S2S3
Short-tailed black swallowtail	<i>Papilio indra minori</i>	G5TU	S1S2
Two-banded skipper	<i>Pyrgus ruralis</i>	G4	S3
Yuma skipper	<i>Ochlodes yuma</i>	G5	S2S3

Following are brief descriptions of some of the animals found in Mesa County that are considered to be of significant biological interest, and are tracked by the Colorado Natural Heritage Program.

Amphibians

Canyon tree frog (*Hyla arenicolor*) G5S2

The canyon tree frog inhabits rocky canyons along intermittent or permanent streams. This desert frog reaches its northern limits in Southern Colorado. Although primarily terrestrial, it breeds in canyon bottom pools surrounded by rock. It is usually found near permanent pools or cottonwoods in the pinyon-juniper zone. In spite of its name, the frogs do not climb trees. The adults feed on insects and spiders; larvae eat suspended organic matter in the pools. Most active at night, the frogs retreat to rock crevices in hot weather and during the cold season. They can sometimes be found during the day, resting in small depressions in solid rock near pools of water (Hammerson 1982). In Mesa County, they were found in eight of the conservation sites, all of which are red sandstone canyons: Dolores Canyon South, East Creek, Echo Canyon, Fruita and Monument Canyons, John Brown Creek Mesa, Maverick Canyon, Mee Canyon, and Rough Canyon. The canyon tree frog can be expected in any of Mesa County's canyons south of the Colorado River which have permanent water.



Figure 31. Canyon tree frog (*Hyla arenicolor*) Photo by Lauren Levo.

Great Basin spadefoot toad (*Scaphiopus intermontanus*) G5S2

The Great Basin spadefoot toad (Figure 33) is found in a wide variety of habitats, from low elevation shrublands to spruce-fir forests, and from British Columbia to Northwestern Arizona. In Colorado, it frequents pinyon- juniper woodlands, sagebrush and semi-desert shrublands, usually in or near dry rocky slopes or canyons (Hammerson 1982). It may dig a burrow in loose soil, or use ready-made burrows of small mammals. It breeds in temporary or permanent water, including rain pools and flooded areas along streams. Adult toads eat insects, and larvae probably eat algae, organic debris and plant tissue. In Mesa County, it was found in the DeBeque Canyon, Devil's Kitchen, Echo Canyon, Fruita and Monument Canyons, Persigo Wash, and Rabbit Valley conservation sites. The Great Basin spadefoot was found to be more common than previously thought, and broadly distributed in semi-desert habitats in Mesa County.

Northern leopard frog (*Rana pipiens*) G5S3

The northern leopard frog (Figure 34) occurs in a wide range of habitats throughout Colorado. However, some areas in Colorado have seen a decline in this species, especially those at high elevations. Part of the decline seems to be due to predation by the increasingly abundant bullfrog (*Rana catesbiana*), which is native to the eastern U. S., but introduced in Colorado. However, the leopard frog is also becoming uncommon in areas where bullfrogs are absent. The exact cause of the declines is unknown and needs further investigation (Hammerson 1982). The leopard frog inhabits springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually in permanent water with rooted aquatic vegetation. In summer, the frog commonly occupies wet meadows and fields. Metamorphosed frogs eat various small invertebrates; larvae eat algae, plant tissue, organic debris, and probably some small invertebrates. In Mesa County, they have been found along the Colorado River, in a reservoir on Pinyon Mesa, and in the Big Dominguez Canyon, DeBeque Canyon, East Creek, Gunnison River, John Brown Creek Mesa, Little Dolores River and Unawep Seep conservation sites.

Red-spotted toad (*Bufo punctatus*) G5S3S4

Red spotted toads (Figure 32) have been known in Colorado from the southeastern part of the state, and from western Colorado south of the Colorado River. The first record north of the river, in Rabbit Valley, was produced during this inventory. The toad lives in rocky canyons and gullies in deserts, grasslands and dry woodlands. It hides under rocks, in rock crevices, or underground when inactive. Eggs are laid, and larvae develop in shallow water in temporary rain pools, spring-fed pools, and in pools along intermittent streams. Metamorphosed toads eat a variety of small terrestrial arthropods. Larvae eat suspended matter, organic debris, algae and plant tissue. Red spotted toads were found often in the same location as Great Basin spadefoot toads. They were located in seven of the conservation sites identified here: Bangs Canyon, Big Dominguez Canyon, Devil's Kitchen, East Creek, Echo Canyon, Rabbit Valley, and Rough Canyon.



Figure 32. Red spotted toad (*Bufo punctatus*)
Photo by Lauren Levo.



Figure 33. Great Basin spadefoot toad (*Scaphiopus intermontanus*). Photo by Lauren Levo.



Figure 34. Northern leopard frog (*Rana pipiens*). Photo by Lauren Levo.

Birds

American peregrine falcon (*Falco peregrinus anatum*) G4T4S2B,SZ

The peregrine falcon (Figure 35) is listed as endangered by the U. S. Fish and Wildlife Service. Since 1947, its eggshell thickness was reduced 15 to 20 percent, probably due to the introduction of chemicals such as DDT in the food chain. In recent years, the species has been recovering, and in 1995, was proposed for removal from the endangered species list.

The cliffs and canyons in Mesa County provide habitat for nests and foraging. The raptor swoops or flies fast and low after a wide variety of birds. Exact locations of nests cannot be divulged, but several conservation sites have peregrines within them: Devil's Kitchen, Dolores Canyon South, East Creek, Fruita and Monument Canyons, Gateway, Mee Canyon, Mountain Haven, Sewemup Mesa, Ruby Canyon, and DeBeque Canyon.

Bald eagle (*Haliaeetus leucocephalus*) G4S1B

The bald eagle is a frequent winter visitor to the Grand Valley, but breeding pairs are unknown. However, its breeding range is expanding, possibly due to tree planting and erosion control (Ehrlich 1988). Widespread national efforts to protect and restore breeding populations have been generally successful (Wheye 1992). The species has made a come-back from its previously endangered status, and is now federally listed as threatened in the U.S. (USFWS, Federal Register, 12 July 1995). The bald eagle roosts in conifers or deciduous trees, such as the large cottonwoods along the Colorado River. It prefers accessible trees near water and away from human activity. The eagle feeds opportunistically on fishes, injured waterfowl and seabirds, various mammals, and carrion (Terres 1980). Mesa County bald eagle sites are DeBeque Canyon, Jerry Gulch and Ruby Canyon.

Black-throated sparrow (*Amphispiza bilineata*) G5S3B, SZ

The black-throated sparrow (Figure 36) is an uncommon local summer resident in mesas and valleys along the western border of Colorado from Mesa County southward, and in the southeastern plains. Most records are from Mesa and Delta Counties. It inhabits semidesert shrublands and open pinyon-juniper woodlands. Migrants may also be found in riparian urban and agricultural areas. The birds forage on the ground for seeds and insects (Andrews and Righter 1992). They have been found in Mesa County in the Deer Creek, Gateway, Mount Lincoln, and Rabbit Valley conservation sites.

Burrowing owl (*Athene cunicularia*) G4S3S4B

The burrowing owl is uncommon in the Grand Valley, and vulnerable in other western valleys and mountain parks. The species is declining in Colorado, being almost completely extirpated in some areas. Although loss of habitat may be responsible in some areas, there are sites with suitable habitat that no longer have owls, so other factors appear to be involved as well (Andrews and Righter 1992). The owls inhabit open grassland or semidesert shrublands, usually in or near prairie dog towns. They enlarge and modify abandoned rodent burrows for their nests, and use the mounds as perches. They often use the same burrow year to year. The owls feed on large insects and rodents, or sometimes on birds and amphibians. Fourteen nests were located during this survey, all in the area between the Highline Canal and the Bookcliffs. Conservation sites that have burrowing owls are Highline Lake, Persigo Wash, and Grand Valley North.

Cooper's Hawk (*Accipiter cooperii*) **G4S3S4**

Cooper's hawk (Figure 37) is a rare to uncommon summer resident in western valleys, foothills, and lower mountains.

In Mesa County, it nests in lowland valleys and pinyon-juniper woodlands, as well as the usual mature forests. In Bangs Canyon it was nesting in Douglas fir in the upper canyon, while in Echo Canyon it was found nesting in cottonwood. The raptor feeds on medium sized birds, small ground foraging mammals, and occasionally, reptiles and amphibians. All four Mesa County records in CNHP's biological and conservation database (BCD) were new in 1996. Two nests were documented from the vicinity of Colorado National Monument, in addition to those in the Echo Canyon and Bangs Canyon conservation sites.

Great Blue Heron (*Ardea herodias*) **GS3B,SZ**

The wide ranging great blue heron has colonies scattered throughout Colorado. Some winter here, while most others return from more southern habitats to our area in mid February to March and leave again in October (Andrews and Righter 1992). They prefer freshwater and brackish marshes along lakes, rivers, fields and meadow. They commonly nest high in trees, or less commonly in bushes, on the ground, rock ledges or cliffs. The birds eat fish, crustaceans, amphibians and reptiles, mice and shrews, and other animals. Most foraging is done while standing in the water. In our area, undisturbed cottonwood areas are essential for nesting. Colonies are utilized year after year, as long as there is no disturbance; however, the supporting cottonwoods generally die after some years, causing the colonies to relocate. All of our records in Mesa County are from DeBeque Canyon, along the Colorado River.

Gunnison sage grouse (*Centrocercus minimus gunnisonii*) **G4T1S1**

Recently described as a new species (Braun et al, in press) the Gunnison sage grouse is known from only three locations: one site in Utah, the Gunnison, Colorado area, and Glade Park-Pinyon Mesa, in Mesa County (Figure 38). The small grouse depend on a sagebrush habitat, preferring patchy shrublands with abundant grasses and forbs. They annually gather at leks to display and mate. These are often located in small clearings. There are now estimated to be fewer than 100 birds on Pinyon Mesa. Historic overgrazing has severely reduced the suitable habitat, and changes in grazing management are critical to the species' survival. Habitat improvement, such as removal of invading pinyons and junipers, and reseeding grasses have been recommended. CNHP strongly advocates that seeding be done with native species only. Recent research and recommendations for habitat conservation and improvement can be found in Woods and Braun (1995). Conservation sites for Fish Park and Pinyon Mesa were designed to include the known leks of the area, with a 2.5 mile radius surrounding each.



Figure 35. American peregrine falcon (*Falco peregrinus anatum*). Photo courtesy of BLM.



Figure 36. Black throated sparrow (*Amphispiza bilineata*). Photo courtesy of BLM.



Figure 37. Cooper's hawk (*Accipiter cooperii*). Photo courtesy of BLM.



Figure 38. Gunnison sage grouse (*Centrocercus minimus gunnisonii*). Photo courtesy of BLM.

Fish

Colorado squawfish (*Ptychocheilus lucius*) G1S1

The Colorado squawfish was once an important food and commercial fish, living throughout the Colorado River drainage in mainstream channels, including the Green, Yampa, White, Colorado, Gunnison, Dolores, and Animas rivers. Its current distribution is restricted to the lower reaches of these rivers, except the Dolores and Animas (Woodling 1985.) The decline of the fish is not fully understood. It is thought that dams have restricted spawning migrations, and that lowered water temperatures resulting from cold water releases prevent the development of fertilized eggs. Biotic interactions with other introduced fish species may also have impacted their decline (Woodling 1985). The young squawfish prefer small, quiet backwaters. Adults use various habitats, including deep, turbid, strongly flowing water, eddies, runs, flooded bottoms, or backwaters (especially during high flow). Lowlands inundated during spring high flow appear to be important habitats (Tyus and McAda 1984). Efforts for the recovery of the squawfish include reintroduction and the construction of fish ladders to facilitate their natural migration (Anderson, personal communication.)

Humpback chub (*Gila cypha*) G1S1

The humpback chub was historically widely distributed throughout the Colorado River Basin to which it is endemic. Its habitat has been altered by the construction of dams, and today it is found in widely separated river areas in the upper and lower Colorado Basin. Not only is the species rare, but it is threatened by hybridization with the roundtail chub (*Gila robusta*). Reduced river flows allow the round tail chub to successfully inhabit some deep water areas during low water periods where humpback chubs were previously isolated, resulting in competition and hybridization. Intermediates between the species occur in altered river systems, but not in unaltered rivers, emphasizing the importance of natural riverine environments for the recovery of the species (Tyus and Karp 1989)

Razorback sucker (*Xyrauchen texanus*) G1S1

The razorback sucker is extremely rare in Colorado. Fewer than seventy specimens have been collected since 1979, and these have all been adult fish, which may live for thirty years (Woodling 1985). This suggests that reproductive failure is the cause of their decline. Lack of recruitment of young into the population has been attributed to predation by non-native species including catfish and carp. Dams may block access to spawning habitats, change suitable juvenile habitat, block upstream migration, and lower water temperatures. There are confirmed spawning areas in Mesa County at Clifton, and the Colorado River between Grand Junction and Clifton is one of the main concentration areas of the fish. Habitats for the fish include backwaters, eddies, and impoundments. The fish are often associated with sand, mud and rock substrates in areas with sparse aquatic vegetation and moderate to warm temperatures (Sigler and Miller 1963).

Roundtail chub (*Gila robusta*) G3S2

The roundtail chub inhabits warm streams and large tributaries of the Colorado River Basin from Wyoming south to Mexico. Although our subspecies of the roundtail chub is abundant in most waters where it is found, it is declining in the Gunnison river, where it was abundant until the late 1970's (Woodling 1985). It is found in rocky runs, rapids, and pools of creeks and rivers, often in association with cover such as boulders or overhanging cliffs or vegetation (Woodling 1985). Groups of adults concentrate in quiet swirling water adjacent to fast moving water, while fish younger than one year old concentrate in river eddies and irrigation ditches (Woodling 1985). Their decline in the Gunnison River has been attributed to cold water releases downstream of Curecanti Dam (Woodling 1985).

Mammals

Botta's pocket gopher subsp. (*Thomomys bottae howelli*) G5T?S1

A member of a wide-ranging species, this subspecies of Botta's pocket gopher is on the edge of its range in Mesa County, the only Colorado location. We found it north of the Highline Canal from Big Salt Wash, east approximately to Palisade. A second location in Mesa County was found in alfalfa fields along the Little Dolores River at the confluence of Sieber Canyon. It lives in areas with well-developed soils, where it eats roots, bulbs, tubers and other vegetable matter. It forages above ground at night or on overcast days. In winter, it may tunnel through snow to reach above-ground vegetation. In California, grazed areas were found to have a lower abundance of pocket gophers than ungrazed areas (Hunter 1991). The species has been the subject of much research because of its ecological and economic importance. It is considered undesirable in agricultural areas because of tunneling and herbivory on domestic crops. On the other hand, it is valuable for soil formation (Armstrong 1972). It is represented in the Glade Park, Persigo Wash and Grand Valley North conservation sites.

Desert woodrat (*Neotoma lepida*) G5S1

The desert woodrat builds its dens in rocky areas of canyons and semiarid shrublands, making use of cracks and ledges of cliffs and spaces under fallen boulders or slabs (Fitzgerald et al 1995). Dens are constructed primarily of sticks and vegetative cuttings cemented with fecal matter, and often include cactus spines and bones. Finer materials are used for a nest within the den. The woodrat eats the foliage of xerophytic shrubs, forbs and cacti. In our area, common food plants are Russian thistle and shadscale. Occasionally it also eats twigs, tender bark, seeds or berries. Young are born in spring or early summer. There may be more than one litter per year. The desert woodrat occurs in Colorado only in small areas of Mesa, Garfield and Rio Blanco counties. In Mesa County, Finley found the woodrat south of Mack and Loma (Finley 1958). We found it in Rabbit Valley, Persigo Wash, Badger Wash and Grand Valley North conservation sites. All sites were north of the Colorado River, between the river and the Bookcliffs. This represents the extreme eastern edge of its range (Finley 1958).

Kit fox (*Vulpes macrotis*) G5S1

The largest rare mammal known in Mesa County, the kit fox (Figure 39) inhabits open desert or shrublands. It feeds primarily on small rodents, and opportunistically on birds, reptiles and insects. The species is mostly nocturnal, although young may play outside the mouth of the den in the late afternoon (CNHP 1996). Breeding season is December through February. Females produce one litter of four to five pups in February or March. Young are tended by both sexes, until family groups split up in the fall. Kit foxes have been radio-collared and tracked in Mesa County, and are known from the Cheney Reservoir, Rabbit Valley and Persigo Wash conservation sites.



Figure 39. Kit fox (*Vulpes macrotis*). Photo courtesy of CDOW.

Ord's kangaroo rat subsp. (*Dipodomys ordii sanrafaeli*) G5T?S2

Ord's kangaroo rat is found in extreme western Colorado, in sagebrush, pinyon-juniper, or desert shrub communities. They commonly dig burrows in light textured sandy soils. Food plants include cacti, Mormon tea, Russian thistle, pine nuts, and various seeds and branches of shrubs. The rat is able to eat plants high in oxalic acid, and derives water from its diet. It was found on both sides of the Colorado River, in seven of the conservation sites: Badger Wash, Echo Canyon, Fruita and Monument Canyons, Highline Lake, Rabbit Valley, Shadow Lake, and Six and Fifty Reservoir.

Townsend's big-eared bat (*Plecotus townsendii*) G4T4S3

Thompson's big eared bat is a medium sized, pale brown bat with brown membranes. Its long ears curl backward at rest. It roosts in caves, tunnels, mines and buildings. A gleaner, it can be found fluttering near vegetation in full dark. Our records are from the East Creek and Fruita and Monument Canyons conservation sites.

White tailed antelope squirrel (*Ammospermophilus leucurus pennipes*) G5T?S1

The white tailed antelope squirrel generally occurs below 5500 feet in river valleys, where the predominant vegetation is an association of saltbushes, sagebrush and greasewood, growing on heavy soils (Armstrong 1972). Rock outcrops and river-sorted boulder fields are its preferred habitat. The ecology of the subspecies is in need of study in Colorado, where its ecology is virtually unknown. Overgrazing, conversion of riparian habitats to more intensive irrigated agriculture, and similar practices may have negatively affected populations of the species (Fitzgerald, et al. 1982). The species occurs in seven of the conservation sites

recommended here: Colorado National Monument, Badger Wash, Bar X Wash, Highline Lake, Persigo Wash, Rabbit Valley, and Shadow Lake Draw, and Grand Valley North.

Yuma myotis (*Myotis yumanensis*) G5S3

This far-ranging bat species is more closely associated with water than most other North American bats. It is found in a wide variety of upland and lowland habitats, including riparian, desert scrub, moist woodlands and forests, but usually is near open water. Foraging is restricted to riparian corridors of the few major rivers. Nursery colonies are usually in buildings, caves and mines, and under bridges. It is reported that nursery colonies are abandoned or much reduced in numbers when disturbed (Barbour and Davis 1969). In Mesa County, the bat is known from Colorado National Monument, the Fruita and Monument Canyons and Devil's Kitchen sites; and from Highline Lake.

Reptiles

Corn snake (*Elaphe guttata*) G5S3S4

The corn snake ranges throughout the southeastern and south-central U. S. and northeastern Mexico. The population in western Colorado and southeastern Utah is disjunct from the rest of its range. The snake is associated with river valleys and canyon bottoms in Colorado. It inhabits a variety of vegetation types, including grassland, shrubland, and woodland, but usually does not venture far from permanent water. This snake is sometimes seen in rodent infested ranch outbuildings. The snake eats mainly rodents; but will also eat bats, birds and their eggs, lizards, snakes, frogs, and insects. It prowls on warm nights, and sometimes it can be found under objects on the ground during the day. It was found in the East Creek and Jerry Gulch conservation sites.

Longnose leopard lizard (*Gambelia wislizenii*) G5S2

The longnose leopard lizard inhabits desert and semidesert areas from Oregon and Idaho to Baja California. In Colorado, it is known only from Garfield, Montezuma and Mesa Counties. It prefers sites with scattered shrubs such as greasewood, saltbushes and sagebrush, especially in areas with abundant rodent burrows. It is generally ground dwelling, but sometimes climbs into bushes. It hides in underground burrows when inactive (Hammerson 1982, Nussbaum et al. 1983). It can be recognized by the numerous small round brown spots on a light brownish-gray background. Breeding females are brilliantly marked with orange-red on the underside of the tail and on the sides and back. It is found on both sides of the Colorado River. On the south side, it inhabits stands of greasewood and sagebrush on deep sandy soils and broad outwash plains, in or near the mouths of canyons. On the north side of the valley, leopard lizards occur on clay soils in saltbush-sagebrush shrublands and among fairly dense stands of saltbush, greasewood, rabbitbrush, and cheatgrass near arroyos and in the flood plains of semi-permanent streams. They seem to occur only where soil mounded at the base of shrubs is riddled with rodent burrows. The lizard emerges from its winter retreat in late May, long after the other lizards have emerged. (Hammerson 1982). The lizards eat insects, spiders, lizards, small rodents, and some plant material (Stebbins 1985). In Mesa County, it was found in the Badger Wash, Devil's Kitchen, Echo Canyon, Fruita and Monument Canyons, Gateway, Rabbit Valley, and Six and Fifty Reservoir sites.



Figure 40 (above). Corn snake (*Elaphe guttata*).
Photo by Lauren Levo.

Figure 41 (left). Longnose leopard lizard
(*Gambelia wislizenii*). Photo by Lauren Levo.

Figure 42 (below right). Western yellowbelly
racer (*Coluber constrictor mormon*). Photo
courtesy of BLM.



Southwestern blackhead snake (*Tantilla hobartsmithi*) **G5S1**

This species has a spotty distribution from southern California to west-central Colorado, and south to Arizona, southern New Mexico, Texas, and northern Mexico. Mesa County is at the extreme northern edge of its range. It inhabits pinyon juniper woodland, sagebrush and greasewood shrublands and riparian woodlands. It eats the larvae of insects, including beetles, caterpillars, centipedes and millipedes (Cole and Hardy 1981). It is found in Mesa County in the Colorado River at Grand Junction, Colorado National Monument, and John Brown Canyon sites.

Western yellowbelly racer (*Coluber constrictor mormon*) **G5T5S2S3**

The western yellowbelly racer is found in a wide variety of habitats: meadow, prairies; open chaparral, pinyon-juniper woodland; and riparian woodland. In western Colorado, it occurs below about 5500 ft., in agricultural areas, lowland riparian habitats, and occasionally in semi-desert shrublands. This slender bodied snake, despite its name, does not constrict its prey, but swallows it whole, or crushes larger prey in its jaws. It feeds on insects, reptiles, frogs and small mammals. It was found in four of the conservation sites: Colorado River at Grand Junction, Mack South, Shadow Lake Draw, and Unaweep Seep.

Invertebrates

Great Basin silverspot (*Speyeria nokomis nokomis*) **G4T2S1**

The Great Basin silverspot, also sometimes called the Nokomis fritillary, is found in streamside meadows and open seepage areas with an abundance of violets, in generally desert landscapes. Females lay eggs on, and the larvae eat, the leaves of a common violet, *Viola nephrophylla*. Adults use thistles, and possibly several other flowering plants as nectar sources. Individual colonies are often isolated. During the breeding season, the males patrol meadows or seeps, with a strong, rapid flight, to find females. The subspecies is extremely local, restricted in habitat, and rare over the major portion of its range. Some colonies have disappeared a result of water diversions. The colonies in Unaweep Canyon are known to be some of the best in the world for this species. They are represented in the Unaweep Seep conservation site.



Figure 43. Great Basin silverspot (*Speyeria nokomis nokomis*)

Sister (*Adelpha bredowi*) **G4G5S3**

This butterfly occupies moist lowland areas and forested riparian canyons. Males congregate in puddles and moist sandy patches along streams. Adults perch at the ends of branches to sun themselves. Its host plant in Mesa County is Gambel's oak. The only Mesa County record of the species is from Unaweep Seep.

Chapter V. Conservation Sites

Conservation sites are CNHP's suggested guidelines to insure the survival of Colorado's rarest plants, animals and natural plant communities. Each site is centered around one to several occurrences of rare or imperiled elements. Criteria for the selection and ranking of each site is given below. B1 Sites are listed first, then B2 through B5. Sites are arranged alphabetically within each biodiversity rank. Following the list of standard sites, are macrosites, which are large sites that may contain several standard sites within them.

Natural Heritage Significance lists are arranged in order of highest to lowest Global rank, and alphabetically within each rank. The EO field gives the rank of the occurrence, A-D, or H for historic (last documented over ten years ago.) A blank space indicates that the occurrence was not ranked. Element occurrence ranks, as well as global and state ranks, are explained in Appendix I. Following the global and state ranks assigned by CNHP, are the federal and state legal status for each species. Federal status codes in parentheses are former categories that are no longer in effect, and are given for information only.

Site name: Colorado River at Grand Junction

Size: Approximately 2,590 acres.

Biodiversity rank: B1. Outstanding significance. Multiple occurrences of critically imperiled fish.

Location (quadrangle): Clifton and Grand Junction. T1S R1W, sec. 8, 9, 15, 16, 19, 22, 23; T1S R1E sec. 13, 14, 19-22, 23.

General description: This site includes the stretch of the Colorado River south of the city of Grand Junction, and includes multiple occurrences of three of the endangered fish of the Colorado River. It is also a nesting site for the great and snowy egrets, and contains two occurrences of endangered snakes.

Natural vegetation of the banks of the river is scattered groves of cottonwood with squawbush and willows. Much of the understory has been invaded by tamarisk and Russian olive. Natural flows of the river have been altered by upstream dams, resulting in poor regeneration of cottonwood. Beavers have also caused the demise of many of the trees. This problem is now being resolved by wrapping the bases of healthy trees in affected areas with chicken wire.

In addition to the valuable fish habitat, the area is important for open space and recreation in the fast growing city of Grand Junction. Much work has been done already to preserve the river corridor. Grand Junction's Riverfront Project includes a system of trails and protected areas, and a new Botanic Garden. State protected areas include the Walker State Wildlife Area, and Connected Lakes Park. A Recovery Program for the endangered fish, lead by the U. S. Fish and Wildlife Service, uses the area as an experimental spawning ground.

Difficulties encountered in the recovery efforts for the Colorado squawfish are not unrelated to other conservation issues in the area. Floods, which created the areas that the fish historically used for spawning, and which are also necessary for the normal regeneration of cottonwood and willow, are no longer viable options because of the development in the area. The lack of natural flooding has increased tamarisk invasion, which, in turn, takes up so much water that it further reduces flows. Although the total sediment load of the river is lower than it was prior to the increase in surrounding vegetation from agriculture, decreased flows and the absence of flushing result in a concentration of elements such as selenium, which move up the food chain, affecting the survival of the fish.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Ptychocheilus lucius		Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius		Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius		Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius		Colorado squawfish	G1	S1	LE	E
Xyrauchen texanus		Razorback sucker	G1	S1	LE	E
Xyrauchen texanus		Razorback sucker	G1	S1	LE	E
Xyrauchen texanus		Razorback sucker	G1	S1	LE	E
Gila robusta		Roundtail chub	G3	S2	(C2)	SC
Gila robusta		Roundtail chub	G3	S2	(C2)	SC
Casmerodius albus		Great egret	G5	S1B	-	-
Egretta thula		Snowy egret	G5	S2B,	-	-
Elaphe guttata		Corn snake	G5	S3S4	-	-
Tantilla hobartsmithi		Southwestern blackhead snake	G5	S1	-	-
Coluber constrictor mormon		Western yellowbelly racer	G5T5	S2S3	-	-

Protection Urgency rank: P2

Comments: Efforts are underway to acquire properties or easements which will enable the development of a continuous greenbelt and trail system from Fruita to Palisade. This use would be consistent with protecting the natural values of the river corridor, whereas further industrial and commercial development, such as gravel mining, will negatively impact our natural heritage.

Management Urgency rank: M3

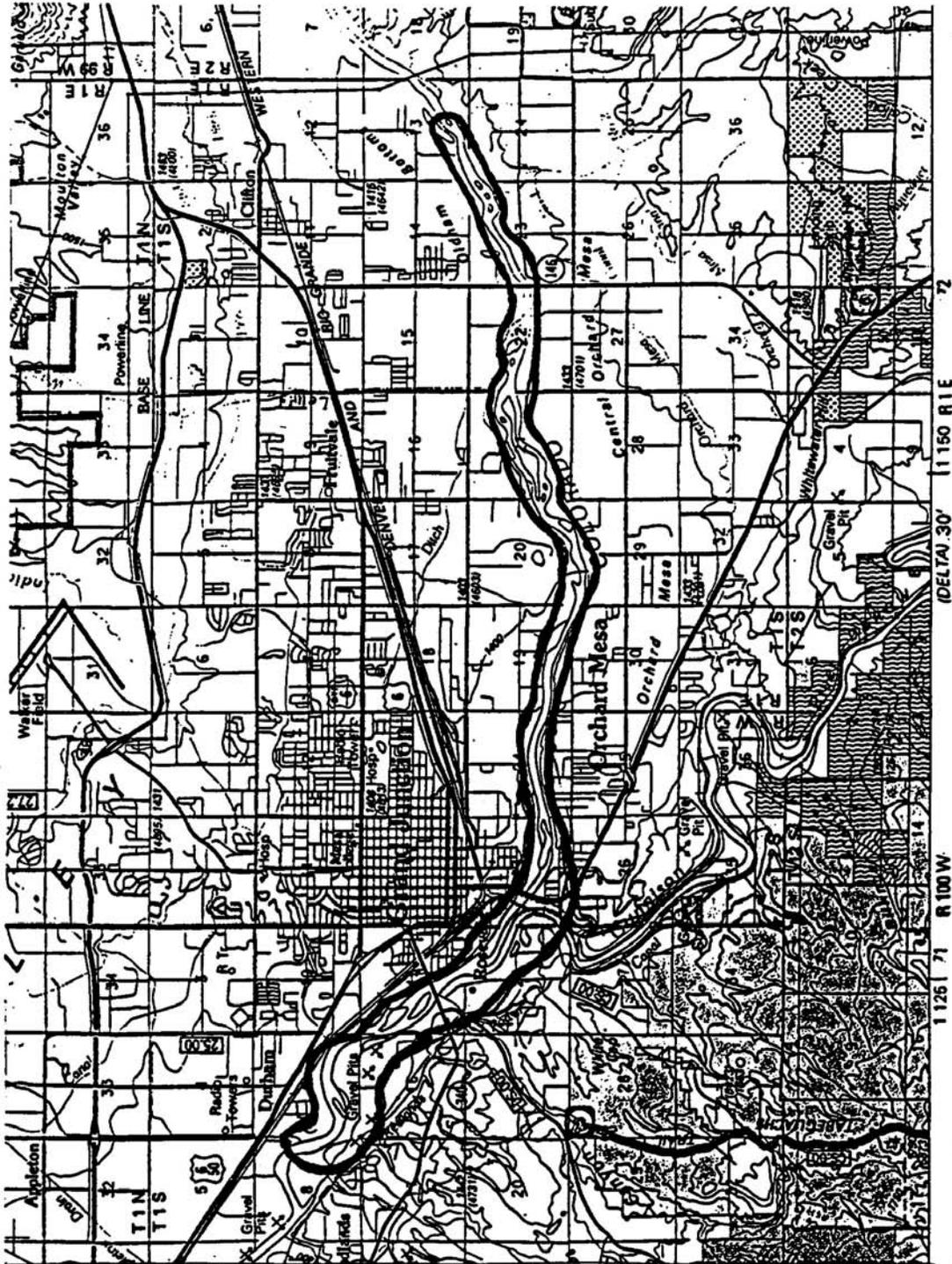
Comments: Restoration of vegetation to a more natural state should be a priority. Although tamarisk control of the entire flood plain is an overwhelming job, it could be removed from some areas, and new cottonwoods and willows planted. Revegetation projects should use only native plants.

Current Status (ownership): Mixed: state, federal, city, county, private. There are many ongoing efforts by federal, state and local entities to protect and restore elements of this site.

Boundary Justification: This site is recommended by CNHP to include the occurrences of the endangered fish. The previous boundary was modified to exclude the Gunnison River section, which is now included in a proposed Gunnison River site.

Colorado River at Grand Junction

Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS

Site name: Coon Hollow

Size: Approximately 4,542 acres.

Biodiversity rank: B1. Outstanding significance. Several excellent occurrences of globally imperiled plants.

Location (quadrangle): DeBeque and Wagon Track Ridge. T8S R98W sec. 24-29, 32-36; T8S R97W sec. 19, 29-31.

General description:

The site includes ridges of the Wasatch Formation (Atwell Gulch Member) that rise 500 feet from the valley (Coon Hollow). A small two track leads into Coon Hollow; however, the area receives very little traffic as the road soon dead-ends. There are several water tanks for cattle, but these, and the cattle themselves, generally remain in the valley bottom and do not impact the element occurrences. The Coon Hollow grazing allotment is a shared allotment, and generally is grazed in spring-time just after the DeBeque milkvetch and DeBeque phacelia flower. Each of the three rare plant species occurs in a different habitat, which form a mosaic in the site. The toe slopes are generally sandstone with many dry washes (habitat for DeBeque phacelia), with an excellent quality Utah juniper community, particularly in the side gulch in sections 26 and 35. Above the juniper community are purple gray, extremely steep and loose slopes that taper off towards the ridge top to barren, shrink-swell charcoal gray soils that provide habitat for the DeBeque phacelia. The ridge tops are in excellent condition with some Juniperus communities, and patches of barren clay that support annual and biennial species. The Uinta Basin hookless cactus is found at the base of the slopes, on gravelly soil, with shadscale, budsage, galleta and prickly pear cactus. Very few weeds are present, except in the valley bottom where grazing is sometimes heavy.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	fed.status	state
Astragalus debequaeus	C	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus		Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	C	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	A	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	B	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	A	Debeque milkvetch	G2	S2	(C2)	-
Phacelia submutica	AB	Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica	A	Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica	A	Debeque Phacelia	G2	S2	C	-
Phacelia submutica	B	Debeque Phacelia	G2	S2	C	-
Astragalus naturitensis		Naturita milkvetch	G2	S2S3	(3C)	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-

Protection Urgency rank: P3

Comments: Threats to all three rare species in this site include oil shale development in the long term. More imminent threats are off road vehicle (ORV) use and oil and gas pipelines. BLM has designated the area as open to ORV use only on signed roads and trails (USDI 1987); however, enforcement is difficult. Although these impacts are presently light, they are likely to increase. The BLM land has no special status.

Management Urgency rank: M3.

Comments: All three species may be vulnerable to trampling by livestock. There is intensive gas and oil activity on valley floor, as well as cattle grazing; however, most of the rare or imperiled plant occurrences are found on the slopes. ORVs should be prohibited on the slopes. Management action may be necessary to protect the quality of occurrences from human activities.

Current Status (ownership): BLM. This site currently has no formal protection.

Boundary Justification: The boundary was drawn to protect the element occurrences and enough appropriate habitat to allow the annual DeBeque phacelia to move through time.



Figure 44. Coon Hollow Conservation Site.

Site name: DeBeque Cutoff

Size: Approximately 3,444 acres.

Biodiversity rank: B1. Outstanding significance. Four excellent occurrences of globally imperiled plants.

Location (quadrangle): DeBeque and Mesa. T9S R97W sec. 14, 15, 22-27, 35, 36.

General description: The site consists of rough, rocky hills, composed of the Atwell Gulch and Shire members of the Wasatch Formation. Eroded purple clay areas on the pinyon-juniper covered slopes provide habitat for the annual DeBeque phacelia, while the DeBeque milkvetch is found in sandy clay soil of the drainage bottoms and on some slopes. It is even found along the highway in some places. Associated species in the area include sagebrush, shadscale, saltbushes, greasewood, snakeweed, Utah juniper, galleta and Indian rice grass. Much of the area is grazed, and exotic species such as cheatgrass and halogeton have invaded some areas, especially the lower flats. The DeBeque Cutoff Road is adjacent to the site. Included in the site is a small parcel of BLM land which is being considered for disposal.

Natural Heritage Resource Significance:

element	EO	common name	global	state	federal status	state
Astragalus debequaeus	A	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	A	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	C	Debeque milkvetch	G2	S2	(C2)	-
Phacelia submutica	A	Debeque Phacelia	G2	S2	C	-
Phacelia submutica	C	Debeque Phacelia	G2	S2	C	-
Phacelia submutica	C	Debeque Phacelia	G2	S2	C	-
Astragalus naturitensis		Naturita milkvetch	G2	S2S3	(3C)	-
Astragalus naturitensis	A	Naturita milkvetch	G2	S2S3	(3C)	-
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Pediomelum megalanthum	B	Large-flowered breadroot	G3	S3	-	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	-

Protection Urgency rank: P5

Comments: The BLM management plan for the area includes the statement: "Protect known important habitat sites of sensitive animal and plant species from disturbing activities." This should provide adequate protection. Present uses appear to be compatible with the existence of the rare plants.

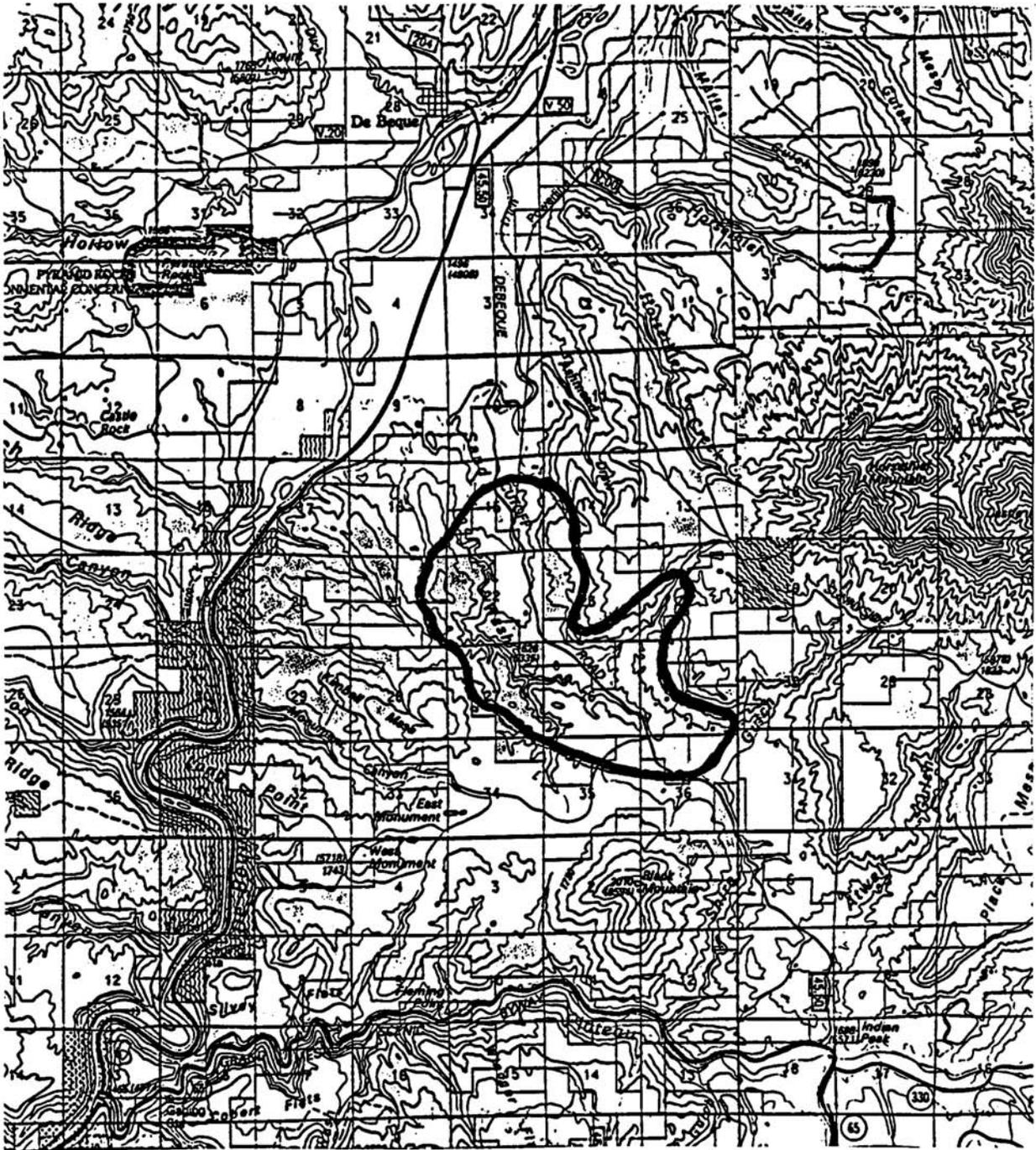
Management Urgency rank: M5

Comments: The BLM lands of this site are managed with emphasis on oil and gas development. Surface disturbing activities could pose a threat to the rare and imperiled plants of the area. Known locations of these plants should be protected, as called for in the management plan (USDI 1987), and nearby areas with similar habitat inventoried before new projects are allowed. Most of the plant occurrences are in small enough areas that they could be avoided. So far, current use does not appear to have negatively affected the plants.

Current Status (ownership): BLM and private

Boundary Justification: The boundary is drawn to encompass a concentration of occurrences of rare or imperiled plants which occur in drainages on both sides of the DeBeque Cutoff Road. The site includes several small draws with similar habitat.

DeBeque Cutoff Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Gateway

Size: Approximately 5,907 acres.

Biodiversity rank: B1. Outstanding significance. Good to excellent occurrences of critically imperiled plants.

Location (quadrangle): Dolores Point North and Gateway. T15S R104W sec. 7, 8, 15-22, 26-29, 32-35; T51N R19W sec. 8, 9, 15-17.

General description: At the foot of the monolithic Palisade, the Dolores River emerges from its narrow canyon and develops a wide floodplain. River banks are covered by scattered cottonwoods with thick stands of coyote willow, tamarisk, big sagebrush and New Mexican privet. Gentle slopes with pinyon, juniper and blackbrush lead up to vertical Wingate sandstone cliffs, home of Peregrine falcons. County roads lead northwest from Gateway to follow the river on both the east and west. Along these roads, in the alluvial soils deposited by the river, are found two of the rarest plants in Colorado, the Dolores skeletonplant and the Fisher Towers milkvetch. They grow among the common desert shrub species shadscale, greasewood, prickly pear cactus and Indian rice grass. Much of the area has been invaded by weeds and is heavily grazed by domestic livestock.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Astragalus piscator	B	Fisher Towers milkvetch	G1?	S1	-	-
Astragalus piscator	AB	Fisher Towers milkvetch	G1?	S1	-	-
Astragalus piscator		Fisher Towers milkvetch	G1?	S1	-	-
Lygodesmia doloresensis		Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	C	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	C-	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	C	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	B	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	B	Dolores skeletonplant	G1Q	S1	(C2)	-
Cryptantha osterhoutii	B	Osterhout cryptanth	G3	S1S2	-	-
Pinus edulis/Coleogyne ramosissima		Pinyon pine/blackbrush	G3	S3	-	-
Penstemon utahensis		Utah penstemon	G4	S2	-	-
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B,	LE	T
Amphispiza bilineata		Black-throated sparrow	G5	S3B,		
Gambelia wislizenii		Longnose leopard lizard	G5	S2	-	-
Pinus edulis/Cowania mexicana	B	Pinyon pine/cliffrose	G5	S3?	-	-
Forestiera pubescens	C	New Mexican privet	GU	SU	-	-

Protection Urgency rank: P2.

Comments: Although most of the occurrences of the Dolores skeletonplant and the Fisher Towers milkvetch are on BLM land, the area is a patchwork of private and public land. The extremely limited range of the species makes protection of its habitat crucial. Efforts should be made to educate and work with the private landowners for the plants' protection. The Dolores River has been recommended for status as a Wild and Scenic River. The site has been designated by BLM as open to oil and gas leasing, with a no surface occupancy stipulation.

Management Urgency rank: M2

Comments: The area is heavily grazed. It is not known how much impact this has on the plants. The predominance of *Lygodesmia* plants in clumps of prickly pear cactus suggests that they may be vulnerable to trampling by cattle. Small wire cage exclosures were installed by the BLM in 1989 to study the effects of grazing, but these have not been recently checked and may no longer be in place. A follow-up of that study or new exclosures and a monitoring plan are needed. A similar study should be conducted for *Astragalus piscator*. After such studies are completed, a management plan should be developed. Riparian areas could be improved by tamarisk removal.

Current Status (ownership): BLM and private. There is currently no special protection for the area.

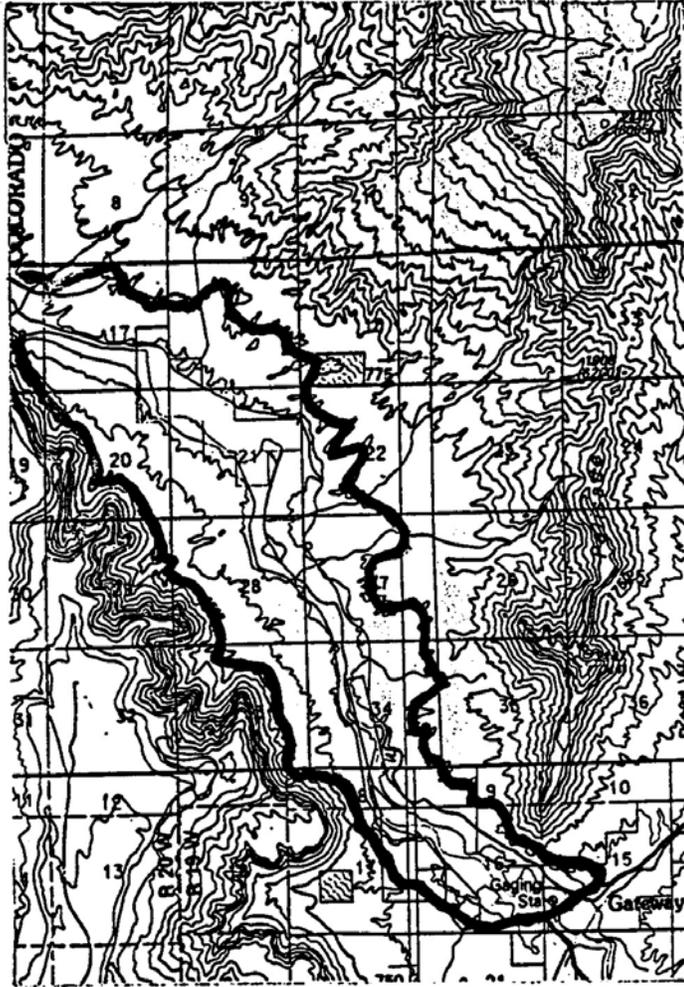
Boundary justification: The boundary is drawn to include the Dolores River floodplain and slopes below the steep cliffs which rise on both sides of the river. The area contains extensive habitat which is suitable for the Dolores skeleton plant and the Fisher Towers milkvetch, although the occurrences are patchy.

Further research needs: Develop and implement a long term monitoring study to determine the effects of grazing on *Lygodesmia doloresensis* and *Astragalus piscator*. Further taxonomic study of *Lygodesmia doloresensis* is needed to determine its relationship to other members of the genus, and the populations found in Rabbit Valley. See discussion in Chapter 3.



Figure 45. Gateway Conservation Site. Looking west across Dolores River, with tamarisk in foreground.

Gateway Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Pinyon Mesa

Size: Approximately 19,071 acres.

Biodiversity rank: B1. Very high significance. An excellent occurrence of a G2 plant.

Location (quadrangle): Bieser Creek, Fish Creek, Payne Wash, and Two V Basin. T12S R102W sec. 17, 19, 20, 21, 28-32; T 13S R103W sec. 21-36; T14S R102W sec. 1-5, 8-16, 21-24, 26-28.

General description: The Pinyon Mesa site includes two of the known leks (mating display grounds) of the Gunnison sage grouse (see also Fish Park site). The area is a mosaic of sagebrush, oak, aspen, manzanita and pinyon-juniper communities. It has a diverse mixture of shrub species, including mountain mahogany, serviceberry, squaw-apple, bitterbrush and snowberry, in addition to the dominant species mentioned above. Understory grasses and forbs, which are important to sage grouse, tend to be sparse, as the area has been heavily grazed for many years. There has been a loss of good habitat for the sage grouse as a result of invasion of sagebrush areas by pinyon and juniper, as well as the removal of the grass/forb component (Woods and Braun 1995). Elevations of the site range from approximately 7600 feet to 9500 feet. Many primitive roads and trails and a county road are present. Several springs and numerous natural ponds and stock ponds exist within the site. High quality examples of three natural communities were documented within the site. The Silver sage/snowberry plant association is found in the highest non-forested part of the Dolores Triangle, along MS Road, at the headwaters of North Fork Creek. It is an excellent example of a community type that represents several thousand acres. Exotic species in the area include Kentucky bluegrass, salsify (*Tragopogon dubius*) and dandelion.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Arctostaphylos patula	B	Greenleaf manzanita shrublands	GU	SU	-	-
Artemisia cana-Symphoricarpos oreophilus	B	Silver sage/Snowberry	GU	S?	-	-
Centrocercus minimus gunnisonii		Gunnison sage grouse	G4T1	S1	-	-
Centrocercus minimus gunnisonii		Gunnison sage grouse	G4T1	S1	-	-
Stipa comata West	B	Needle and thread grassland	G2	S2	-	-
Stipa comata West	B	Needle and thread grassland	G2	S2	-	-

Protection Urgency rank: P3

Comments: Private land in the site is critical for the sage grouse and needs to be protected. Part of the area is included in the Mountain Island Ranch Longshore Conservation easement. Most of the site is in private ownership with several ranches on which no formal protection is provided.

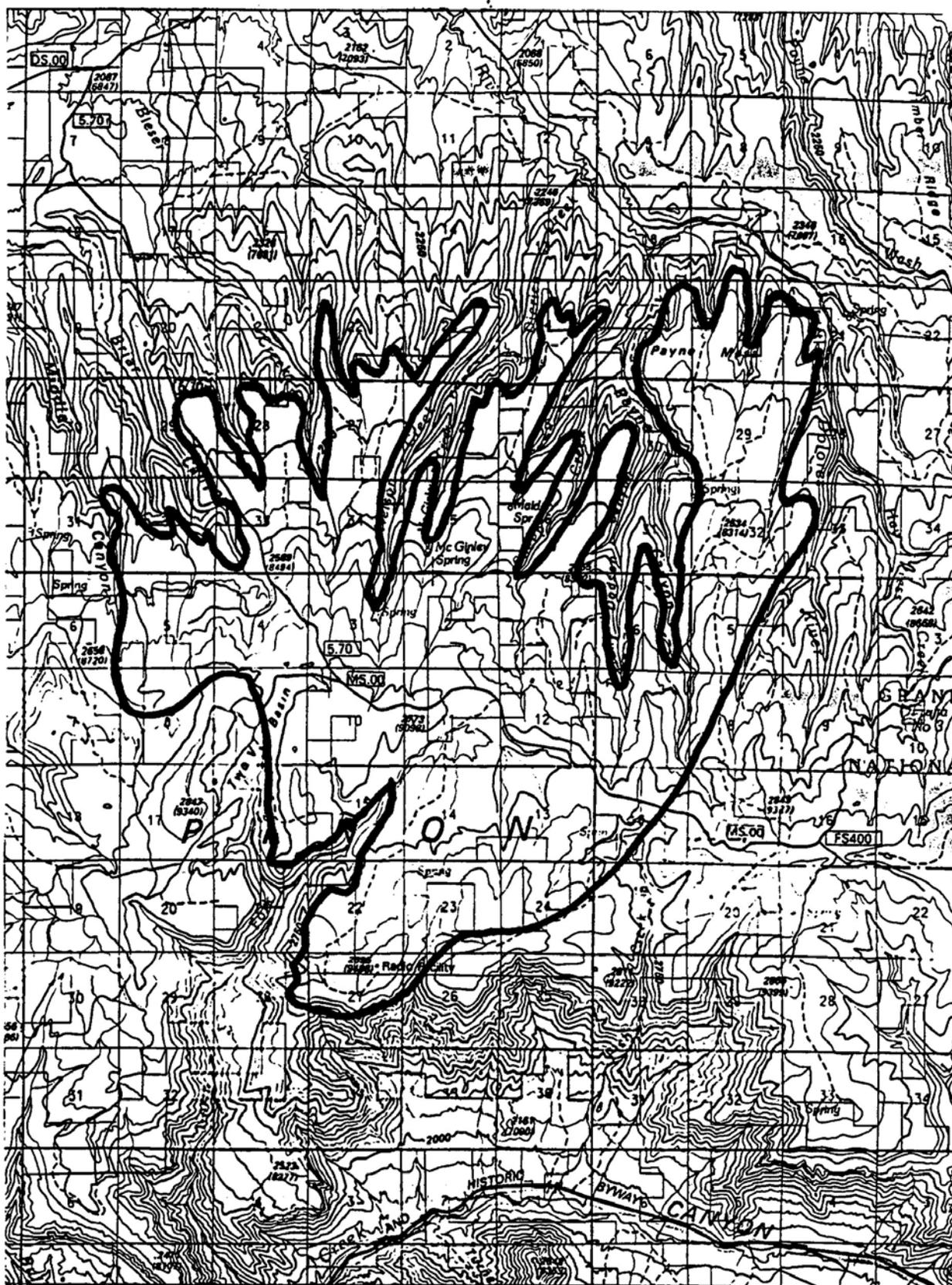
Management Urgency rank: M2

Comments: Some habitat improvement for sage grouse should be undertaken on both BLM and private lands. The grouse is being intensively studied by CDOW. Nearby Forest Service lands that were known to be occupied are not now inhabited. The decline in the Gunnison sage grouse is thought to be a response to the degraded sage community (Woods and Braun 1995).

Current Status (ownership): BLM and private. The public lands have no formal protective status. There is a conservation easement on a portion of the Mountain Island Ranch, held by the Mesa County Land Conservancy. Most of the site is in private ownership with several ranches on which no formal protection is provided.

Boundary Justification: The Gunnison sage grouse leks of the area are included within the boundary. In addition, an area of approximately 2.5 mi. radius surrounding each lek is included provided that there is some suitable habitat. Some adjoining potential habitat on the north end of the mesa is also included.

Pinyon Mesa Conservation Site



Site name: Rattlesnake Canyon

Size: Approximately 2,044 acres.

Biodiversity rank: B1. Outstanding significance. An excellent occurrence of a critically imperiled plant.

Location (quadrangle): Battleship Rock and Mack. T12S R104W sec. 1-11; T11S R104W sec. 1-4, 7-36; T10S R104W sec. 24, 25, 34-36; T11S R103W sec. 18-22, 27-34; T1N R3W, sec. 13-36; T11S R102W sec. 13-36.

General description: This spectacular red rock canyon runs north from Black Ridge to the Colorado River. It is rimmed by Entrada sandstone, and contains the second largest concentration of natural arches in the country. It is a popular destination for hikers and bicyclists. Access to the canyon is by foot from a trailhead near the Colorado River, or by a four-wheel drive road from Black Ridge. Boaters and rafters on the Colorado River may access the mouth of the canyon from the river. The area is a Wilderness Study Area, and is recommended as wilderness by the Colorado Environmental Coalition as well as the BLM (Colorado Environmental Coalition 1995).

The canyon is in nearly pristine condition. The mesas above the canyon have the best example of the Utah juniper/Salina wildrye community seen in Mesa County. The riparian zone along the canyon bottom has scattered plains cottonwood, box elder, willow and birch. The gentle slopes above have a mix of pinyon, juniper, mountain mahogany, cliffrose and sagebrush, with a well developed cryptogamic crust on the soil surface. Just below the canyon rim, in small pockets of soil in the Entrada sandstone, is the largest population in Colorado of the rare canyonlands lomatium. Large vertebrates of the canyon include deer, mountain lion, bighorn sheep, bald and golden eagles.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Lomatium latilobum	A	Canyonlands Lomatium	G1	S1	(C2)	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Juniperus osteosperma/Elymus salinus	A	Utah juniper/Salina wildrye	GU	SU	-	-

Protection Urgency rank: P2

Comments: The presence of one of the three known Colorado populations of *Lomatium latilobum*, the threat of damage from high visitor use and the present good condition of the canyon make it a high priority for protection. The area is a part of the Black Ridge Canyons Wilderness Study Area (WSA), and has been recommended for wilderness designation by BLM (USDI 1989). The wilderness environmental impact statement (EIS) makes no mention of any endangered plant species. Protection of some kind is desirable for the benefit of the rare plants and the ecosystem as a whole. This could include designation as wilderness or as an Area of Critical Environmental Concern (ACEC) by BLM. The area is an extremely popular destination for hikers and bicyclists, and damage to the *Lomatium* is a potential threat under heavy use. Proposals to close the lower road (the “hunter access road”) should be seriously considered.

Management Urgency rank: M2

Comments: Much has been done already to protect the canyon, including closing off the final part of the old 4-wheel drive road which lead to the canyon rim, and building a new trailhead and parking area. However, in spite of that, there is some evidence of recent vehicle use. Closing the road farther back still, would be beneficial. Many social trails now cross the canyon floor, destroying the cryptogamic crust. Trails need to be marked, and located away from the *Lomatium latilobum* sites. A monitoring program needs to be developed to assess the effects of present use on the *Lomatium*.

Current Status (ownership): BLM. The site is currently protected from vehicular traffic as a Wilderness Study Area (WSA).

Boundary Justification: The site includes the entire canyon and a section of the adjacent mesa, in order to include the *Juniperus osteosperma* / *Elymus salinus* community. A large area of unexplored potential habitat for *Lomatium latilobum* exists in the canyon. Other adjacent areas are included in the Black Ridge macrosite.

Further research needs: Define methods and carry out monitoring program for *Lomatium latilobum*. Continue to search for *Lomatium latilobum* on the opposite side of the canyon and other nearby areas. Map extent of the *Juniperus osteosperma* / *Elymus salinus* community, and establish permanent plots for monitoring.

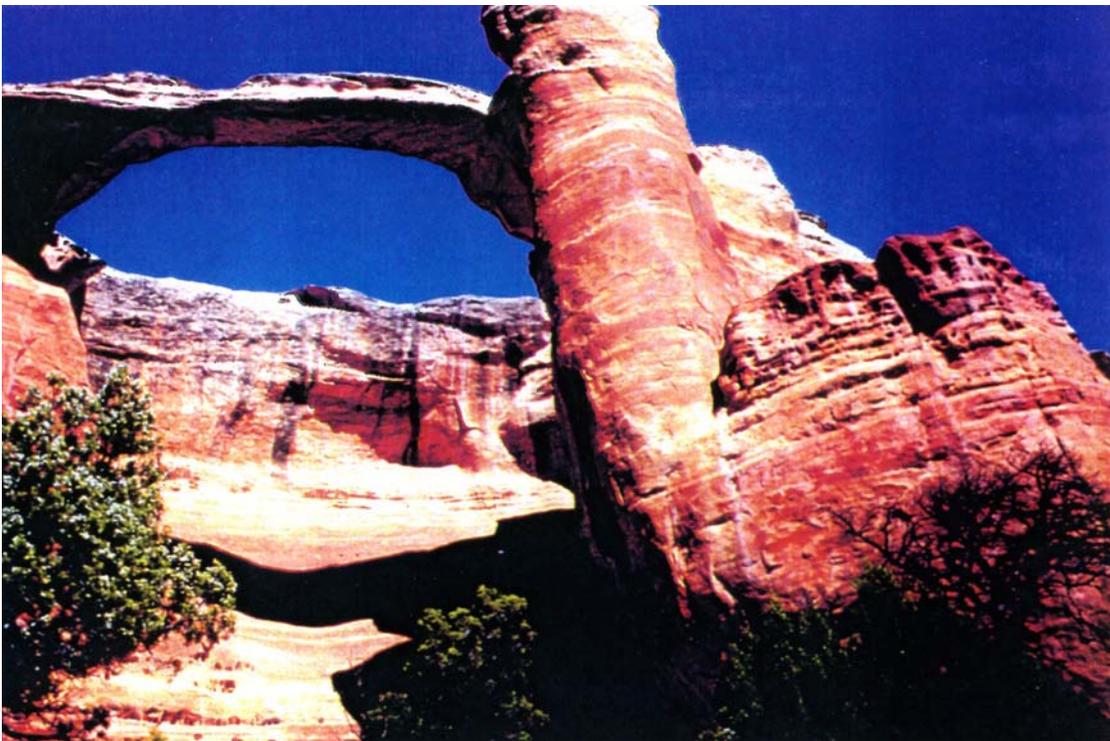
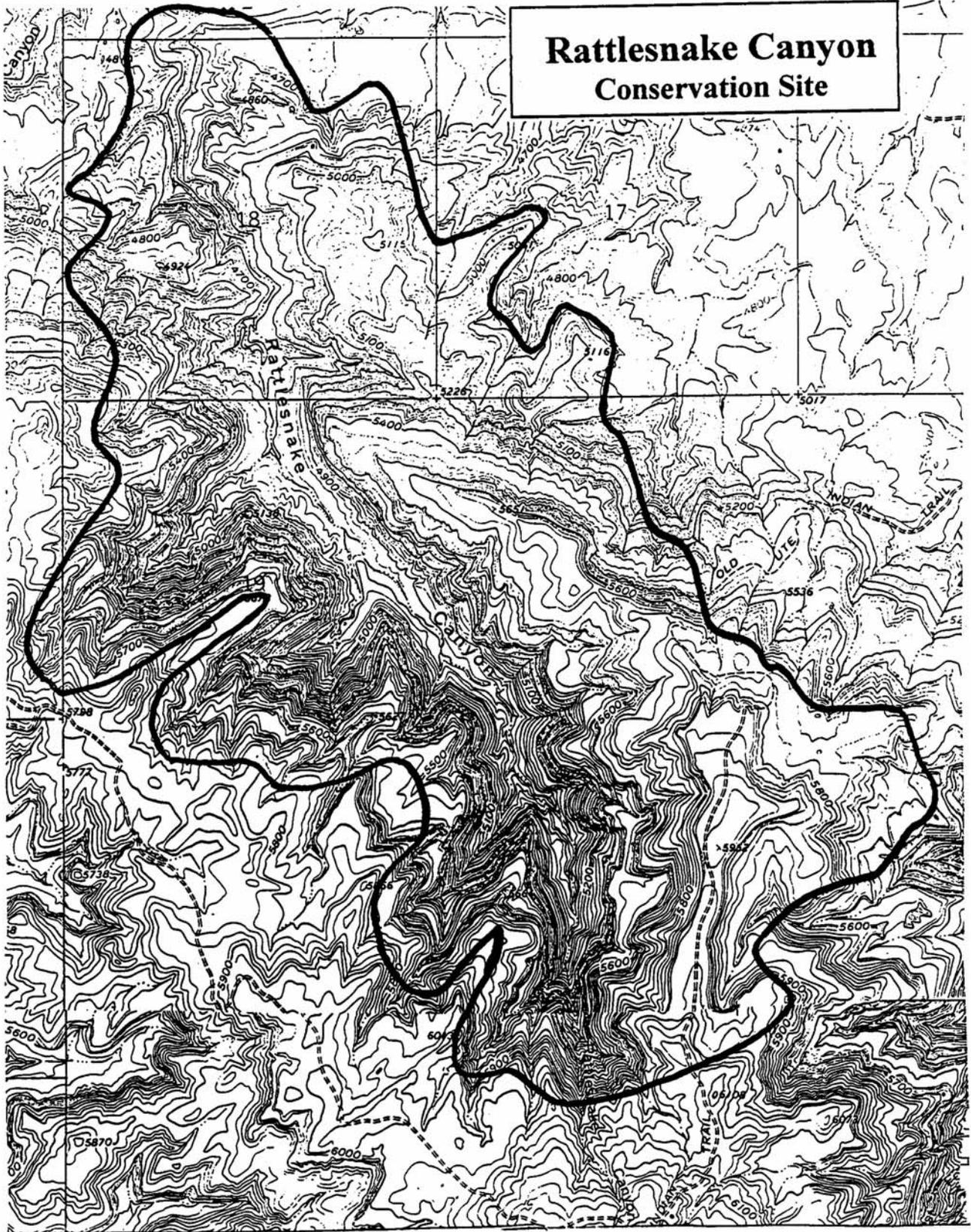


Figure 46. Rattlesnake Canyon Conservation Site. Arches in the Entrada sandstone, habitat for *Lomatium latilobum*.

Rattlesnake Canyon Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
..... CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Ruby Canyon

Size: Approximately 7,391 acres.

Biodiversity rank: B1. Outstanding significance. Multiple occurrences of critically imperiled fish.

Location (quadrangle): Bitter Creek Well, Mack, Ruby Canyon and Westwater. T1N R3W sec 7-9, 16-18; T10S R103W sec. 4-8, 15-19, 21, 22; T10S R104W sec. 23-28.

General description: The home of three of the endangered fish of the Colorado River, as well as bald eagles and peregrine falcons, this section of the Colorado River has been recommended for wild and scenic river designation. BLM estimates that this section of the river receives 7000 visitor days of use per year. Natural vegetation along the river is plains cottonwood with squawbush and coyote willow. Much of the area has been invaded by tamarisk and Russian olive. See the discussion under the Colorado River at Grand Junction site..

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state
Gila cypha	H	Humpback chub	G1	S1	LE	E
Gila cypha	H	Humpback chub	G1	S1	LE	E
Gila cypha	H	Humpback chub	G1	S1	LE	E
Gila cypha	H	Humpback chub	G1	S1	LE	E
Gila cypha	H	Humpback chub	G1	S1	LE	E
Gila cypha	H	Humpback chub	G1	S1	LE	E
Gila cypha	H	Humpback chub	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	H	Colorado squawfish	G1	S1	LE	E
Xyrauchen texanus	H	Razorback sucker	G1	S1	LE	E
Gila robusta	H	Roundtail chub	G3	S2	(C2)	SC
Haliaeetus leucocephalus		Bald eagle	G4	S1B, S3	LT	T
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B, SZ	LE	T
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B, SZ	LE	T
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B, SZ	LE	T

Protection Urgency rank: P4

Comments: The area is under BLM ownership, with a few very small parcels of private land. Protection for the peregrine falcon, bald eagle, razorback sucker, Colorado squawfish, and humpback chub are provided by the state and federal government under the Endangered Species Act.

Management Urgency rank: M3

Comments: BLM management plans for Ruby Canyon emphasize recreation. The plan calls for managing wildlife habitat primarily for endangered and riparian species, with a focus on improving the chance of survival, and increasing the area of cottonwood stands. Woody riparian habitat is to be maintained “to favor the tallest plant species native to each site, while promoting diversity in plant heights and species” (USDI 1987). In order to accomplish this, some tamarisk control will be necessary.

Habitat for peregrine falcons and bald eagles is actively managed and protected from surface-disturbing activities. A further management objective is to provide suitable habitat for the four endemic Colorado River fish in cooperation with the CDOW and USFWS. Surface disturbance is to be prohibited in riparian areas. ORV use is limited to existing roads on the north side of the river. The south side is closed to vehicles because of the wilderness recommendation (USDI 1987). and nurturing of some replacement

cottonwoods should be undertaken. Consideration should be given to restricting motorized watercraft in the canyon.

Current Status (ownership): BLM, with some private. The BLM land on the south side of the river has been designated a Wilderness Study Area.

Boundary Justification: Boundaries are drawn to include the river and its flood plain within the canyon. There is a need to determine the full extent of this site in Utah.

Ruby Canyon Conservation Site



SCALE 1:100,000
 1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
 CONTOUR INTERVAL 50 METERS
 (CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Atwell Gulch

Location: Mesa and Molina quadrangles. T9S R96W sec. 32,33; T10S R96W sec. 4-8.

Size: Approximately 1,329 acres.

Biodiversity rank: B2. Very high significance. This site contains high quality (B ranked) occurrences of two globally imperiled plants.

General description: Located about 10 miles southeast of DeBeque, east of the DeBeque Cutoff Road, Atwell Gulch is the namesake of the Atwell Gulch member of the Wasatch formation, which is the only known substrate for the rare DeBeque milkvetch, *Astragalus debequaeus*. The gulch has pinyon and juniper woodlands with open parks of sagebrush and saltbushes. Large sandstone boulders overlay the clay soils on the steep hillsides. The site lies mostly to the east of the DeBeque Cutoff Road, with a small part on the west side.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Astragalus debequaeus	B	Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	B	Debeque milkvetch	G2	S2	(C2)	-
Astragalus wetherillii	C	Wetherill milkvetch	G3	S3	(3C)	-
Astragalus wetherillii	C	Wetherill milkvetch	G3	S3	(3C)	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	-

Current Status: The northern half of the site is owned by BLM; the southern half by Ute Water Conservancy of Grand Junction, CO. Negotiations are in process to transfer the private portion to BLM.

Protection Urgency rank: P3

Comments: The northern, BLM owned portion of the site is well protected under current ownership. Negotiations are underway for the exchange of the Ute Water Conservancy land to the BLM. Ute Water has no other plans to develop the property, but if the exchange were to fail, the site might be at risk. Possible future threats include oil shale or oil and gas development, ORV use and residential development of private lands.

Management Urgency rank: M4

Comments: No management actions are needed at this time. The *Astragalus debequaeus* plants accumulate selenium, and are therefore probably avoided by cattle. Plants appear to be abundant and healthy, with no evidence of herbivory.

Boundary Justification: The boundary encompasses both documented occurrences of the two elements and potential areas of similar habitat in Atwell Gulch. This is one of several sites included in the DeBeque South Macrosite.

Further research needs: Continue searching the Atwell Gulch member of the Wasatch formation to locate additional sites. Known sites should be monitored for population trends and threats.

Site name: Bar X Wash

Size: Approximately 5,194 acres.

Biodiversity rank: B2. Very high significance. A good occurrence of a G2 community, and a concentration of good occurrences of G3 plants.

Location (quadrangle): Bar X Wash. About nine miles northwest of Mack. T8S R105W sec. 13, 24, 25; T8S R104W sec. 18, 19, 30-32; T9S R104W sec. 4, 5, 8, 9, 16, 17, 20, 21, 28, 29.

General description: This site is in the western part of the West Salt Creek drainage, an area of low Mancos shale hills, covered with desert shrub vegetation. Several communities form a mosaic pattern on the hillsides. They represent various combinations of shadscale, mat saltbush and Gardner saltbush, in combination with poison aster, Salina wild rye, galleta, and shale barrens. Other common species on the hillsides are Yucca, low rabbitbrush, and the selenium indicator, *Stanleya pinnata*. In gullied washes, three rare plants were found together: Ferron milkvetch, Grand buckwheat, and tall cryptanth. Flat bottomlands have greasewood, with a weedy understory of cheatgrass, mustard and horned buttercup. A few Utah junipers are scattered on the higher hills. Native bunchgrasses survive in patches of a few acres on the less heavily grazed slopes.

The area contains four significant natural communities and four rare plant species, as well as two birds of concern. The *Lygodesmia doloresensis* was a very small disjunct occurrence of a species found along the Dolores River. Further study of the taxonomy and biogeography of this species is needed.

So far, recreational impacts are far lower than in similar areas further east toward Grand Junction. The BLM land is closed to ORV use; however, as the Grand Valley becomes more populated, illegal ORV use could become a threat to the site. Oil and gas exploration and development have affected the area: swaths of weedy vegetation demarcate pipeline routes (Figure 47) and roadsides, and large areas are dominated by cheatgrass. Prevalence of broom snakeweed (*Gutierrezia sarothrae*) in some areas indicates former heavy grazing impacts. However, the presence of patches of native vegetation provides hope that natural communities can be recovered with time.

Natural Heritage Resource Significance:

element	EO	common name	global	state rank	fede	state
<i>Lygodesmia doloresensis</i>	D	Dolores skeletonplant	G1Q	S1	(C2)	-
<i>Atriplex confertifolia</i> / <i>Oryzopsis hymenoides</i>	B	Shadscale/Indian rice grass	G2	S2	-	-
<i>Atriplex gardneri</i> / <i>Elymus salinus</i>	B	Gardner saltbush/Salina wildrye	G2?	S2?	-	-
<i>Astragalus musiniensis</i>	B	Ferron milkvetch	G3	S1	-	-
<i>Cryptantha elata</i>	B	Tall cryptanth	G3	S2	(3C)	-
<i>Cryptantha elata</i>	C	Tall cryptanth	G3	S2	(3C)	-
<i>Eriogonum contortum</i>	B	Grand buckwheat	G3	S2	-	-
<i>Eriogonum contortum</i>	B	Grand buckwheat	G3	S2	-	-
<i>Atriplex confertifolia</i> / <i>Elymus salinus</i>	B	Shadscale/Salina wildrye	G3G5	S3	-	-
<i>Atriplex confertifolia</i> / <i>Elymus salinus</i>	C	Shadscale/Salina wildrye	G3G5	S3	-	-
<i>Atriplex confertifolia</i> / <i>Elymus salinus</i>	B	Shadscale/Salina wildrye	G3G5	S3	-	-
<i>Lanius ludovicianus</i>		Loggerhead shrike	G4G5	S3B, SZ	(C2)	-
<i>Icterus parisorum</i>		Scott's oriole	G5	S2B	-	-
<i>Numenius americanus</i>		Long-billed curlew	G5	S2B, SZN		
<i>Amphispiza belli</i>		Sage sparrow	G5	S3B, SZ	-	-
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel	G5T?	S1	-	-
<i>Juniperus osteosperma</i> / <i>Elymus salinus</i>	C	Utah juniper/Salina wildrye	GU	SU	-	-

Protection Urgency rank: P5 A grazing management plan is presently being formulated by BLM, NRCS, the permittee and other interested parties. All participants agree on the goal of improving the condition of the native vegetation. *Eriogonum contortum* seems to be a fairly resilient shrub. The *Astragalus* and *Cryptantha* may be more susceptible to impacts of grazing. Most vulnerable is the condition of the natural communities: the ratio of weedy areas to those with native bunchgrasses. Status of oil and gas development is unknown.

Management Urgency rank: M3. Grazing exclosures are needed to monitor effects of grazing and potential for recovery of the rare plants and plant communities. Grazing management should be designed to protect the rare plants and communities, and to generally improve the condition of the native vegetation.

Current Status (ownership): BLM. Grazing allotment.

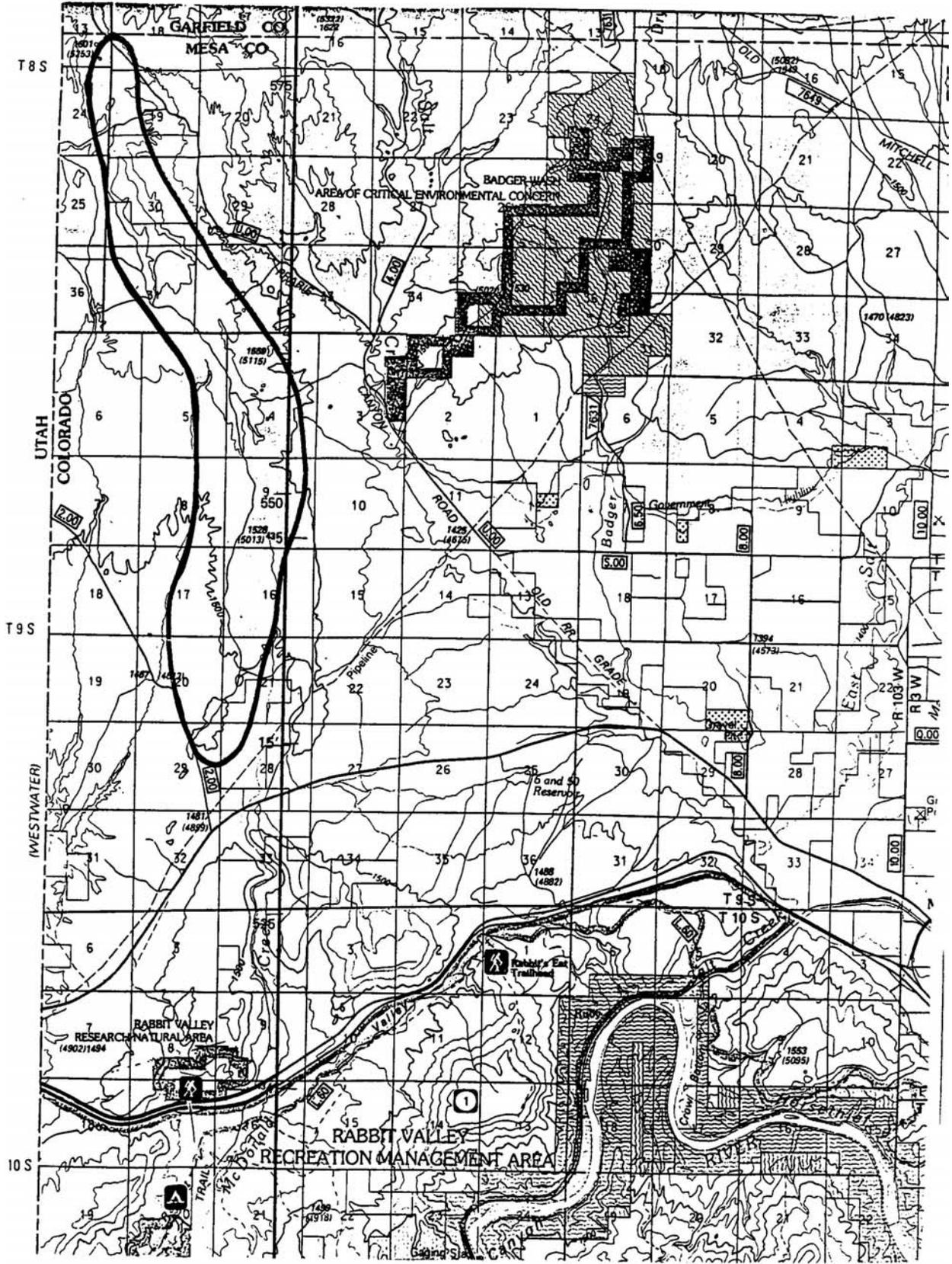
Boundary Justification: The site includes a cluster of occurrences of rare plant communities and rare plants, with potential habitat for the plants between observed locations.

Further research needs: Confirmation of the identity of the *Lygodesmia doloresensis* plants found here. These disjunct plants may be valuable in understanding the taxonomy of the genus. Exclosures, as discussed above.



Figure 47. Bar X Wash Conservation Site. Native bunchgrasses persist in patches, providing hope for the recovery of natural communities.

Bar X Wash Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Big Dominguez Creek

Size: Approximately 6,307 acres.

Biodiversity rank: B2. Very high significance. An excellent occurrence of a G3 community, and multiple fair to good occurrences of G3 plants.

Location (quadrangle): Keith Creek and Triangle Mesa. T14S R98W sec. 18-20; T15S R100W sec. 12-19, 22, 23; T15S R99W sec. 4, 5, 7, 8.

General description: Dominguez Creek supports some of the best riparian vegetation seen during this survey. In a stretch of about sixteen air miles from Carson Hole on the Uncompahgre Plateau to the Gunnison River, this beautiful stream descends from 9000 feet to 4800 ft., from coniferous forests to desert shrubs and cactus. Midway, in the area of Big Dominguez Campground, the rushing stream forms small waterfalls and trout-filled plunge pools in the Precambrian rock. Sedges and the rare canyon bog orchid line the banks, while blue spruce and cottonwoods tower above thickets of river birch, thinleaf alder and Red-osier dogwood. Above, on the canyonsides, the bright green of pinyon and juniper contrast with red sandstone cliffs. Farther downstream, plains cottonwood replaces the narrowleaf, as the canyon bottom winds below sheer Wingate sandstone cliffs.

Two significant natural communities, three rare plants and three amphibians of special concern in Colorado occur in the Dominguez Creek site. The Grand Junction milkvetch is confined to the eastern base of the Uncompahgre Plateau in Mesa, Montrose and Delta Counties. The canyon bog orchid grows in wet areas along streams or in bogs, while the Uinta Basin hookless cactus is found on drier alluvial soils.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Astragalus linifolius	B	Grand Junction milkvetch	G3	S3	(3C)	-
Astragalus linifolius	C	Grand Junction milkvetch	G3	S3	(3C)	-
Populus angustifolia/Cornus sericea	A	Narrowleaf cottonwood/Red-osier dogwood	G3	S2?	-	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Picea pungens/Cornus sericea	B	Blue spruce/Red-osier dogwood	G4	S2	-	-
Platanthera sparsiflora	A	Canyon bog orchid	G4G5T3	S2	-	-
Bufo punctatus		Red spotted toad	G5	S3S4	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Rana pipiens		Northern leopard frog	G5	S3	-	SC

Protection Urgency rank: P3.

Comments: The site has been proposed for wilderness designation, and is presently a BLM Wilderness Study Area. Mineral exploration and development are allowed until the area is designated wilderness by congress. This high quality riparian area deserves special designation to ensure proper management of ecosystem values.

Management Urgency rank: M3

Comments: Wilderness designation, and a proposed new bridge across the Gunnison River providing easier public access could bring about increased human activity. Trampling by fishermen could endanger the canyon bog orchid. A designated trail away from the stream with access points to the creek might help to reduce trampling on the stream bank where the plants are concentrated. The local avifauna could be significantly impacted by the increasing popularity of this canyon.

Current Status (ownership): BLM, CDOW, and Uncompahgre National Forest with some private land. BLM has recommended approximately 320 acres of private land and 600 acres of state land within Dominguez Canyon for acquisition (USDI 1987).

Boundary Justification: Boundaries are drawn to include the entire canyon, to its rim. All element occurrences in Dominguez Canyon are included. Although documented occurrences of riparian communities are mapped as separate sites, the entire canyon downstream from Carson Hole has been hiked by CNHP staff, and was found to be worthy of protection. The riparian area upstream from Carson Hole has not yet been inventoried by CNHP.

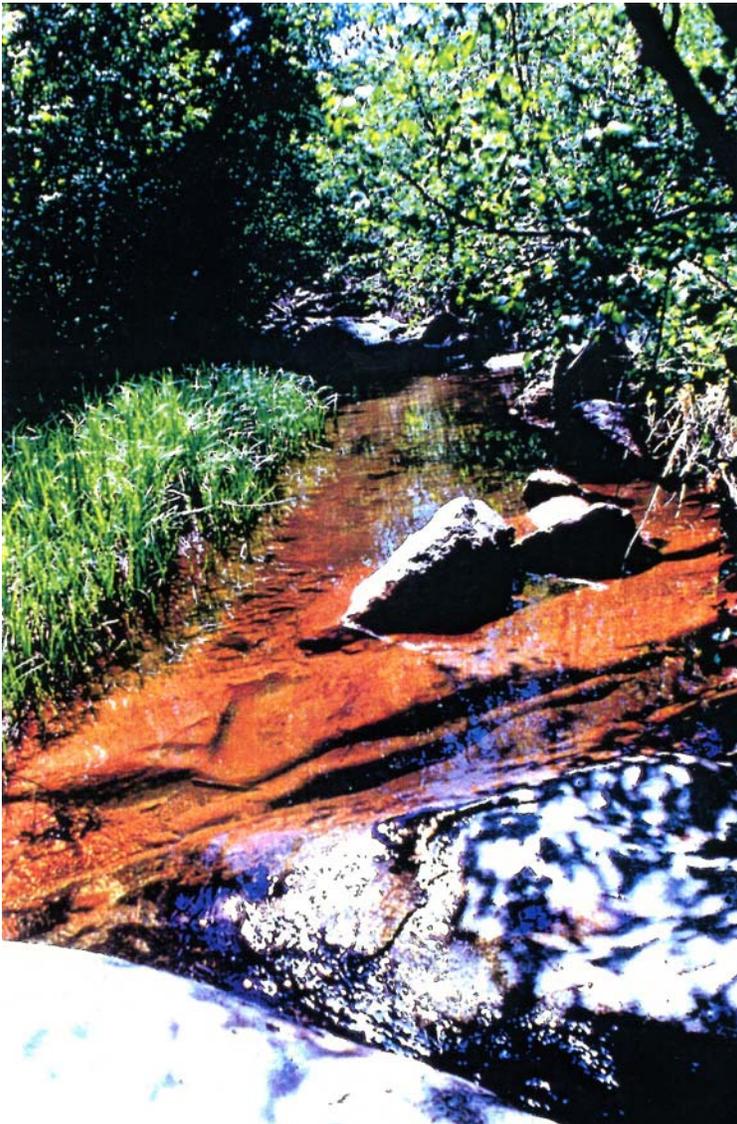
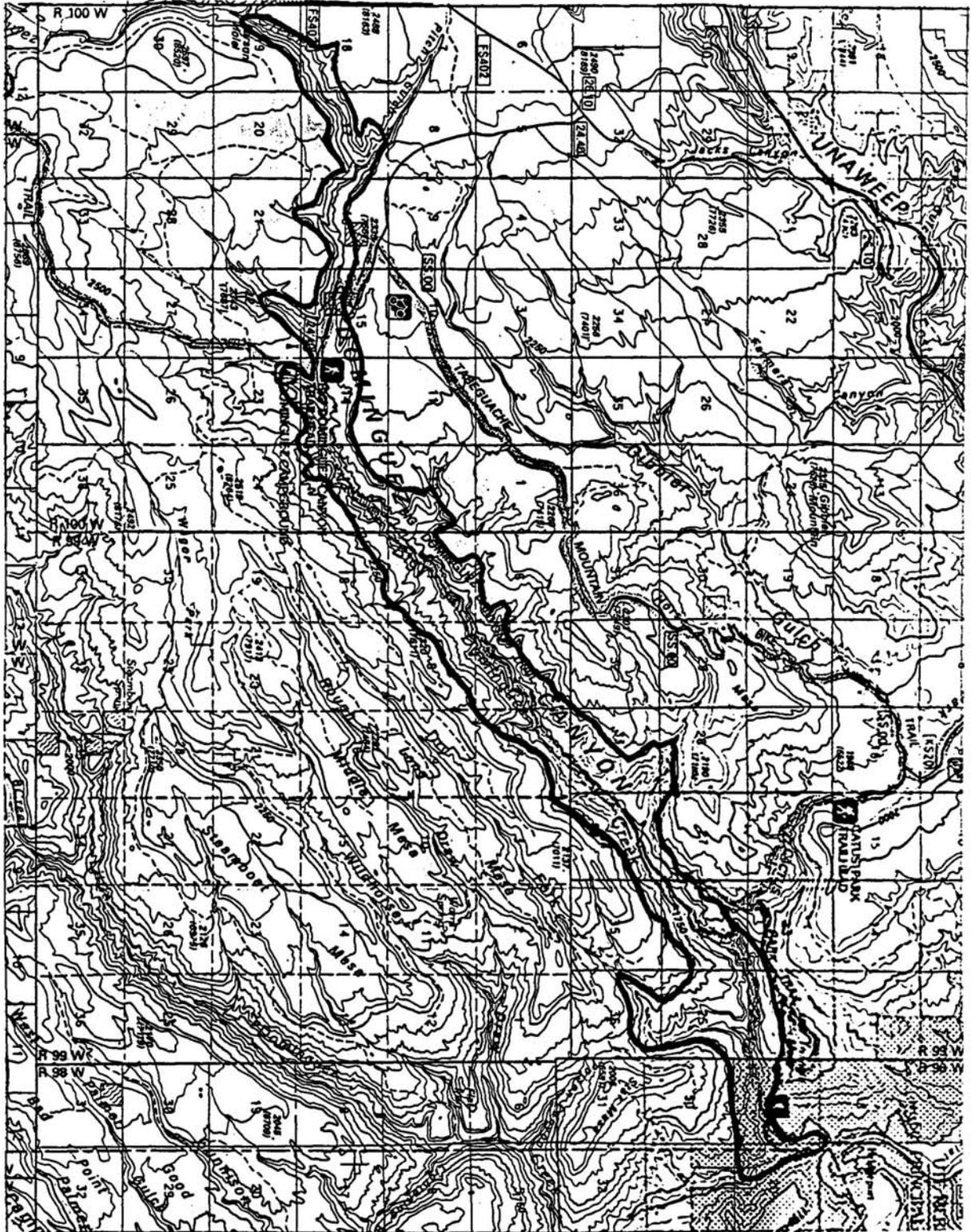


Figure 48. Big Dominguez Conservation Site. Riparian vegetation with canyon bog orchids along Big Dominguez Creek.

Big Dominguez Creek Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Corcoran Wash

Size: Approximately 111 acres.

Biodiversity rank: B2. Very high significance. An excellent occurrence of a G2 plant.

Location (quadrangle): Winter Flats. T8S R99W sec. 19, 20.

General description: This site encompasses a steep southeast facing slope above Corcoran Wash, with clay soil derived from the Wasatch formation. Boulders and fragments of sandstone form rounded clumps on its surface (CNHP 1995). Associated species include pinyon, juniper, sagebrush, spearleaf and shrubby buckwheats, snakeweed, and groundsel. The nearby area in the valley bottom has been altered. Sagebrush was chained in 1967, and crested wheat planted. Other areas have been burned, and have regrowth of oak and serviceberry. Grazing on the private lands has been heavy, and exotic species such as cheatgrass and sweet clover are abundant. However, the steeper BLM land of this site appears to be in good condition. The site was revisited by CNHP in 1996, and its high quality was reconfirmed (Spackman et al 1997)

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Astragalus debequaeus	A	DeBeque milkvetch	G2	S2	(C2)	-

Protection Urgency rank: P5

Comments: There are no known threats to the population

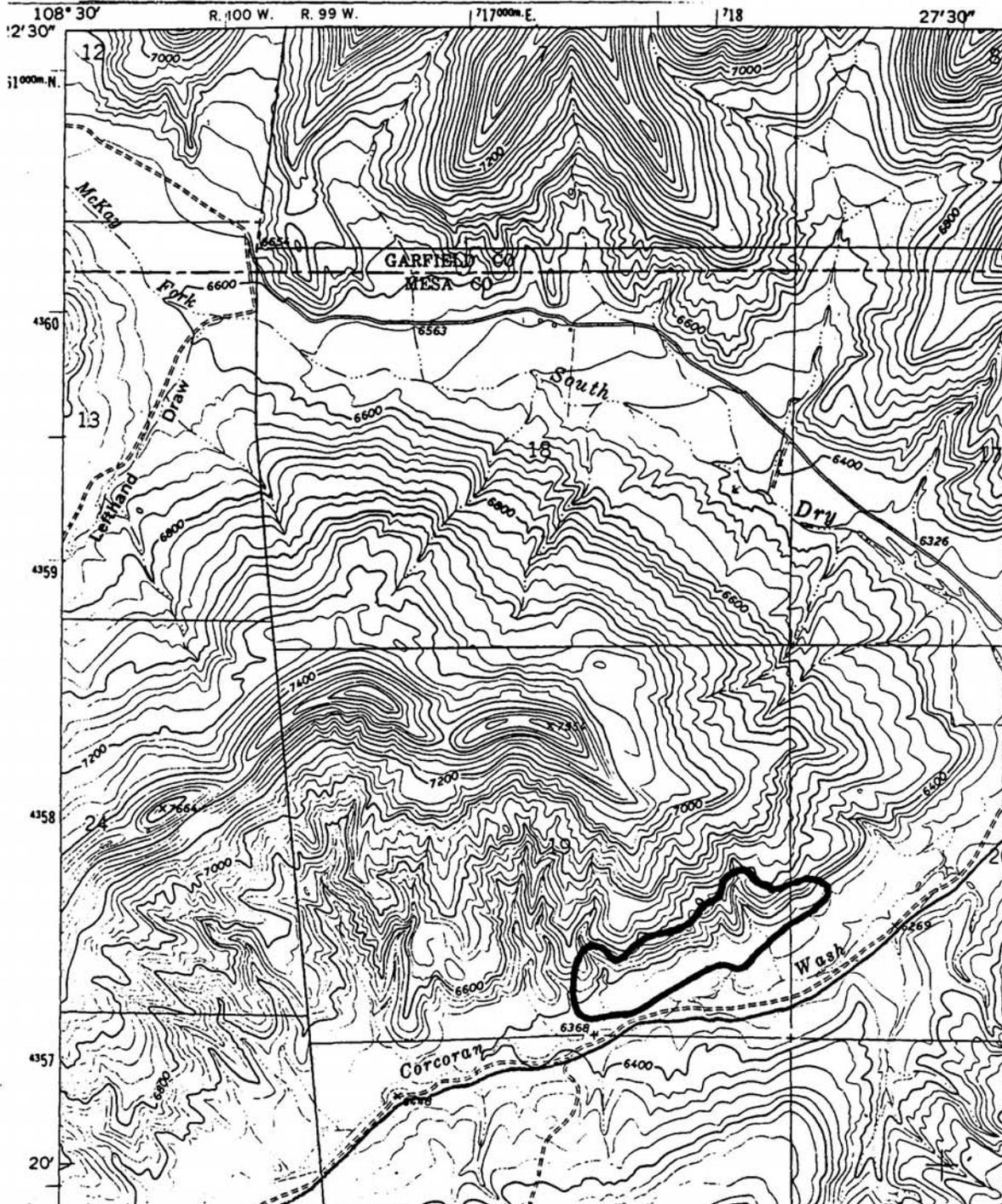
Management Urgency rank: M5.

Comments: No management needs are known. Although land near the site is disturbed, there is no evidence that the rare plant population has been impacted.

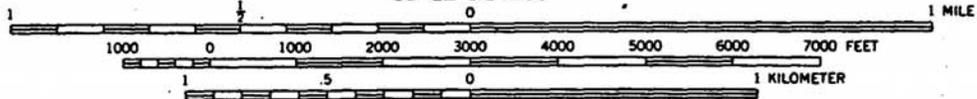
Current Status (ownership): BLM. The area has no special status.

Boundary Justification: Boundaries are drawn to include the population of the DeBeque milkvetch, surrounded by a buffer zone of approximately 500 ft. to protect the occurrence from direct impacts of motorized vehicles and livestock grazing.

Corcoran Wash Conservation Site



SCALE 1:24 000



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: DeBeque Canyon

Size: Approximately 2,545 acres.

Biodiversity rank: B2 Outstanding significance. Multiple occurrences of critically imperiled fish, and moderate occurrences of a globally imperiled plant community.

Location (quadrangle): Cameo, DeBeque and Wagon Track Ridge. T9S R97W sec. 8, 17-19, 29-31; T9S R98W sec. 25, 36; T10S R 97W sec. 6,7,18; T10W R98W sec. 12, 13, 23, 24, 26, 27, 34, 35.

General description: This narrow canyon of the Colorado River is historical habitat for at least two of the river’s endangered fish. However, inventory by CDOW over the last three years indicates that none of the listed fish are present now. A proposed fish ladder would enable the natural migration of the fish to take place. If it is built, the fish could be returned to the canyon within a few years. Other species of concern in the canyon include peregrine falcons, bald eagles, great blue herons, and a state endangered frog. A short distance northwest of Grand Junction, the canyon is shared by the river and Interstate 70. Natural vegetation of the area is plains cottonwood with squawbush and coyote willow. However, this has been impacted by the altered flood regime resulting from damming of the river. Although isolated patches of cottonwood riparian woodlands in fair to good condition remain, much of the understory vegetation has been replaced by tamarisk. Good regeneration of cottonwood is rare. The population of the narrow-stemmed Gilia on the alluvial soil of a tributary to the canyon may be its southernmost occurrence.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Ptychocheilus lucius	C	Colorado squawfish	G1	S1	LE	E
Ptychocheilus lucius	C	Colorado squawfish	G1	S1	LE	E
Xyrauchen texanus	C	Razorback sucker	G1	S1	LE	E
Populus deltoides ssp wislizenii/Rhus trilobata	C+	Fremont cottonwood/skunkbush	G2	S2	-	-
Populus deltoides ssp wislizenii/Rhus trilobata		Fremont cottonwood/skunkbush	G2	S2	-	-
Populus deltoides ssp wislizenii/Rhus trilobata	C	Fremont cottonwood/skunkbush	G2	S2	-	-
Gilia stenothyrsa	D	Narrow-stem gilia	G3	S1	-	-
Haliaeetus leucocephalus		Bald eagle	G4	S1B,	LT	T
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B,	LE	T
Ardea herodias		Great blue heron	G5	S3B,	-	-
Ardea herodias	H	Great blue heron		S3B,	-	-
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5	S2	-	-

Protection Urgency rank: P4

Comments: The area has been proposed as wilderness, although designation appears unlikely. BLM has tools available to protect the site. It has designated the area as unsuitable for coal mining and sensitive for public utilities development including power lines and pipelines.

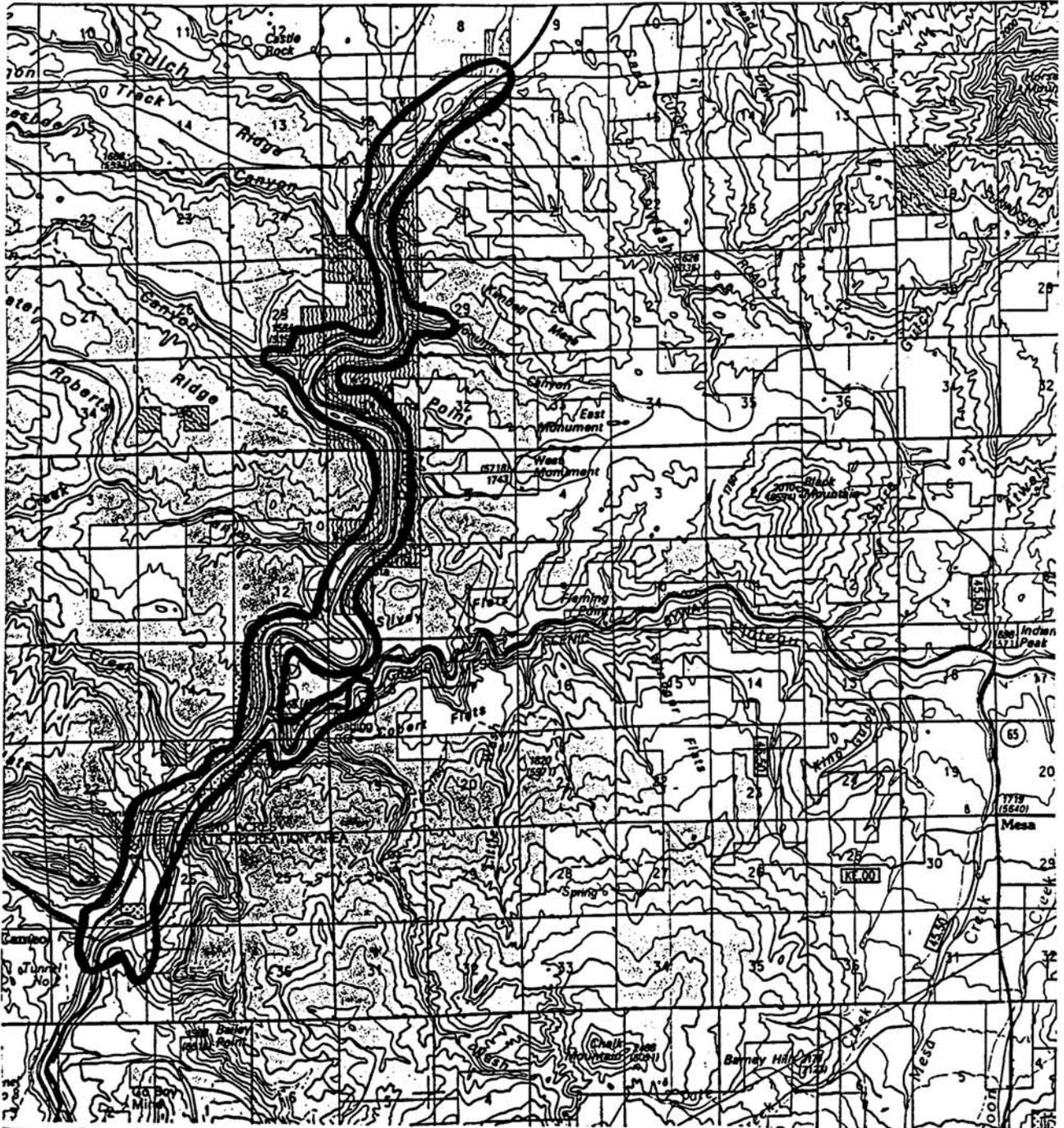
Management Urgency rank: M3

Comments: The riparian community has been altered due to the absence of natural flooding. Management for the protection and increase of cottonwood stands, as called for by the BLM management plan for the Ruby Canyon area is appropriate here also. The narrowstem gilia site could be threatened by ORV use.

Current Status (ownership): The majority of the site is on BLM land with no formal protection. Small parts of the site are managed by the Bureau of Reclamation and the Colorado State Parks (Island Acres State Recreation Area).

Boundary Justification: The boundary encompasses the river and its flood plain within the canyon.

DeBeque Canyon Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Devil’s Kitchen

Size: Approximately 1,788 acres.

Biodiversity rank: B2. Very high significance. A good (B-ranked) occurrence of a G1 plant.

Location (quadrangle): Colorado National Monument. T1S R1W sec. 30-32; T12S R101W sec. 2, 11, 13, 14, 23, 24.

General description: This site includes a popular picnic area in Colorado National Monument, overlooking the Grand Valley to the north, and trails that are heavily used by day-hikers. It extends into Columbus Canyon on the west and No Thoroughfare Canyon on the east. The site encompasses lowlands with shadscale and sagebrush, and slopes with a pinyon-juniper woodland, bordered by vertical cliffs of Wingate sandstone. Prior to this survey, we knew of one clump of the extremely rare canyonlands lomatium here. This year, we discovered 65 clumps, extending for about a mile past the known location. The rank of the occurrence was thereby raised from poor (D) to good (B) quality. Four other rare plants have been found in this diverse site. The site provides a variety of habitats which support rare bat species, Peregrine falcons, lizards, frogs, toads and snakes.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Lomatium latilobum	B	Canyonlands Lomatium	G1	S1	(C2)	-
Allium nevadense		Nevada onion	G4	S1	-	-
Nama dichotomum		Livemore fiddleleaf	G4	SH	-	-
Portulaca halimoides		Dwarf purslane	G4?	S1	-	-
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B,	LE	T
Muhlenbergia		Sixweeks muhly	G5	S1	-	-
Tantiilla hobartsmithi	H	Southwestern blackhead snake	G5	S1	-	-
Gambelia wislizenii	H	Longnose leopard lizard	G5	S2	-	-
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Scaphiopus	H	Great Basin spadefoot toad	G5	S2	-	SC
Myotis yumanensis		Yuma myotis	G5	S3	(C2)	-
Myotis yumanensis		Yuma myotis	G5	S3	(C2)	-
Bufo punctatus		Red-spotted toad	G5	S3S4	-	SC

Protection Urgency rank: P5.

Comments: The site is within Colorado National Monument. The area receives no specific protection other than that afforded by its inclusion in the Monument.

Management Urgency rank: M3

Comments: Although the canyonlands lomatium does not seem to be impacted yet, it may be vulnerable to trampling by hikers walking along the base of the cliffs. Much effort has been spent in educating the public and protecting the plants from trampling at Fiery Furnace and Devil’s Garden in Arches National Park (personal observation), and similar efforts may be called for here, as use of the Monument increases. A designated trail into Columbus Canyon, built away from the cliff base, might help to keep most foot traffic away from the plants. The *Lomatium latilobum* population should be monitored for trend and impacts. See the monitoring studies of Floyd and Hanna (1994) conducted in Arches National Park for methods that have been used.

Current Status (ownership): National Park Service. The area receives no specific protection other than that afforded by its inclusion in the National Monument.

Boundary Justification: The boundary encompasses all of the element occurrences.

Further research needs: Research on *Lomatium latilobum*'s response to trampling has been conducted in Arches National Park (Floyd and Hanna 1994.) However, much is still unknown about its reproduction and ecology. Questions about its pollinators and specific habitat requirements need to be addressed.



Figure 49. *Lomatium latilobum* growing on Chinle formation at Devil's Kitchen Conservation Site.

Site name: Dolores Canyon South

Size: Approximately 8,298 acres.

Biodiversity rank: B2. Very high significance. A good occurrence of a G1 plant, and multiple unranked occurrences of G2 and G3 plants.

Location (quadrangle): Gateway and Juanita Arch. T51N R19W sec. 22, 23, 26, 27, 34-36. T50N R19W sec. 1-3, 11-14, 23-25, 36; T50N R18W sec. 7, 18, 19, 30-32; T49N R18W sec. 5, 6, 8, 9, 17, 20.

General description: This spectacular red sandstone canyon south of Gateway is one of the most scenic areas in Mesa County. The Dolores River winds between sheer cliffs, reflecting the red rocks above. The river is bordered by oak and tamarisk, which give way to Utah juniper and big sagebrush covered slopes, reaching up to cliffs with inaccessible ledges. The Dolores skeletonplant was found along the highway in 1979 and 1985. At that time it was noted that the population might not be viable, as it appeared to be preferentially grazed by domestic livestock and wildlife. Recent searches have failed to relocate it. However, since the entire range of the species is extremely limited, it would be worthwhile to continue the effort. Additional inventory will be conducted in 1997. If the skeletonplant is still not relocated, this site will be reevaluated.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Lygodesmia doloresensis	HB	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	HC	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	H	Dolores skeletonplant	G1Q	S1	(C2)	-
Lygodesmia doloresensis	H	Dolores skeletonplant	G1Q	S1	(C2)	-
Astragalus naturitensis		Naturita milkvetch	G2	S2S3	(3C)	-
Mimulus eastwoodiae		Eastwood monkey-flower	G3	S1S2	-	-
Pediomelum aromaticum	C	Paradox breadroot	G3	S2	-	-
Penstemon utahensis		Utah penstemon	G4	S2	-	-
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B, SZ	LE	T
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B, SZ	LE	T
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC

Protection Urgency rank: P5

Comments: No protection needs are known. BLM has designated the area as open to oil and gas leasing with a no surface occupancy stipulation.

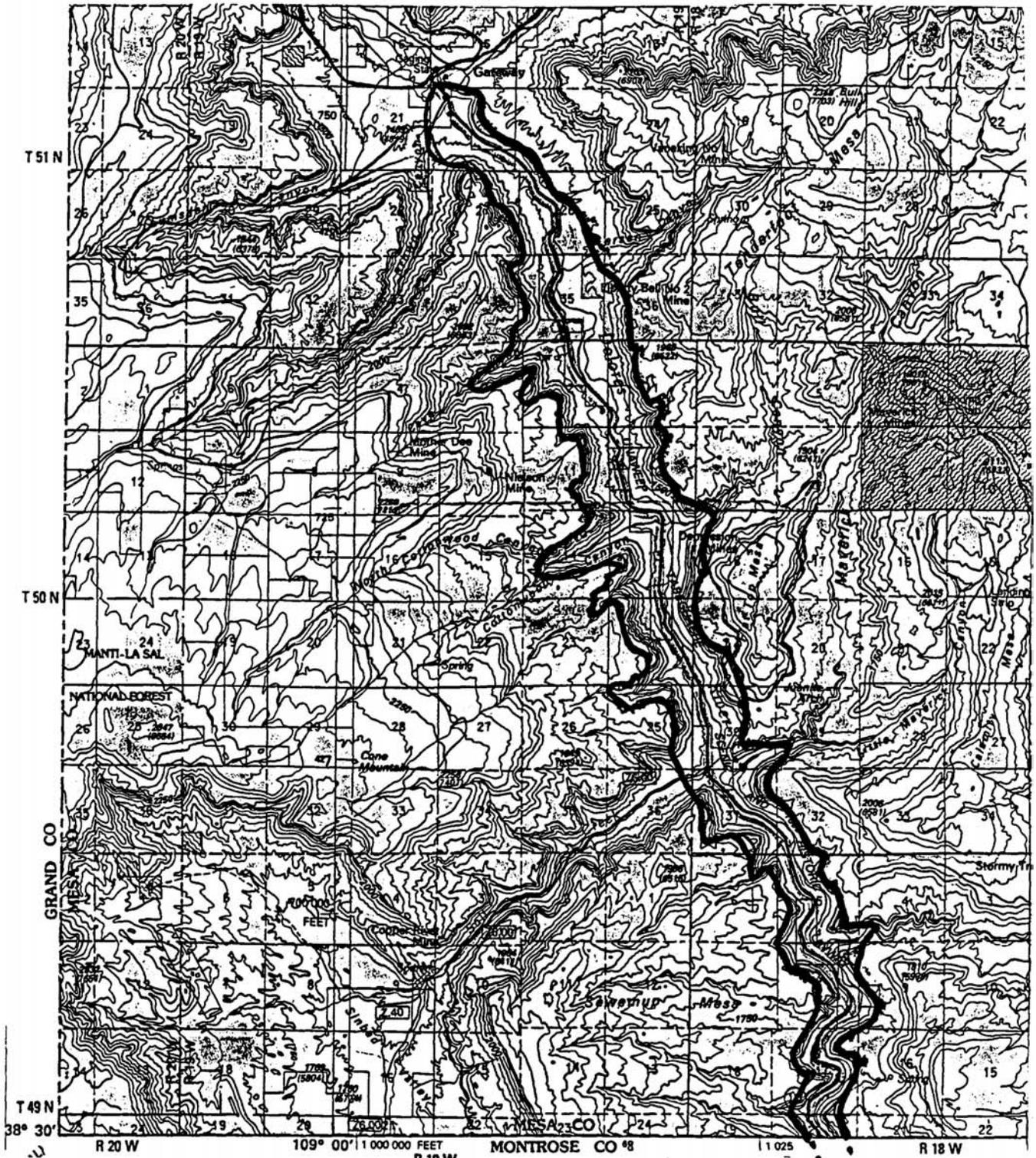
Management Urgency rank: M2

Comments: Continue to search for *Lygodesmia doloresensis*, and if located, consider fencing the site to protect from grazing by wildlife.

Current Status (ownership): BLM and private. The area has no special designation at this time.

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone, which includes the cliffs on either side of the canyon.

Dolores Canyon South Conservation Site



SCALE 1:100,000
 1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
 (CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Echo Canyon

Size: Approximately 408 acres.

Biodiversity rank: B3. Very high significance. An excellent occurrence of a G3 plant.

Location (quadrangle): Colorado National Monument and Grand Junction. T1S R1W sec. 31, 32; T12S R1W sec. 8.

General description: Echo Canyon, a tributary of No Thoroughfare Canyon, is a secluded area between Little Park Road and Colorado National Monument. It contains a perennial stream, bordered by willows and horsetails, with occasional cottonwoods. Hundreds of rare giant helleborine orchids line the banks. Quiet pools are breeding grounds for two rare toads and a rare frog. Partway up the canyon, a fault creates a steep drop, over which the stream cascades in the spring. Above the falls, the geology and soils change, and support the rare Grand Junction milkvetch. The long-nosed leopard lizard and Ord’s kangaroo rat are found in the pinyon, juniper and sagebrush community above the stream.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Astragalus linifolius	A	Grand Junction milkvetch	G3	S3	(3C)	-
Epipactis gigantea	B	Giant helleborine	G4	S2	-	-
Accipiter cooperii		Cooper's hawk	G4	S3S4B,	-	-
Gambelia wislizenii		Longnose leopard lizard	G5	S2	-	-
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5	S2	-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5	S2	-	SC
Bufo punctatus		Red-spotted toad	G5	S3S4	-	SC
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-

Protection Urgency rank: P5

Comments: No special protection is needed if management concerns are addressed.

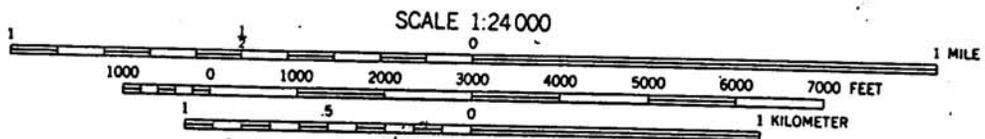
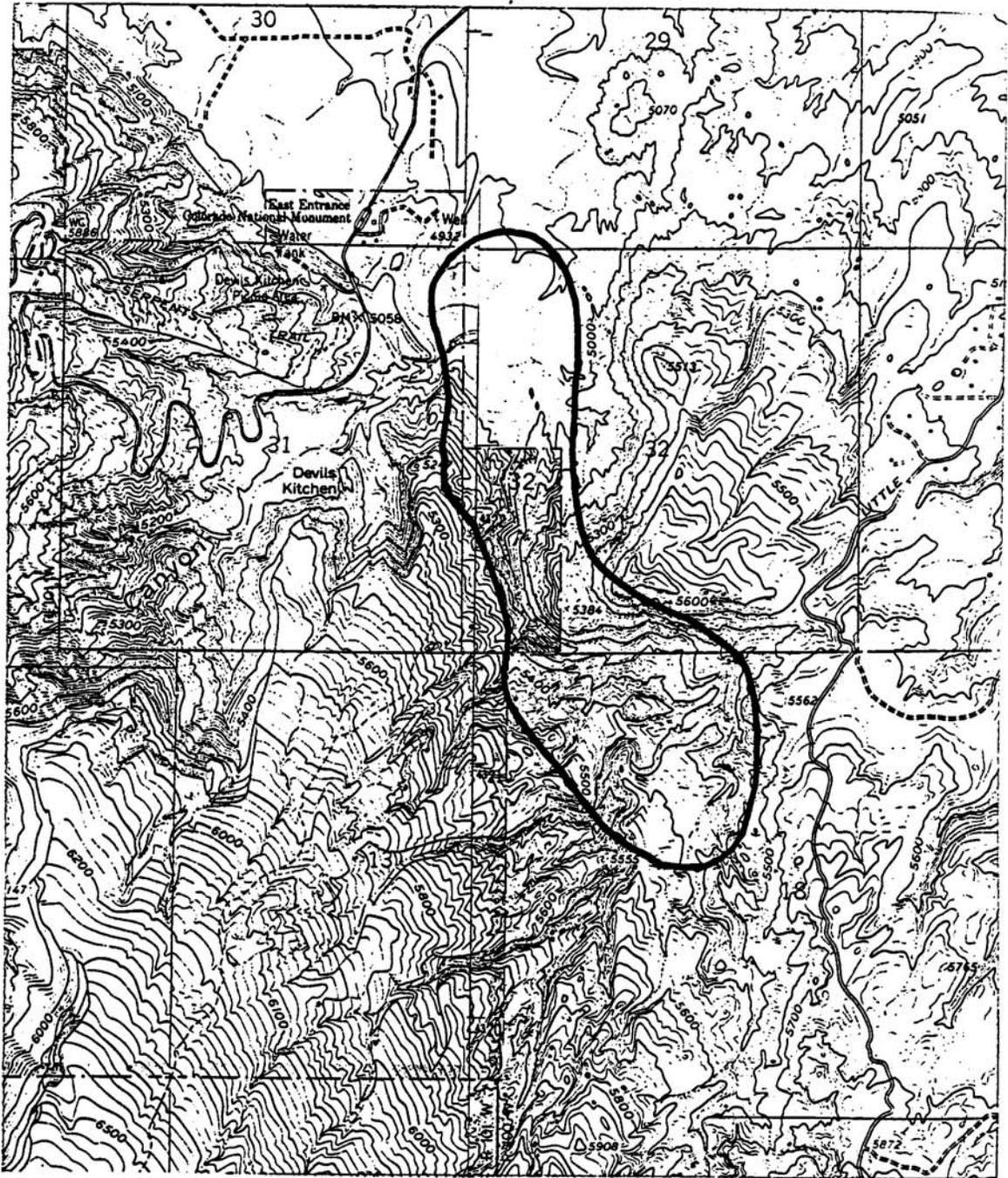
Management Urgency rank: M5

Comments: The area is used for hiking and mountain biking. Existing trails do not seem to impact the *Astragalus linifolius* or *Epipactis gigantea*. However, any additional trails that are developed should be located away from the element occurrences. CNHP will provide specific location information for these occurrences on request.

Current Status (ownership): BLM and Mesa County. No special protection is currently provided. Part of the BLM land in this site has been leased to the county, and is of interest to the City of Grand Junction for a city park. BLM has recommended that if the city acquires the property it adopt a management plan aimed at mountain bike trails modeled after one already in place by the BLM in Bangs Canyon (Daily Sentinel, July 9, 1996). At present, BLM is formulating the management plan for this property (Stevens, personal communication).

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone of approximately 1000 ft. to protect the elements from direct and indirect impacts.

Echo Canyon Conservation Site



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: Escalante Creek

Size: Approximately 12,826 acres (including Delta and Montrose County area)

Biodiversity rank: B2. Very high significance. An excellent occurrence of a G3 plant and a G3 community, and multiple good occurrences of a G3 plant.

Location (quadrangle): Escalante Forks and Kelso Point. T49N R14W sec. 2, 3, 9, 10, 16, 17, 20; T50 N R14W sec. 1-5, 10-15, 22-24, 26, 27, 34, 35; T51N R14W sec. 25, 32-36; T51N R13W sec. 10, 11, 14-16, 20-22, 28-32; T15S R98W sec. 35, 36; T15 S R97W sec. 17-20, 29-32.

General description: Escalante Creek boasts a rich riparian area, with great diversity due to its wide elevation range. At its highest elevations, the creek is lined with Douglas fir and narrowleaf cottonwood trees, with a thick understory of red-osier dogwood. North-facing slopes above the creek are covered with firs, while the warmer and drier south-facing slopes are dominated by pinyon and juniper. Benches and dry washes with soils derived from the Morrison formation support one of the world’s best populations of the rare Grand Junction milkvetch, *Astragalus linifolius*. Seeps in the vertical Wingate sandstone cliffs support unusual hanging garden communities which include the rare giant helleborine orchid, *Epipactis gigantea*. Elements listed below are those in Mesa County only.

Natural Heritage Resource Significance:

element	EO	common name	global	state	fede	state
Pseudotsuga menziesii/Populus angustifolia	B	Douglas fir/narrowleaf cottonwood	G?	S?	-	-
Pseudotsuga menziesii/Populus angustifolia		Douglas fir/narrowleaf cottonwood	G?	S?	-	-
Populus angustifolia/Cornus sericea	A	Narrowleaf cottonwood/Red-osier	G3	S2?	-	-
Astragalus linifolius	A	Grand Junction milkvetch	G3	S3	(3C)	-
Astragalus linifolius	B	Grand Junction milkvetch	G3	S3	(3C)	-
Astragalus linifolius		Grand Junction milkvetch	G3	S3	(3C)	-
Astragalus linifolius	B	Grand Junction milkvetch	G3	S3	(3C)	-
Epipactis gigantea	B	Giant helleborine	G4	S2	-	-
Epipactis gigantea	B	Giant helleborine	G4	S2	-	-

Protection Urgency rank: P3

Comments: The occurrences documented were on BLM, but the species may also occur on the adjacent private land. Future alteration of the private land in this scenic area could be a threat.

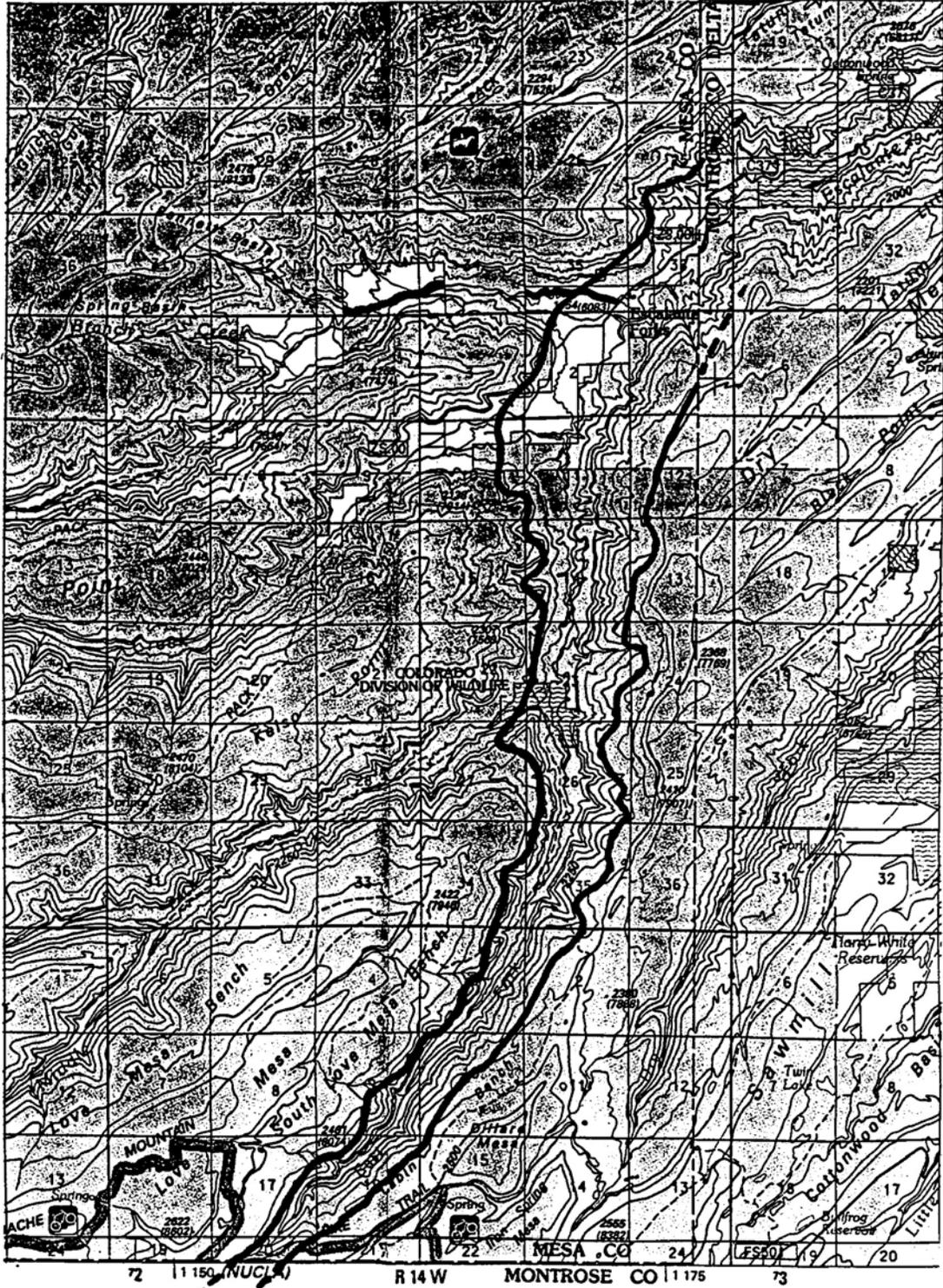
Management Urgency rank: M2

Comments: Water quality at the lower end of the canyon in Delta County has been impacted by cattle grazing. The upper parts of the canyon within Mesa County are in better condition.

Current Status (ownership): Mostly USFS, some BLM, private, and CDOW parcels.

Boundary Justification: Includes the canyon to its rim, in order to protect both the elements and the hydrological processes necessary to sustain them.

Escalante Creek Conservation Site



SCALE 1:100,000
 1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
 (CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Fish Park

Size: Approximately 4,683 acres.

Biodiversity rank: B2. Very high significance. An unranked occurrence of a G1 species.

Location (quadrangle): Marble Canyon. T12S R104W sec. 19, 29-31; T13S R104W sec. 4, 5, 8, 9; T21S R26E sec. 8, 17, 20, 29.

General description: This site is centered around large sagebrush flats which are bordered by pinyon and juniper woodlands and rock outcrops. Some irrigated hay fields, stock ponds, roads, and landing strips are included in the site. The site includes an area which was recently used by the endangered Gunnison sage grouse as a lek. The sage grouse prefers the patchy shrublands with abundant grasses and forbs. These habitats are being encroached upon by pinyon and juniper, making them unsuitable for the grouse. (Woods and Braun 1995). The grouse had been reported to be foraging in nearby hay meadows where at least two of the birds were killed by predators (Woods and Braun 1995). Activity associated with fire fighting efforts in the area in 1995 displaced the grouse, but they returned to foraging areas when fire fighting activities ceased. Some habitat improvement was conducted by the BLM: individual young pinyons and junipers were hand cut and removed from the site. Other improvements suggested by Woods and Braun (1995) are thinning of sagebrush, seeding with grasses and forbs, and linear wet meadow development. CNHP recommendations include seeding with a mixture of native grass and forb species. No grouse were seen using the lek in 1996, so it is not known whether this is still a viable population.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Centrocercus minimus gunnisonii		Gunnison sage grouse	G4T1	S1	-	-

Protection Urgency rank: P3

Comments: The site is under both private and public (BLM) ownership. No formal protection is provided. Special designation of the BLM land which would protect the site from human alteration is warranted.

Management Urgency rank: M2

Comments: The Gunnison sage grouse is being intensively studied by CDOW. The decline in the grouse is largely blamed on the degraded sage community. Management is needed within 5 years. Woods and Braun (1995) suggested the following management recommendations: 1) annual movement and winter grounds need to be identified, 2) monitoring of leks should continue in subsequent years, 3) habitat manipulations are necessary in Fish Park (assure there are no other elements that may be negatively impacted, 4) land protection of any available parcels is warranted, 5) protect from human development, and 6) sagebrush communities need to be restored; however, CNHP does not support some of the restoration methods mentioned in the 1995 report, such as seeding with non-native species.

Current Status (ownership): BLM and private.

Boundary Justification: The Gunnison sage grouse leks of the area are included within the boundary. In addition, an area of approximately 2.5 mi. radius surrounding each lek is included provided that there is some suitable habitat (CNHP 1995).

Further research needs: Changes in vegetation and grouse use in the burned areas should be monitored.

Site name: Flat Top Mesa

Size: Approximately 1,019 acres.

Biodiversity rank: B2. Very high significance. An excellent occurrence of a G3 plant.

Location (quadrangle): Juanita Arch. T50N R18W sec. 8, 17-20, 30.

General description: This site is located on the upper rim of an outcrop of Entrada sandstone, where debris from the Morrison formation above has accumulated. A 4-wheel drive road runs along the base of the slickrock. Vegetation of the area is predominantly pinyon and juniper woodland, with cliffrose, mountain mahogany, galleta and Indian rice grass. The area is almost entirely free of exotic species. The San Rafael milkvetch is found in gullied washes at the top of the slickrock. The adjacent canyon appears to be in excellent condition.

Natural Heritage Resource Significance:

element	EO	common name	global	state	federal	state
Astragalus rafaellensis	A	San Rafael milkvetch	G3	S1	(3C)	-

Protection Urgency rank: P5

Comments: The area is quite remote and receives very little traffic. No special designation is warranted at this time.

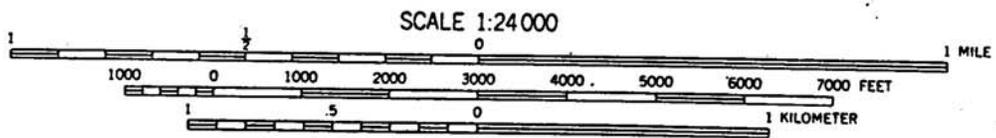
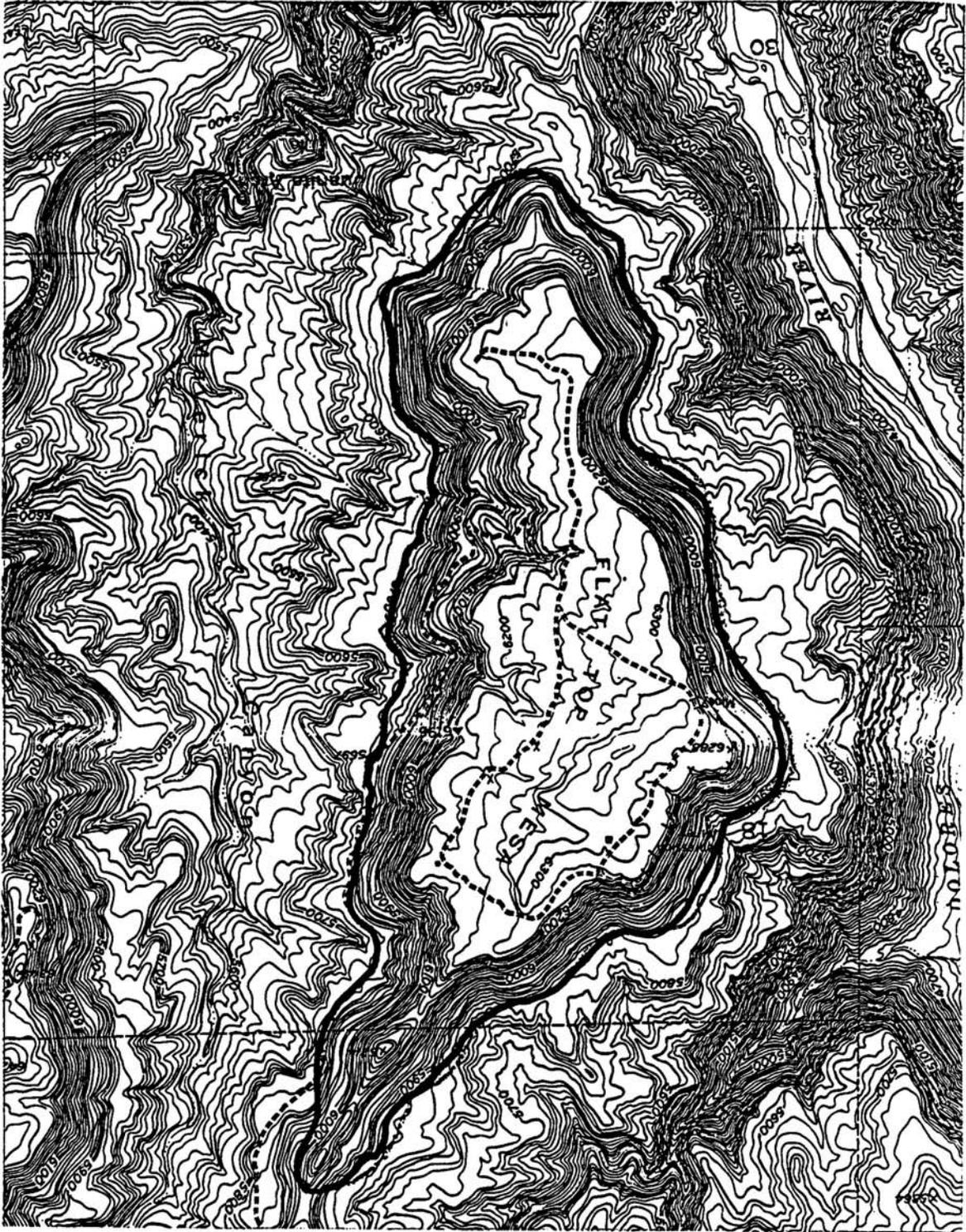
Management Urgency rank: M5

Comments: No management is needed at this time.

Current Status (ownership): BLM. No formal status is given to this site.

Boundary Justification: Boundaries are drawn to include all element occurrences and the similar potential habitat on the mesa slopes. The mesa top was also included as a buffer zone and to protect hydrological processes.

Flat Top Mesa Conservation Site



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: Fruita and Monument Canyons

Size: Approximately 3,900 acres.

Biodiversity rank: B2. Very high significance. A good occurrence of a G1 plant, and multiple occurrences of G3 plants.

Location (quadrangle): Colorado National Monument. T1N R2W sec. 29-33; T11S R101W sec. 17-20, 29, 30; T11S R102W sec. 13.

General description: This spectacular site includes the west entrance to Colorado National Monument, and the north end of the park. A paved road leads from Fruita to the canyon rims. Included in the site are such well known formations as Balance Rock and Independence Monument. The tunnels built for the highway have been adopted as homes by bats. One of only three known Colorado locations for the Canyonlands lomatium is found at the base of Balance Rock in seasonally wet gullies in the Chinle sandstone. The same habitat supports the Osterhout cryptanth. There are few exotic species in the park, and it provides excellent examples of common communities in pristine condition. These include Utah juniper, pinyon pine, mountain mahogany, Mormon tea and Utah serviceberry.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Lomatium latilobum	B	Canyonlands Lomatium	G1	S1	(C2)	-
Pediomelum megalanthum		Large-flowered breadroot	G3	S		
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Pediomelum aromaticum		Paradox breadroot	G3	S2	-	-
Allium nevadense		Nevada onion	G4	S1	-	-
Allium nevadense		Nevada onion	G4	S1	-	-
Eriogonum palmerianum		Palmer buckwheat	G4	S1	-	-
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B,	LE	T
Plecotus townsendii		Townsend's big-eared bat	G4T4	S3	(C2)	-
Centaureum exaltum		Great Basin centaury	G5	S1	-	-
Tadarida brasiliensis		Brazilian free-tailed bat	G5	S1	-	-
Sporobolus flexuosus		Mesa dropseed	G5	S1S2	-	-
Gambelia wislizenii	H	Longnose leopard lizard	G5	S2	-	-
Gambelia wislizenii	H	Longnose leopard lizard	G5	S2	-	-
Hyla arenicolor	H	Canyon treefrog	G5	S2	-	SC
Scaphiopus intermontanus	H	Great Basin spadefoot toad	G5	S2	-	SC
Myotis yumanensis		Yuma myotis	G5	S3	(C2)	-
Myotis yumanensis		Yuma myotis	G5	S3	(C2)	-
Myotis yumanensis		Yuma myotis	G5		(C2)	
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.		S2	-	-
Lampropeltis triangulum	H	Utah milk snake		S2		-

Protection Urgency rank: P5

Comments: The area is well protected as part of Colorado National Monument.

Management Urgency rank: M4

Comments: Hikers to Balance Rock may impact the *Lomatium latilobum* population. Well signed established trails away from the plants would protect them from trampling and erosion, which were identified as the major threats to the plants in Arches National Park (Floyd and Hanna 1994).

Current Status (ownership): National Park Service, Colorado National Monument.

Boundary Justification: Boundaries are drawn to include the cluster of element occurrences in the northwestern part of Colorado National Monument.

Site name: Horsethief Creek

Size: Approximately 2,171 acres.

Biodiversity rank: B2. Very high significance. A good occurrence of a G2 plant.

Location (quadrangle): DeBeque. T8S R97W sec. 26, 34-36; T9S R97W sec. 1-3, 12; T8S R96W sec. 30, 31.

General description: The site includes low hills with rock outcrops of the Wasatch and Ohio Creek Formations. Vegetation in flat bottomlands is dominated by greasewood, while hills have juniper, sagebrush, four-wing saltbush, and shadscale. Some parts of the site have been severely trampled by cattle, and contain a high percentage of annual weeds, including cheatgrass and horned buttercup. Other common plants are low rabbitbrush, snakeweed, and galleta. A paved road passes through the northern part of the site.

Natural Heritage Resource Significance:

element	EO		global rank		federal status	state
Astragalus debequaeus	C	Debeque milkvetch	G2		(C2)	
Astragalus debequaeus	B	Debeque milkvetch		S2	(C2)	
Phacelia submutica	D	Debeque Phacelia		S2		-
Phacelia submutica	D		G2	S2	C	-
Phacelia submutica			G2	S2	C	-
		Long-flower cat's eye	G3		-	-
Astragalus wetherillii		Wetherill milkvetch		S3	(3C)	-

Protection Urgency rank: P5

Comments: There is presently no formal protection for this site. No protection needs are known.

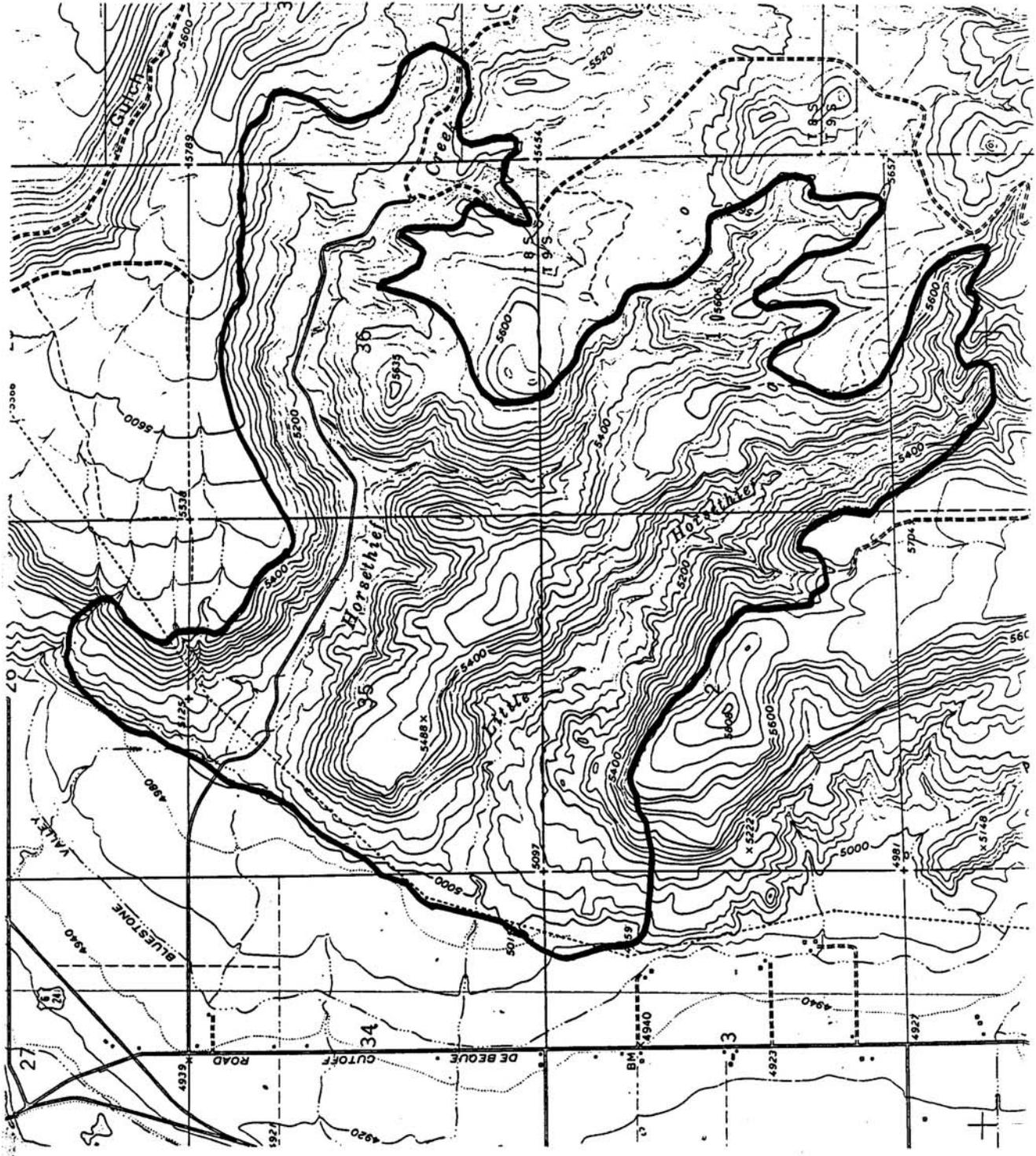
Management Urgency rank: M4

Comments: No management needs are known for the protection of the rare plant species. However, the site as a whole has been heavily impacted by livestock grazing. Monitoring of the site is recommended to determine trends of the rare plant species.

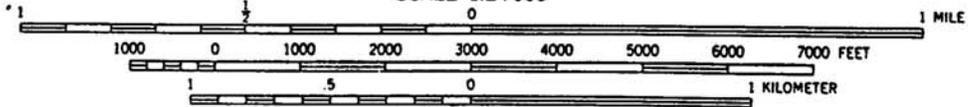
Current Status (ownership): BLM

Boundary Justification: Boundaries are drawn to include the cluster of element occurrences and the area of similar potential habitat between them.

Horsethief Creek Conservation Site



SCALE 1:24 000



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: Horsethief Mountain

Size: Approximately 1,503 acres.

Biodiversity rank: B2. Very high significance. Excellent occurrences of G2 plants.

Location (quadrangle): DeBeque. T9S R96W sec. 6, 7, 18-20; T9S R97W sec. 12, 13.

General description: The barren purple-brown clays of this site support some of the best known populations of the DeBeque phacelia. Other plant species in the area are shadscale, cheatgrass, Indian rice grass, gumweed, and buckwheat. The portion of the site within the National Forest is not currently grazed, and no oil and gas surface occupancy is allowed. A remnant population of about twenty bighorn sheep occupies the area. It is not known whether they have any impact on the DeBeque Phacelia.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state
Phacelia submutica	A	Debeque Phacelia	G2	S2	C	-
Phacelia submutica	B		G2	S2	C	-
Phacelia submutica	B	Debeque Phacelia	G2	S2	C	-
Phacelia submutica	B	Debeque Phacelia		S2	C	-

Protection Urgency rank: P4.

Comments: The National Forest part of the site has been proposed by the Forest Service as a Research Natural Area. Since several of the occurrences are on the adjacent BLM land, similar designation by BLM is justified.

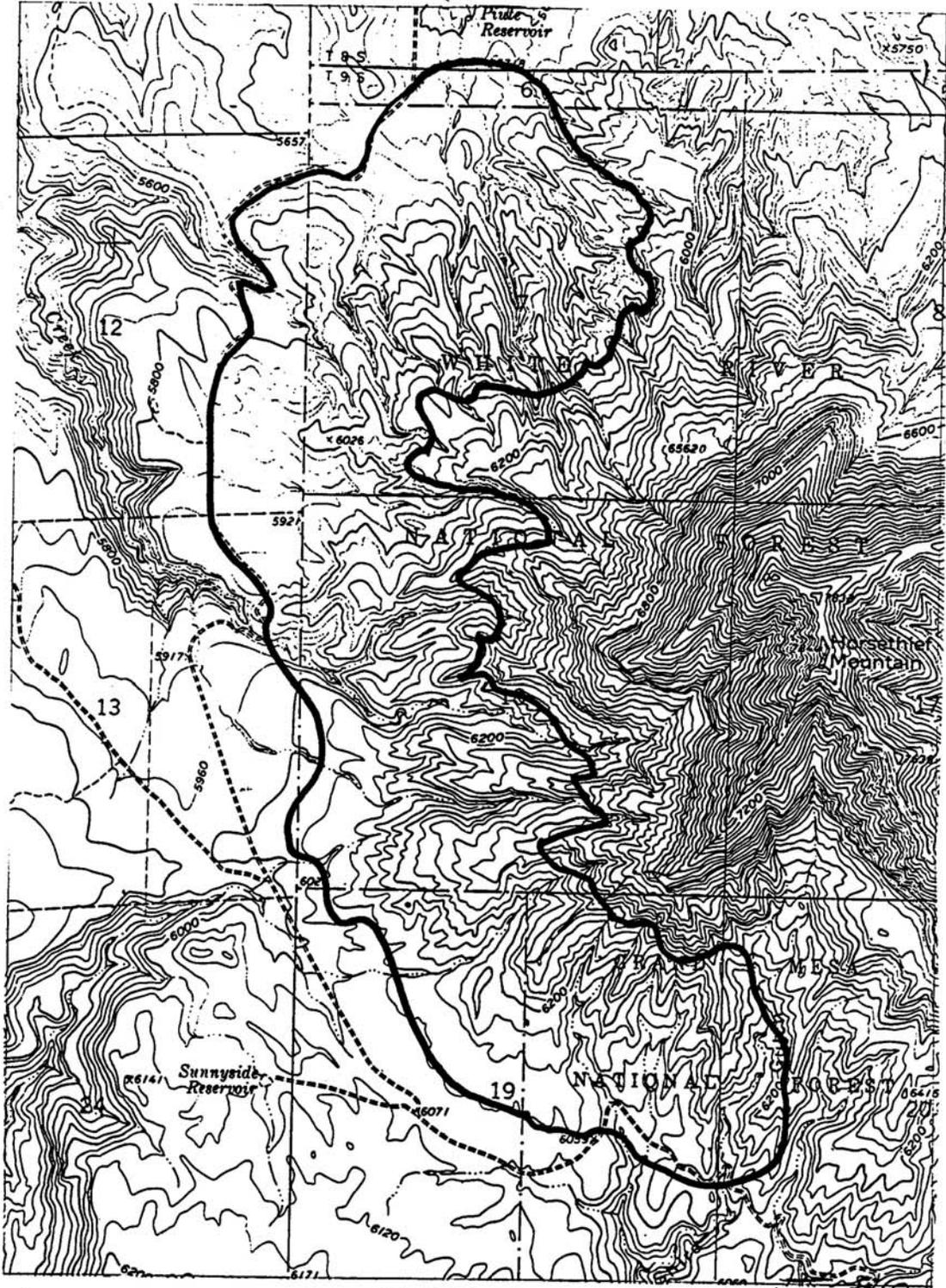
Management Urgency rank: M4

Comments: The site is apparently ungrazed currently.

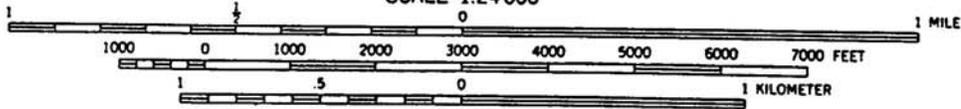
Current Status (ownership): White River National Forest, Grand Mesa National Forest, small piece of BLM. Part of the BLM land contains public water reserves.

Boundary Justification: This site includes the former sites Horsethief Mountain North, Horsethief Mountain West, Horsethief Mountain South and Piute Reservoir. The four former sites were contiguous, along the eastern slopes of Horsethief Mountain, and share similar geology and habitat. Potential habitat for the Phacelia between known occurrences has been included in the site.

Horsethief Mountain Conservation Site



SCALE 1:24000



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: John Brown Canyon

Size: Approximately 4,503 acres.

Biodiversity rank: B2. Very high significance. An unranked occurrence of a G1 plant.

Location (quadrangle): Gateway. T50N R19W sec. 4, 5. T51N R19W sec. 21, 22, 27, 28, 33, 34.

General description: John Brown Creek, a tributary of the Dolores River, forms a narrow canyon south of Gateway. Riparian vegetation along the creek includes the plains cottonwood, narrowleaf cottonwood and their hybrid, *Populus acuminata*, as well as box elder and willows. The Dolores skeleton plant was found along the stream near its mouth. Rocky pools in the creek support the canyon tree frog and northern leopard frog. The mesa top is forested with aspen, oak and Ponderosa pine. A gravel road runs along the canyon bottom for several miles before it climbs to the mesa top. It is quite heavily used by logging trucks, and receives fairly heavy recreational traffic.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
		Dolores skeletonplant	G1O	S1	(C2)	-
Penstemon utahensis		Utah penstemon	G4	S2	-	-
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Tantilla hobartsmithi		Southwestern blackhead snake	G5	S1	-	-

Protection Urgency rank: P5

Comments: The site has no formal protection. No protection needs are known.

Management Urgency rank: M4 The Dolores skeletonplant population should be monitored.

Current Status (ownership): BLM

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone.

Further research needs: Resolution of the taxonomic status of the Dolores skeleton plant is needed.

Site name: Long Point

Size: Approximately 1,285 acres.

Biodiversity rank: B2. Very high significance. An excellent occurrence of a G1 plant.

Location (quadrangle): Cameo and Mesa. T10S R97W sec. 29,31,32|4,5

General description: This narrow, steep-sided mesa above DeBeque Canyon is rocky and covered with sagebrush and scattered Utah juniper. It is lightly grazed. The Naturita milkvetch and Wetherill milkvetch are found scattered on ledges and in crevices of the sandstone rimrock overlooking the Colorado River.

Natural Heritage Resource Significance:

element	EO		global rank	state	federal status	state status
Astragalus naturitensis		Naturita milkvetch	G2	S2S3	(3C)	
Astragalus naturitensis		Naturita milkvetch	G2	S2S3	(3C)	-
Astragalus wetherillii		Wetherill milkvetch	G3	S3	(3C)	-

Protection Urgency rank: P5

Comments: The area is under BLM ownership.

Management Urgency rank: M5

Comments: The site of the rare plant species appears to be ungrazed by livestock. Its rugged and remote nature make active management unnecessary.

Current Status (ownership): BLM, with no formal protective status.

Boundary Justification: Boundaries are drawn to include the element occurrences and similar potential habitat on the relatively flat top of the mesa.

Further research needs: More inventory is needed to determine the conservation status of *Astragalus naturitensis*. CNHP will accomplish this in early 1997.

Site name: Pyramid Ridge

Size: Approximately 2,114 acres.

Biodiversity rank: B2. Very high significance. Excellent occurrences of a G2 plant.

Location (quadrangle): Wagon Track Ridge. T8S R98W sec. 35, 36; T9S R98W sec. 1-5.

General description: The Pyramid Ridge Conservation Site is a dramatic multi-hued jumble of steep purple and gray shale slopes and yellow sandstone outcrops just north of Sulphur Gulch (Figure 8). It boasts one of the world’s largest populations of the rare DeBeque milkvetch as well as the DeBeque phacelia, the Uinta Basin hookless cactus, and excellent, undisturbed examples of two communities. The DeBeque milkvetch is found on the Atwell Gulch member of the Wasatch Formation, in small drainages at the base of the cliffs, and near the top of the ridge. Associated species are Utah juniper, sagebrush, snakeweed, mountain mahogany, Mormon tea, shadscale, rabbitbrush, cliffrose, bitterbrush, Indian rice grass, and cheatgrass. Patches of galleta on benches near the top of the ridge are unusually dense and free of exotic species, probably because the area has been inaccessible to cattle. A juniper and mountain mahogany community on an upper bench was unusual in the abundance of spiny greasewood (*Forsellesia meionandra*), which is usually found only as scattered individuals in Mesa County.

Natural Heritage Resource Significance:

element	EO	common name	global	state	fed	state
Juniperus osteosperma/Cercocarpus montanus	B		G?	S?	-	-
Astragalus debequaeus		Debeque milkvetch	G2	S2	(C2)	-
Astragalus debequaeus	A	Debeque milkvetch		S2	(C2)	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Hilaria jamesii grassland		Western Slope Grasslands	G3	S1	-	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-

Protection Urgency rank: P3

Comments: The site is under BLM management, but has no special designation. It appears to be at least as worthy, if not more so, than the adjacent Pyramid Rock site which is a BLM Research Natural Area and ACEC, as well as a designated State Natural Area (Colorado Dept. of Natural Resources 1994). The site has a much larger population of rare plant species, and is extremely scenic and geologically interesting. Some protection is afforded under the present BLM management plan, which calls for protecting “known important habitat sites of sensitive animal and plant species from surface-disturbing activities” (USDI 1987). This would apply to the three rare plant species listed above, which are on the BLM sensitive list. We recommend that BLM also consider this site for special designation.

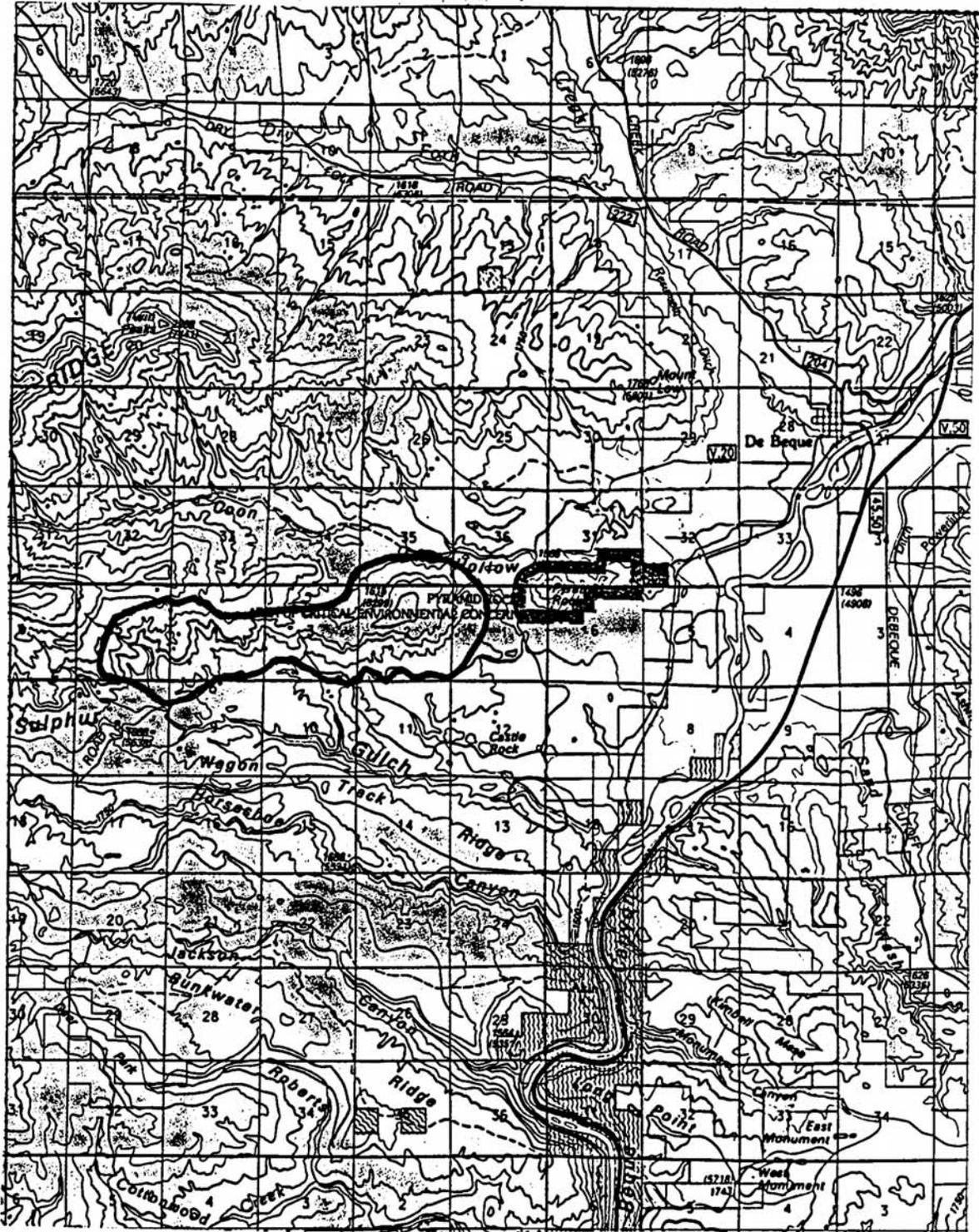
Management Urgency rank: M4

Comments: Most of the site is naturally protected by its steepness. However, there has been some ORV use in the washes near the road, and increased use could be damaging to natural communities. Future oil and gas exploration or development could threaten the site. Managing this site with the same prescription as is given to the Pyramid Rock RNA would benefit the rare and endangered plant populations.

Current Status (ownership): BLM, with no formal protection.

Boundary Justification: Boundaries are drawn to include all known element occurrences and adjacent similar habitat within the natural geographic confines of the ridge.

Pyramid Ridge Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Pyramid Rock

Size: Approximately 1,563 acres.

Biodiversity rank: B2. Very high significance. Good occurrences of G2 and G3 plants.

Location (quadrangle): Wagon Track Ridge. T8S R98W sec. 36; T8S R97W sec. 31, 32; T9S R98W sec. 1; T9S R97W sec. 5-7.

General description: This isolated peak has been recognized as a designated Natural Area by the state (Colorado Department of Natural Resources 1994), and a Research Natural Area and ACEC by the BLM. It contains populations of four rare plant species and a high quality example of the Utah juniper/Salina wild rye plant association. The steep slopes of the mountain are composed of the purple and gray “shrink-swell” soils of the Wasatch formation. Scattered junipers and bunch grasses dot the upper slopes. At the base of the mountain are desert shrubs with the invasive alien, cheatgrass.

Natural Heritage Resource Significance:

element	EO	common name	global rank		federal status	state
Astragalus debequaeus	B	Debeque milkvetch	G2	S2	(C2)	
Phacelia submutica	B	Debeque Phacelia		S2		-
Pediomelum megalanthum	BC	Large-flowered breadroot	G3	S3		-
	C	Uinta Basin hookless cactus	G3	S3	LT	-
Juniperus osteosperma/Elymus salinus	BC	Utah juniper/Salina wildrye	GU	SU	-	-

Protection Urgency rank: P5

Comments: The entire site is protected as an ACEC; 470 acres are protected as a designated State Natural Area. The BLM management plan prohibits oil and gas surface occupancy, mineral materials sales, and ORV use except on designated roads and trails. The plan refers to the protection of two plant species, although four rare or imperiled species are present (USDI 1987).

Management Urgency rank: M4

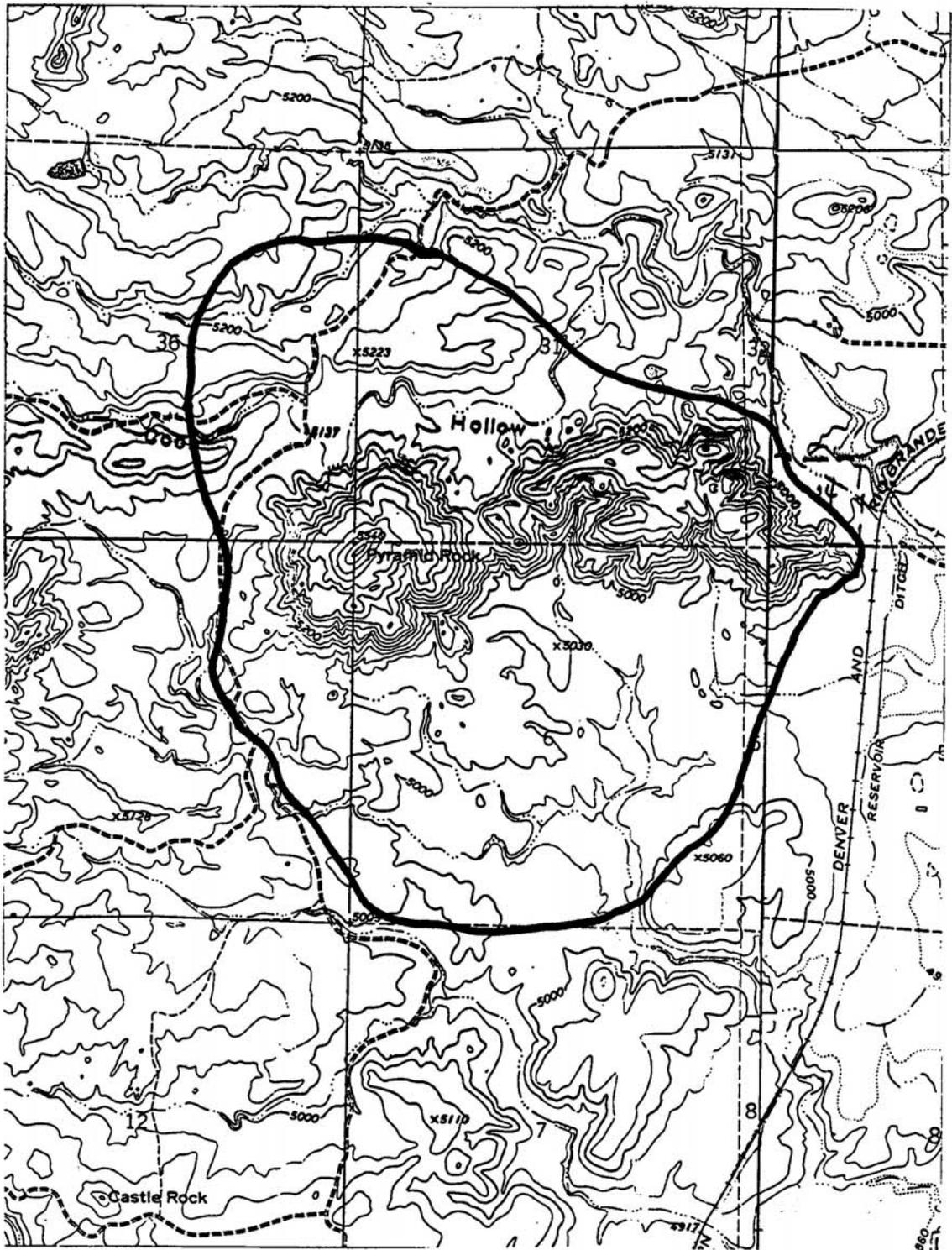
Comments: A monitoring program for the rare plants, as called for in the ACEC management plan (USDI 1992), should be undertaken in 1997.

Current Status (ownership): BLM. The area is a State Designated Natural Area (Colorado Department of Resources 1994), and a BLM Research Natural Area and ACEC.

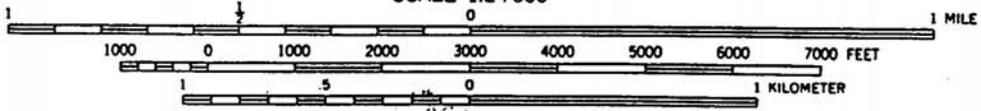
Boundary Justification: Boundaries are drawn to include all element occurrences, and conform to the natural boundaries of this isolated mountain.

Research Needs: Documentation of animal associates is desirable.

Pyramid Rock Conservation Site



SCALE 1:24 000



CONTOUR INTERVAL 40 FEET

Site name: Rabbit Valley

Size: Approximately 17,473 acres.

Biodiversity rank: B2. Very high significance. An unranked occurrence of a G1Q plant, and good occurrences of G2 and G3 plants.

Location (quadrangle): Bitter Creek Well and Ruby Canyon. T10S R104W sec. 1-33; T11S R104W sec. 5; T10S R103W sec. 6, 7.

General description: This large site includes a BLM ACEC and a state designated Natural Area (Colorado Department of Natural Resources 1994), which protect important paleontological and cultural sites as well as natural features. BLM and the Museum of Western Colorado have developed the site for interpretive use, and the Museum directs ongoing fossil digs. The site is located on the north side of the Colorado River, at the northern end of the Uncompahgre Uplift, at the Utah border. It adjoins the Ruby Canyon site of the Colorado River on the south.

Vegetation of the area is primarily pinyon, juniper, sagebrush and desert shrubs. Greasewood and shadscale have an understory of Indian rice grass, needle and thread, or galleta in undisturbed areas, or more commonly, cheatgrass. The site is grazed, often heavily (personal observation). However, some remnants of former vegetation were found. A high quality example of the rare Utah juniper/Needle and thread plant association was located on an isolated mesa in the eastern part of the site. Remnant patches of native bunchgrasses attest to the natural communities which would be present if no disturbance had occurred. Several of the records listed below are historic occurrences which have not been recently confirmed. The kit fox record, for instance, documents the shooting of a male and pregnant female. It is not known whether there are any surviving foxes in the area. Likewise, the *Eriogonum*, *Amsonia* and *Lygodesmia* occurrences have not been relocated recently, in spite of searches during this survey which specifically targeted them.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
<i>Lygodesmia doloresensis</i>	H	Dolores skeletonplant	G1Q	S1	(C2)	-
<i>Stipa comata</i> West grassland	C	Needle and thread grassland	G2	S2	-	-
<i>Cryptantha osterhoutii</i>	B	Osterhout cryptanth	G3	S1S2	-	-
<i>Cryptantha osterhoutii</i>	D	Osterhout cryptanth	G3	S1S2	-	-
<i>Sclerocactus glaucus</i>		Uinta Basin hookless cactus	G3	S3	LT	-
<i>Amsonia jonesii</i>	H	Jones blue star	G4	S1	-	-
<i>Lanius ludovicianus</i>		Loggerhead shrike	G4G5	S3B,	-	-
<i>Neotoma lepida</i>		Desert woodrat	G5	S1	-	-
<i>Neotoma lepida</i>		Desert woodrat	G5	S1	-	-
<i>Vulpes macrotis</i>	H	Kit fox	G5	S1	-	SC
<i>Vulpes macrotis</i>			G5	S1	-	SC
<i>Toxostoma bendirei</i>		Bendire's thrasher	G5	S1B	-	-
<i>Gambelia wislizenii</i>		Longnose leopard lizard	G5	S2	-	-
<i>Scaphiopus intermontanus</i>		Great Basin spadefoot toad	G5	S2	-	SC
<i>Scaphiopus intermontanus</i>		Great Basin spadefoot toad	G5	S2	-	SC
<i>Icterus parisorum</i>			G5	S2B	-	-
<i>Vireo vicinior</i>		Gray vireo	G5	S2B	-	-
<i>Amphispiza bilineata</i>		Black-throated sparrow	G5	S3B,	-	-
<i>Bufo punctatus</i>		Red-spotted toad	G5	S3S4	-	SC
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel ssp.	G5T?	S1	-	-
<i>Eriogonum leptocladon</i> var. <i>leptocladon</i>		Sand buckwheat	G5T?	S1	-	-
<i>Dipodomys ordii sanrafaeli</i>		Ord's kangaroo rat ssp.	G5T?	S2	-	-
<i>Juniperus osteosperma</i> / <i>Stipa comata</i>	A	Utah juniper/needle and thread	GU	S1	-	-
<i>Juniperus osteosperma</i> / <i>Elymus salinus</i>	C	Utah juniper/Salina wildrye	GU	SU	-	-

Protection Urgency rank: P5

Comments: The area is well protected by its status as an ACEC and State Designated Natural Area

Management Urgency rank: M3

Comments: This is a heavily used recreation area, especially attractive to bicyclists and ORV users. Kokopelli's Trail, a popular bicycle trail, runs through the site. Management of ORVs and bicycles has been addressed recently, resulting in well signed trails and closure of several former roads and trails. It appears that these efforts have succeeded in reducing off-road traffic.

Grazing has significantly changed natural communities, and exotic species, especially *Bromus tectorum* and *Halogeton glomeratus*, dominate the valley floor. However, there are still some remnants of native bunch grasses, which could be encouraged with altered grazing management.

Current Status (ownership): BLM

Boundary Justification: The boundary was drawn to include the element occurrences and adjacent habitat for the animal species of the area. It includes the ACEC and the state Natural Area.

Site name: Six and Fifty Reservoir

Size: Approximately 4,117 acres.

Biodiversity rank: B2. Very high significance. Excellent occurrences of a G3 plant and good occurrences of G2 communities.

Location (quadrangle): Badger Wash and Ruby Canyon. T9S R104W sec. 22-27, 34-36; T9S R103W sec. 19, 30.

General description: The Six and Fifty Reservoir Site, which straddles Highway 6 and 50 west of Mack, is an area of low, rolling, shale hills and desert shrub vegetation. Depending on slope and aspect, dominant shrub species on the slopes are shadscale, mat saltbush, and Gardner saltbush. Associated native grasses include galleta, Indian rice grass, and Salina wild rye. Common forbs are poison aster and princes' plume. The rare Grand buckwheat (*Eriogonum contortum*) is abundant on ridges and in small drainages, often associated with gardner saltbush and poison aster. Similar habitats support the less abundant tall cryptanth (*Cryptantha elata*). Flat bottomlands are degraded, and covered by a combination of greasewood, usually with an understory of cheatgrass, or mat saltbush on barren shale, while the drainages of intermittent and perennial streams have been invaded by tamarisk. Other common species are rabbitbrushes, spiny horsebrush, budsage, and winterfat. Recently disturbed areas are invaded by Russian thistle. In spite of heavy grazing, there are remnant patches of Indian rice grass in good condition, with few exotic species, that are indicative of the potential natural community.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Atriplex gardneri/Elymus salinus		Gardner saltbush/Salina wildrye	G2?	S2?	-	
Oryzopsis hymenoides/shale barren	B	Indian ricegrass grassland		S2	-	-
Cryptantha elata	B	Tall cryptanth		S2	(3C)	-
Eriogonum contortum	A	Grand buckwheat	G3	S2	-	-
Eriogonum contortum	A		G3		-	-
Eriogonum contortum	B	Grand buckwheat	G3	S2	-	-
Eriogonum contortum	C	Grand buckwheat	G3	S2	-	-
Eriogonum contortum		Grand buckwheat	G3	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat subsp.	G5T?	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat subsp.	G5T?	S2	-	-
Gambelia wislizenii	H	Longnose leopard lizard	G5	S2	-	

Protection Urgency rank: P5

Comments: The area is BLM property. It carries no special designation.

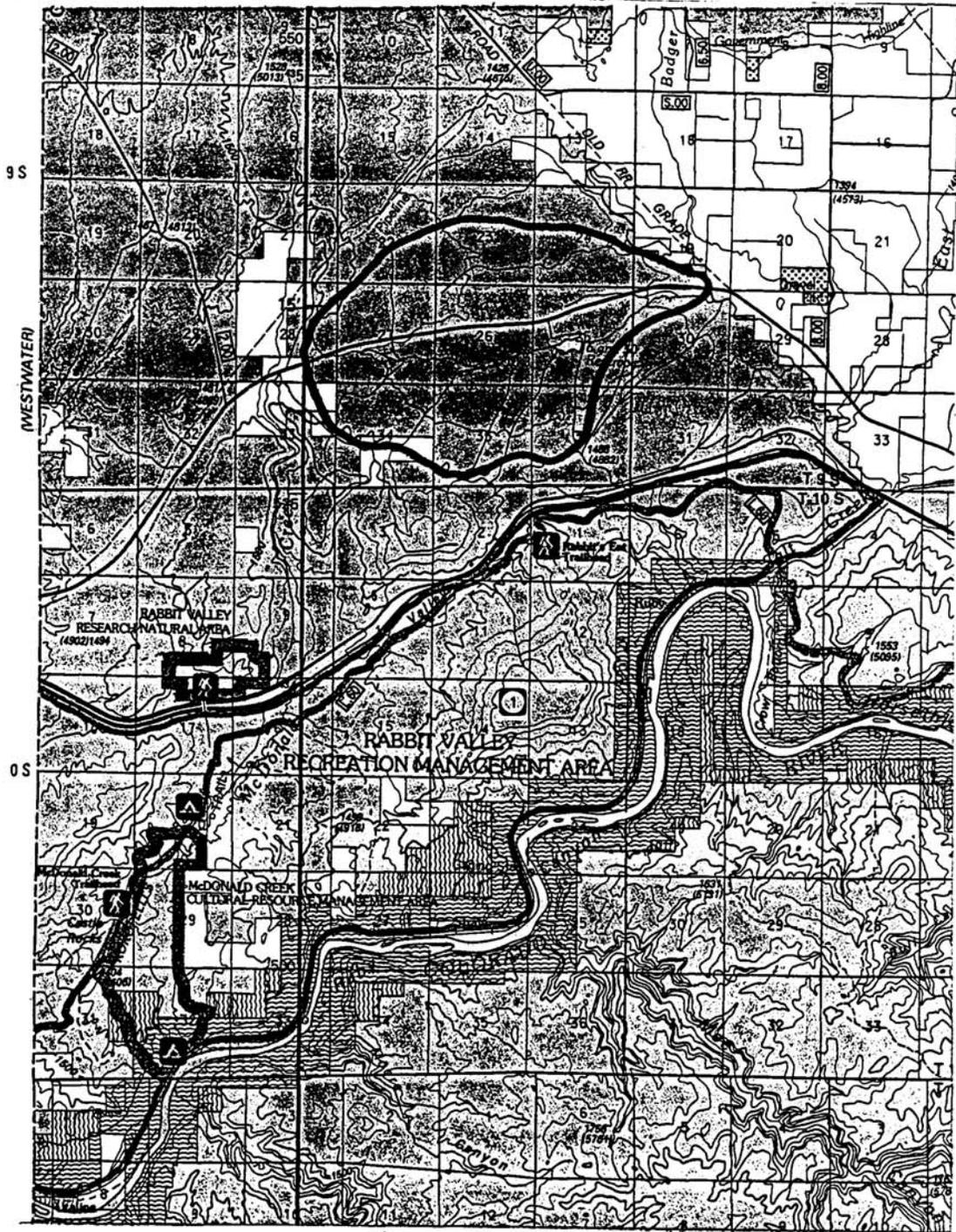
Management Urgency rank: M3

Comments: Monitoring of the rare plants and natural communities should be undertaken. Exclosures placed to assess the effects of grazing are recommended.

Current Status (ownership): BLM with no formal protective status.

Boundary Justification: Boundaries are drawn to include the *Eriogonum contortum* population, and all element occurrences within it.

Six and Fifty Reservoir Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: South Dry Fork

Size: Approximately 303 acres.

Biodiversity rank: B2. Very high significance. A good occurrence of a G2 plant.

Location (quadrangle): Winter Flats. T8S R99W sec. 15, 16, 21, 22.

General description: This site supports a high quality population of the rare DeBeque milkvetch. There are few weedy species, although there is some evidence of grazing and trampling. The milkvetch occupies a south facing slope on reddish brown, dry clay soil. Other plants in the area are greasewood, sagebrush, galleta and Utah juniper. This is one of several sites included in the South Shale Ridge macrosite. (See also Coon Hollow, Pyramid Ridge, Pyramid Rock, Sulphur Gulch, and Corcoran Wash.)

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state status
Astragalus debequaeus	B		G2	S2	(C2)	-

Protection Urgency rank: P5

Comments: The site is on BLM land. Like the Corcoran Wash site, its position on the steep slope which is not grazed by livestock affords protection.

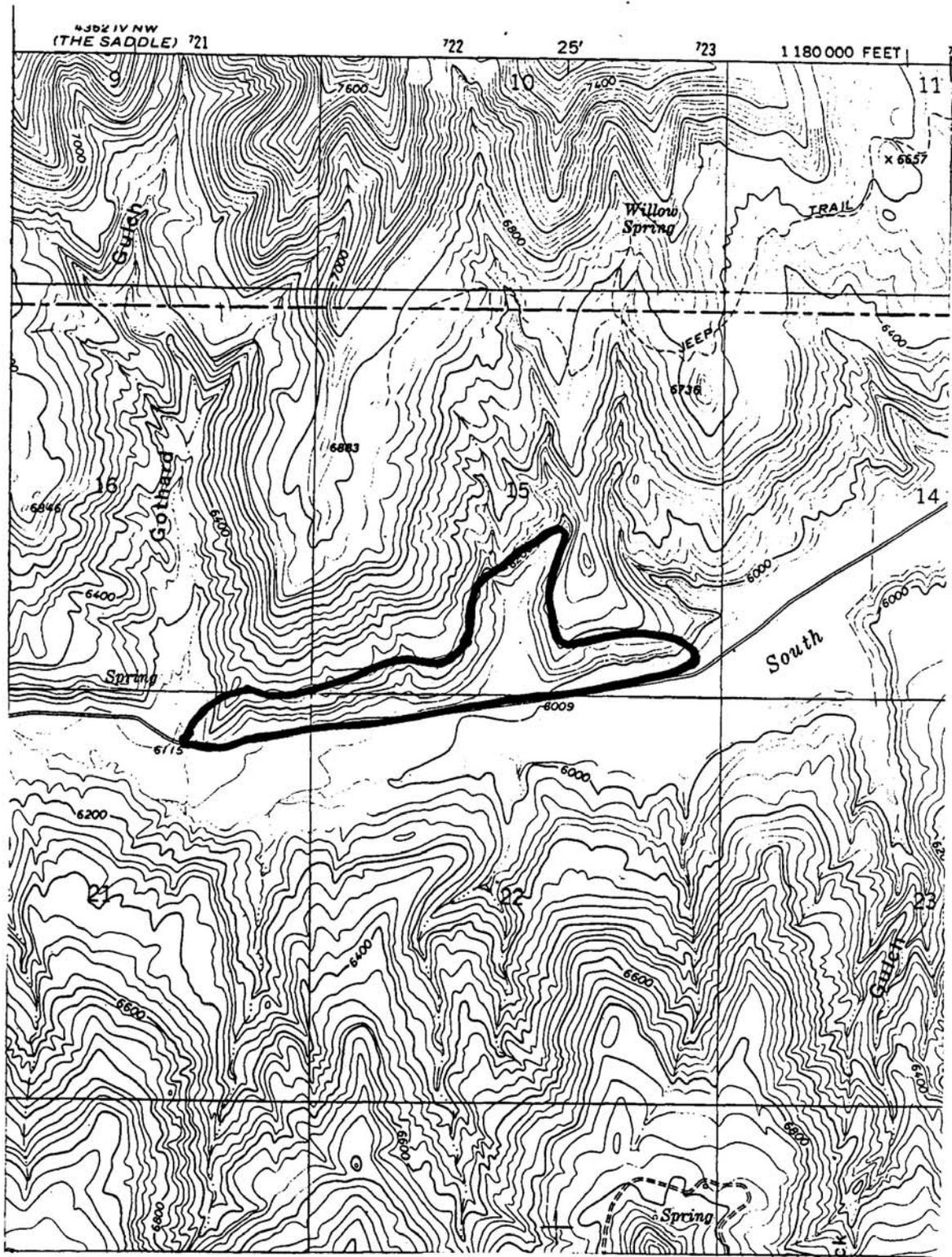
Management Urgency rank: M5

Comments: No foreseeable threats to the occurrence are known.

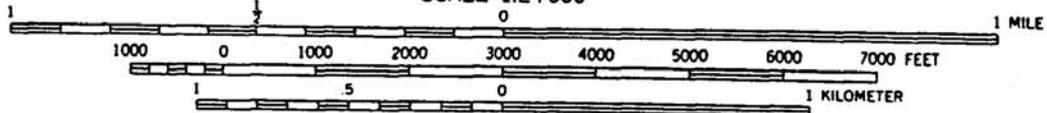
Current Status (ownership): BLM, with no protective status.

Boundary Justification: Boundaries are drawn to include all element occurrences and a small buffer zone to protect the plants from direct disturbance.

South Dry Fork Conservation Site



SCALE 1:24 000



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: Sulphur Gulch West

Size: Approximately 2,534 acres.

Biodiversity rank: B2. Very high significance. Good occurrences of G2 and G3 plants.

Location (quadrangle): Wagon Track Ridge and Winter Flats. T9S R99W sec. 1-4, 11, 12; T9S R98W sec. 6-8.

General description: Five rare plants were found in this site west of DeBeque. As in other sites within the South Shale Ridge macrosite, the DeBeque milkvetch was associated with the Atwell Gulch member of the Wasatch formation. Soils are dark gray shrink-swell clay and sandy clay. Associated plant species are Utah juniper, pinyon pine, greasewood, yucca, galleta, saltbushes, Indian rice grass and cheatgrass. A gravel road crosses the area. The area is grazed; however, cattle tend to stay in the bottoms, rather than on the slopes where most of the plants are found. The exception to this is the Uinta Basin hookless cactus, which is usually found at the base of the hills, and is threatened by trampling. Some of the flat lands at the base of the hills have been treated to remove sagebrush and planted with crested wheat grass.

Natural Heritage Resource Significance:

element	EO		global rank		federal status	state
Astragalus debequaeus		Debeque milkvetch	G2		(C2)	
Phacelia submutica		Debeque Phacelia	G2	S2	C	
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Cryptantha longiflora	D		G3	S2	-	-
Cirsium perplexans	B		G3	S1	-	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	-

Protection Urgency rank: P5

Comments: The area is BLM property, with no special designation. This appears to be adequate at this time.

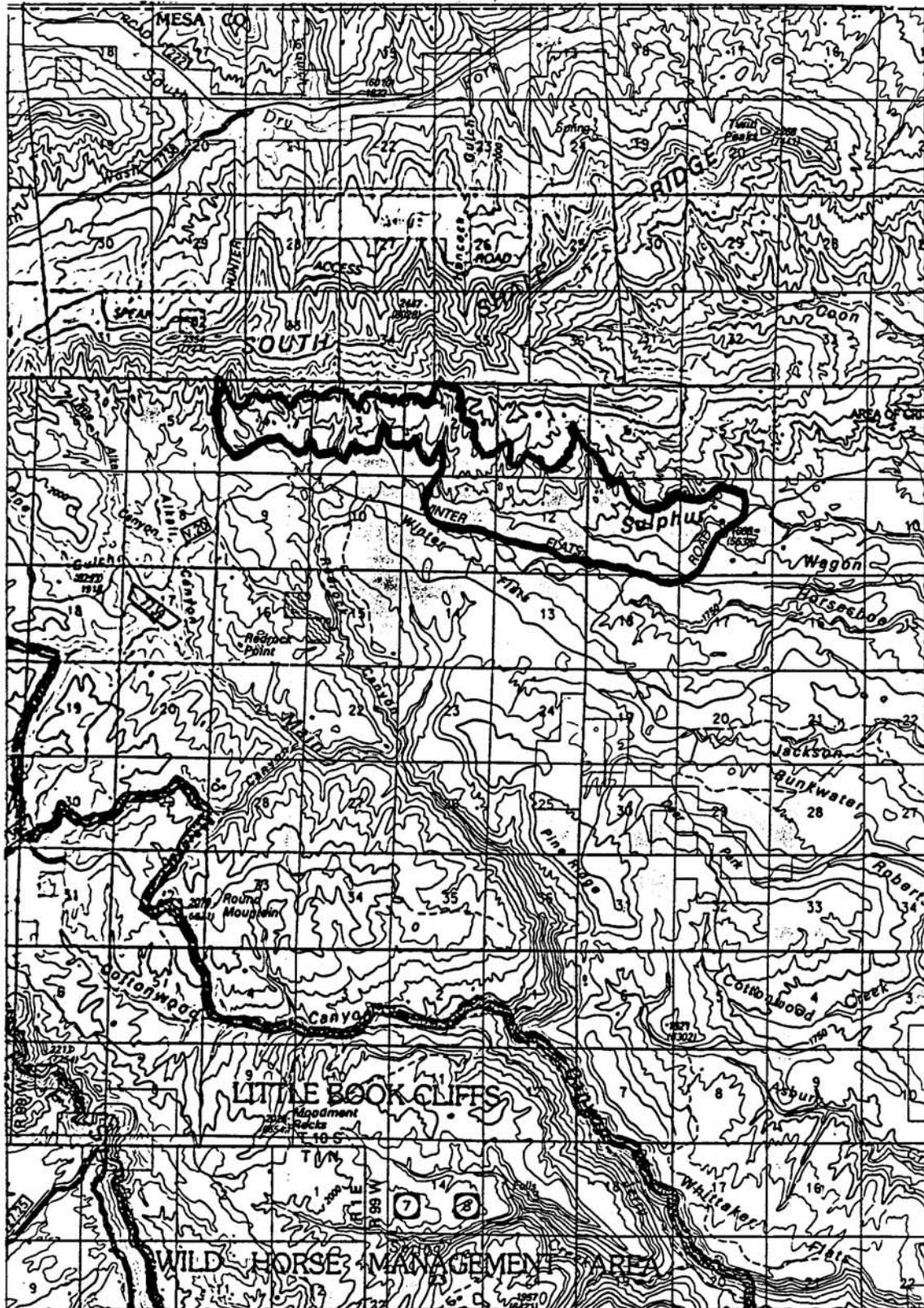
Management Urgency rank: M4

Comments: Grazing, trampling by livestock, and future sagebrush treatment may impact the cactus plants at the base of the hills.

Current Status (ownership): BLM

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone.

Sulphur Gulch Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: UnawEEP Seep

Size: Approximately 19,055 acres.

Biodiversity rank: B2. Very high significance. An excellent occurrence of a G3 community, and the best known occurrence of a G4T2 butterfly subspecies in Colorado.

Location (quadrangle): Fish Creek and Two V Basin. T14S R102W sec. 20, 29-33; T14S R103W sec. 25-28, 33-36; T15S R102W sec. 2-27; T15S R103W sec. 1-3, 10-13.

General description: This site includes the largest known Colorado population of the rare butterfly, the Nokomis fritillary (*Speyeria nokomis nokomis*). Although there is a larger population in Utah, there appears to be a genetic difference between the two. The butterfly larvae feed specifically on bog violets (*Viola nephrophylla*) growing in open areas. The violets were found to grow in a very narrow range of the moisture gradient, usually on toe slopes at the base of seeps or on hummocks, where their roots can reach open water. Associated species are spike rush (*Eleocharis palustris*, and *E. aciculata*), sedges (*Carex utriculata* and *C. lanuginosa*), rushes (*Juncus longistylus*), and willows (*Salix exigua*). In the sites south of West Creek are harebells, cattails, canyon bog orchids, scouring rushes, and horsetails. Areas with a dense thatch of spike rush seem to have fewer violets, perhaps because they are unable to compete for light with the spike rush. Nectar plants, such as *Eupatorium maculatum* and *Cirsium vulgare*, used by the adult butterflies are also found here. The site includes the UnawEEP Seep state designated Natural Area (Colorado Department of Natural Resources 1994), an unusual hillside spring ecosystem of wet sedge marshes and seeps. The springs are not affected by flooding and fluctuation in surface water flow; however, the hydrology of the area is not completely understood. A large population of the giant helleborine orchid (*Epipactis gigantea*) occurs on the lower part of the slope amid a dense growth of spikerushes. There are few exotic species in the seep. The is grazed in early spring and fall, and seems to recover well during the summer. At the base of the seep, West Creek supports a lush growth of narrowleaf cottonwood, box elder, coyote willow, and other riparian species. North Fork Creek enters the canyon at the western end of the site, and is the location of the narrow-leaf cottonwood/red osier dogwood community.

Natural Heritage Resource Significance:

element	EO	common name	global	state rank	fede	state
Alnus incana/Mesic forb	A	Thinleaf alder/Mesic forb	G3	S?	-	-
Populus angustifolia/Cornus sericea	AB	Narrowleaf cottonwood/Red-oshier	G3	S2?	-	-
Epipactis gigantea	A	Giant helleborine	G4	S2	-	-
Epipactis gigantea	B	Giant helleborine	G4	S2	-	-
Platanthera sparsiflora	B	Canyon bog orchid	G4G5T	S2	-	-
Speyeria nokomis nokomis	A	Great Basin silverspot butterfly	G4T2	S1	(C2)	-
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Coluber constrictor mormon	H	Western yellowbelly racer	G5T5	S2S3	-	-
Scirpus validus seep meadows	AB	Softstem bulrush meadow	GU	SU	-	-

Protection Urgency rank: P2

Comments: Much of the habitat of the Nokomis fritillary butterfly is on private land with no special protection. BLM has recently purchased the private land of the main seep, known locally as Swamp Hill. Other private land in the area should be a high priority for conservation easements or other protection. The site includes 36 acres that are designated as a state Natural Area for protection of the seeps and the butterfly population, and is a BLM Research Natural Area. However, this represents only a small portion of the butterfly’s habitat.

Management Urgency rank: M2

Comments: Research by CNHP in 1996 suggests that *Nokomis* populations are declining. Further monitoring and study of the effects of cattle grazing on this site should be conducted. A management plan is

currently being written by BLM, with participation from a wide variety of interested partners. Issues to be addressed include the possible extension of the RNA downstream.

Current Status (ownership): BLM and private. Thirty-six acres are designated as a State Natural Area.

Boundary Justification: Boundaries are drawn to include all colonies which are part of the “Unaweep Canyon population” of *Speyeria nokomis nokomis*. Also included is the intervening riparian habitat which is necessary to maintain dispersal between colonies, as well as the potential spring recharge zones which must be maintained to preserve these spring wetland complexes.

Further research needs: Continue to monitor *Speyeria nokomis* populations and violets; determine effects of grazing. Consider experimental prescribed burns on a small scale. Determine the extent of the recharge zone necessary to sustain the hydrology of the seeps. Resolve taxonomic questions regarding the subspecies *Speyeria nokomis nokomis*.

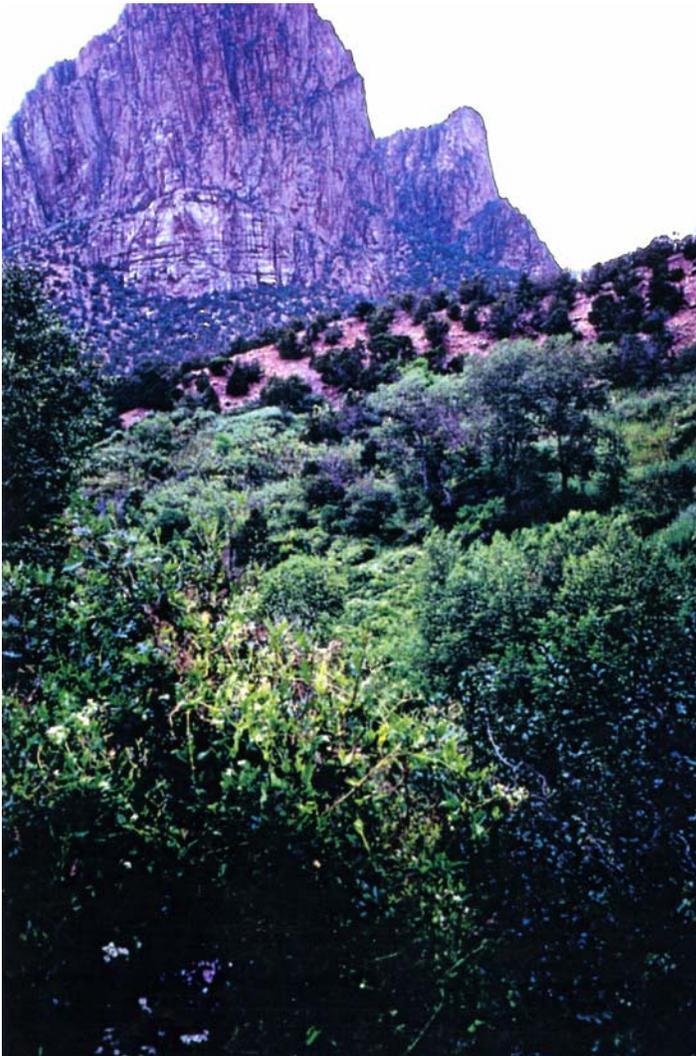
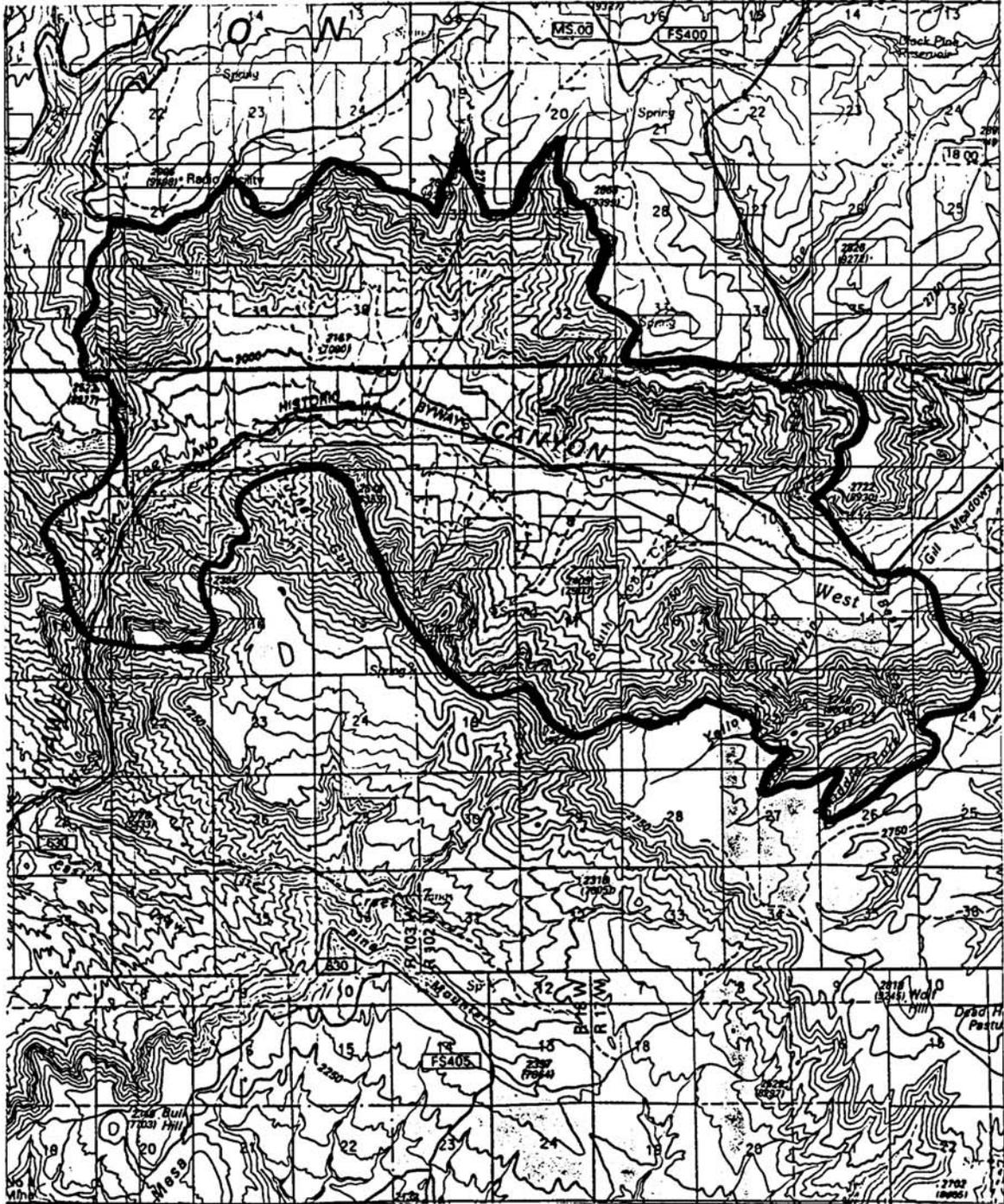


Figure 50. Unaweep Seep Conservation Site. Note contrast between seep and arid pinyon-juniper community above springs.

Unawep Seep Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Badger Wash

Location: Badger Wash quadrangle. About 7 miles northwest of Mack. T8S R103W sec 30, 31; T8S R104W sec 24-26, 35, 36; T9S R103W sec. 5-8.

Size: Approximately 4,388 acres.

Biodiversity rank: B3. Very high significance. Multiple good occurrences of globally threatened plants, and a globally imperiled plant community.

General description: Badger Wash contains an entire small watershed that has been used for hydrologic research since the 1950's (Colorado Department of Natural Resources 1994.) The site consists of low Mancos shale hills with salt desert shrub vegetation. Hillsides are dominated by shadscale and Gardner saltbush. Salina wildrye is locally abundant with the shrubs on undisturbed hillsides. Other native bunchgrasses such as Indian rice grass and needle and thread are occasionally present in small patches. The light gray soil and gray-green vegetation are accented by flowering shrubs-- the yellow-flowering Grand buckwheat and the pink and white *Eriogonum bicolor*--and many spring wildflowers. The lower flat areas between the hills are covered with greasewood or mat saltbush. There is heavy cheatgrass invasion in the bottoms.

Four rare plant species, two significant natural communities, three imperiled small mammal species and a lizard, are found in the Badger Wash conservation site. The area has been impacted by roads to gas wells and pipelines.

Natural Heritage Resource Significance:

element	EO	common name	global rank		federal status	state
Atriplex gardneri/Elymus salinus	B	Gardner saltbush/Salina wildrye	G2?	S2?	-	-
Astragalus musiniensis		Ferron milkvetch	G3	S1	-	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
	B	Tall cryptanth	G3	S2	(3C)	-
Eriogonum contortum		Grand buckwheat	G3	S2	-	-
Eriogonum contortum	C	Grand buckwheat	G3	S2	-	-
Eriogonum contortum		Grand buckwheat	G3	S2	-	-
Eriogonum contortum		Grand buckwheat	G3	S2	-	-
	B	Grand buckwheat	G3		-	-
Eriogonum contortum	C	Grand buckwheat	G3	S2	-	
Allium nevadense		Nevada onion	G4	S1	-	-
Neotoma lepida	H	Desert woodrat	G5	S1	-	-
Gambelia wislizenii	H	Longnose leopard lizard	G5	S2	-	-
Gambelia wislizenii	H	Longnose leopard lizard	G5	S2	-	-
Atriplex corrugata/Shale barren		Mat saltbush/Shale barren	G5	S2?	-	-
Atriplex corrugata/Shale barren	B	Mat saltbush/Shale barren	G5	S2?	-	-
Ammospermophilus leucurus		White-tailed antelope squirrel	G5T?	S1	-	
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-

Current Status: BLM. The BLM has designated 1, 520 acres of this site an Area of Critical Environmental Concern (ACEC) to protect the sensitive plants and the hydrological research area. It is also a state designated Natural Area, and contains the Badger Wash Experimental Site.

Protection Urgency rank: P4. The area is recognized by BLM as an Area of Critical Environmental Concern. However, oil and gas leasing are allowed on all but 685 acres which have a no surface occupancy stipulation. BLM should consider enlarging the ACEC to include the rare plant populations in the area added in this conservation site.

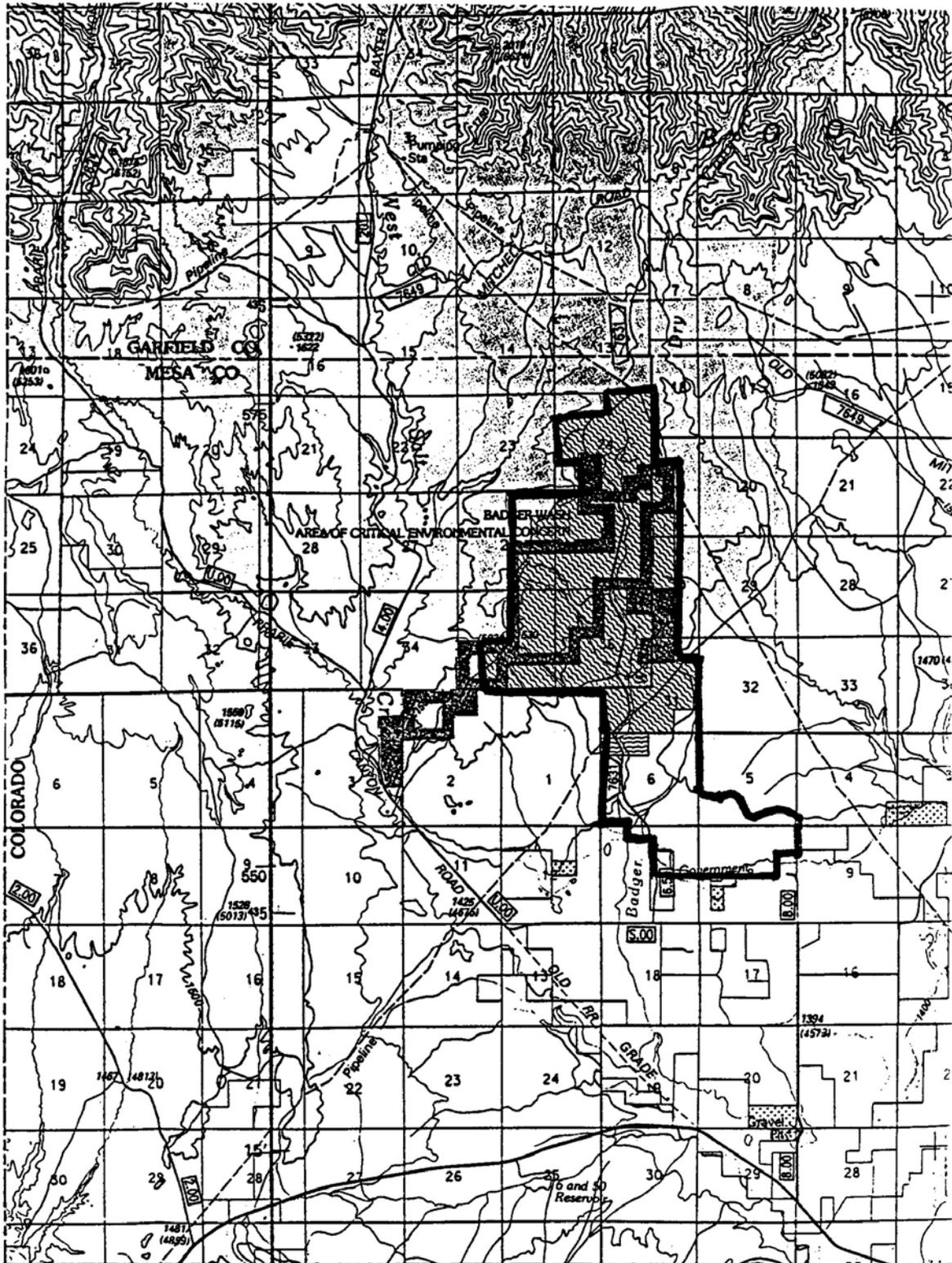
Management Urgency rank: M5.

Key issues identified by BLM for the ACEC management plan are the effects of livestock grazing, oil and gas exploration and development, and other surface-disturbing activities on water quality in the Badger Wash watershed; and protection of sensitive plants (USDI 1992). The management plan for the ACEC is adequate as written, but needs follow-up. The area has been posted as off limits to ORVs. No surface occupancy is allowed for oil and gas projects. A monitoring program for the rare plants should be established, as provided in the ACEC.

Boundary Justification: The boundary was drawn to include the ACEC and the Badger Wash Experimental Site, as well as some nearby occurrences of the rare plant species. The Badger Wash state designated Natural Area is contained partly in this site and partly in the West Salt Creek conservation site.

Further research needs: Former research at the site consisted of comparing the vegetation and small mammal populations of several paired watersheds, one grazed, and the other fenced to exclude grazing (Lambeth, personal communication). These areas have apparently not been examined recently, but would be of interest for study now. Old grazing exclosures should be examined, or if they are no longer effective, new ones should be installed. We should continue monitoring the *Eriogonum contortum* populations.

Badger Wash Conservation site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Cactus Park

Size: Approximately 1,819 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant.

Location (quadrangle): Triangle Mesa. T14S R99W sec. 13, 14, 21-24, 27.

General description: This site contains several small drainages of an unnamed tributary of the Gunnison River, north of Dominguez Canyon. Soils are clay and sand, derived from the Morrison, Entrada and Wingate formations. Pinyon and juniper trees, with mountain mahogany, serviceberry, black sagebrush, rabbitbrush, and a variety of other shrubs, forbs and grasses cover the rocky hillsides. Lower washes have been invaded by tamarisk, but higher elevation drainages are in good condition. The Grand Junction milkvetch, *Astragalus linifolius*, is found on the sides of upper dry washes. Two new subpopulations of this rare plant were located in 1996. The Uinta Basin hookless cactus (*Sclerocactus glaucus*) found here in 1996, while a small population, was a good example of the species, having straight central spines and showing no intergradation with the more common species, *S. parviflorus*.

Natural Heritage Resource Significance:

element	EO	common name		state	federal status	state
Astragalus linifolius	B	Grand Junction milkvetch	G3	S3	(3C)	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	-
Juniperus osteosperma/Elymus salinus	B	Utah juniper/Salina wildrye	GU	SU	-	-

Protection Urgency rank: P5

Comments: The area is entirely on BLM land. This appears to be adequate protection.

Management Urgency rank: M4

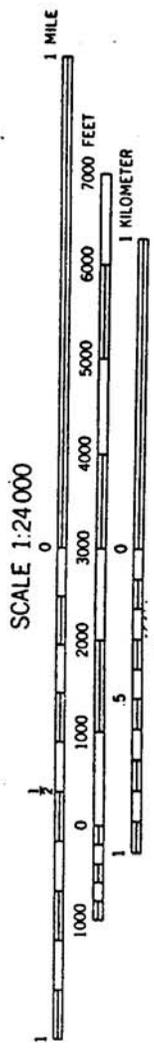
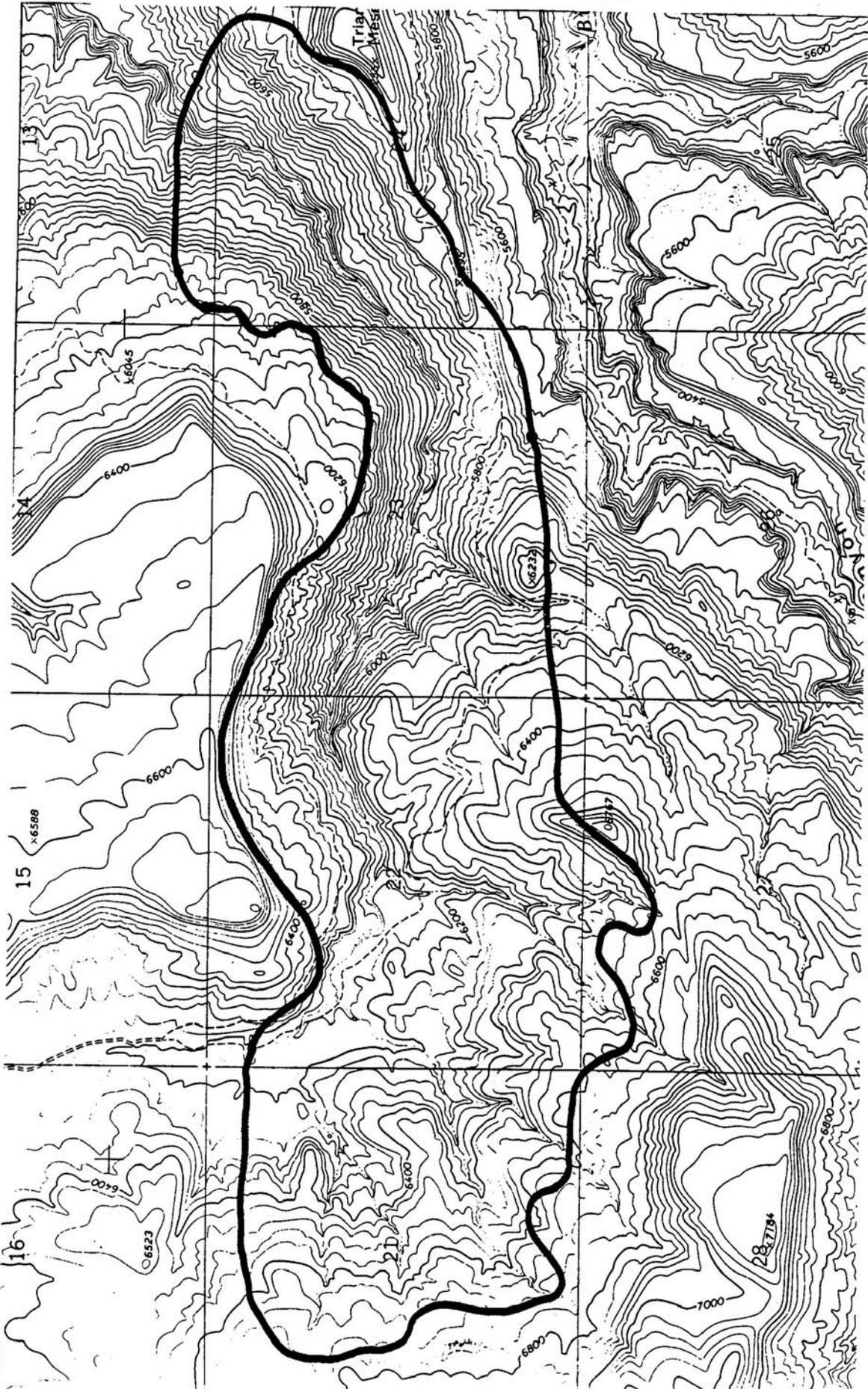
Comments: ORV use in lower washes near roads has impacted the riparian areas. Tamarisk has invaded lower washes, while benches have cheatgrass. The area is grazed; however, grazing does not seem to have negatively impacted the *Astragalus linifolius*.

Current Status (ownership): BLM

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone.

Further research needs: Taxonomic questions as to the relationship between *Astragalus linifolius* and its close relative, *A. rafaensis* need to be resolved. More research is also warranted on the taxonomy of *Sclerocactus glaucus*.

Cactus Park Conservation Site



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: DeBeque North

Size: Approximately 760 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G2 plant.

Location (quadrangle): DeBeque. T8S R97W sec. 21-23, 27.

General description: This site includes the area north of DeBeque and the Colorado River, and Roan Creek. Several populations of four globally rare plant species occur here, on rocky clay soils and alluvium of the rivers. *Sclerocactus glaucus* is found on alluvial terraces above the Colorado River and on steep south facing clay and rock slopes and knolls. Associated species are shadscale, big sagebrush, and spiny horsebrush. The DeBeque phacelia (*Phacelia submutica*) is found on more barren clay slopes of the Wasatch formation. Its population size is variable, as it is an annual species, and it may be completely absent after a drought year.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Phacelia submutica		Debeque Phacelia	G2	S2		-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica	C	Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2		
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Cirsium perplexans		Rocky Mountain thistle	G3	S1	-	
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus	B	Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3	LT	
Sclerocactus glaucus	C	Uinta Basin hookless cactus	G3	S3	LT	

Protection Urgency rank: P4

Comments: Although most of the site is on BLM land, at least one of the *Sclerocactus glaucus* occurrences is on private land.

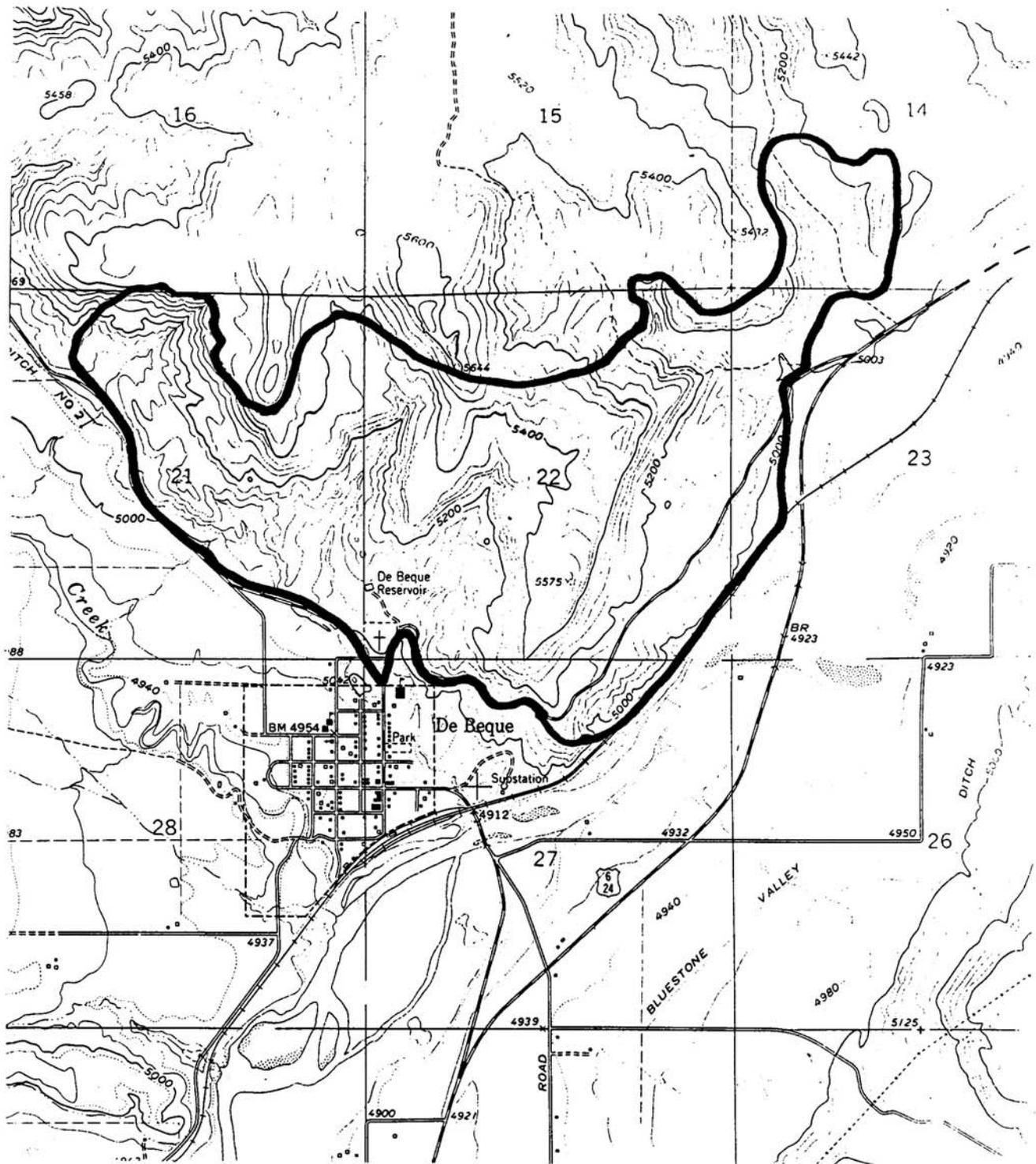
Management Urgency rank: M5

Comments: There are no known threats to the plants.

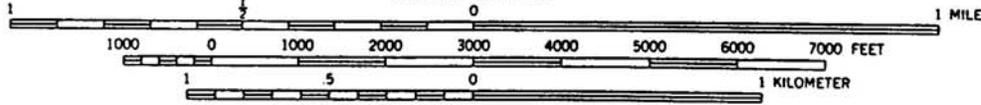
Current Status (ownership): BLM and private. Public lands have no formal protection.

Boundary Justification: Boundaries are drawn to include the known element occurrences and the intervening potential habitat between them.

DeBeque North Conservation Site



SCALE 1:24 000



CONTOUR INTERVAL 40 FEET

Site name: Dry Fork of Kimball Creek

Size: Approximately 517 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant.

Location (quadrangle): Hawxhurst Creek. T8S R95W sec. 34-36; T9S R95W sec. 3.

General description: This site is a high shale ridge about five miles north-northwest of Collbran. The inaccessible divide forms the boundary between the White River National forest and Grand Mesa National Forest. Two rare plant species that have been found nowhere else in Mesa County thrive here, in soil pockets amongst the talus of Green River oil shale.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	
Lesquerella parviflora		Piceance bladderpod	G2G3	S2S3	(3C)	-
Thalictrum heliophilum	B	Sun-loving meadowrue	G3	S3	(3C)	-

Protection Urgency rank: P5

Comments: The site is within two National Forests. No threats are known or likely to exist.

Management Urgency rank: M5

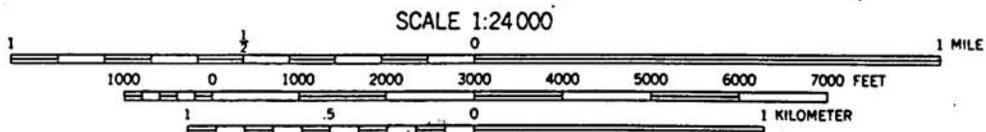
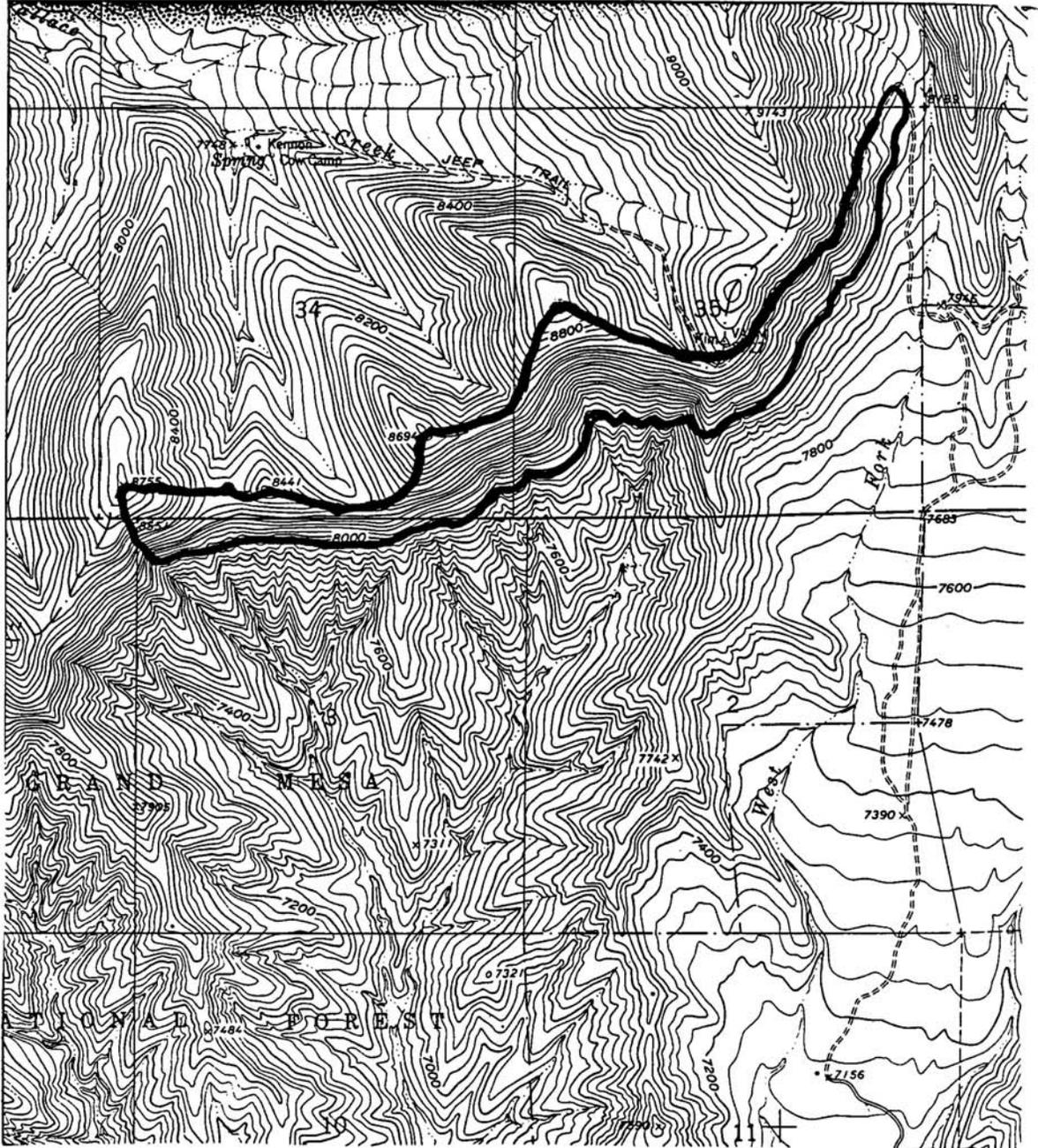
Comments: The inaccessibility of the site makes special management action unnecessary.

Current Status (ownership): White River National Forest and Grand Mesa National Forest, but with no formal designation.

Boundary Justification: Boundaries are drawn to include the populations of *Lesquerella parviflora* and *Thalictrum heliophilum*, and the intervening area of similar habitat along the shale ridge between them.

Further research needs: Confirm population size and condition of the two rare plant species.

Dry Fork of Kimball Creek Conservation Site



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: East Creek

Size: Approximately 7,543 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant.

Location (quadrangle): Island Mesa, Jack’s Canyon, Snyder Flats and Whitewater. T14S R101W sec. 25, 26, 35, 36; T14S R100W sec. 1, 2, 88-12, 14-17, 19-21, 29, 30; T13S R100W sec. 25, 36; T133S R1E sec. 5, 7, 8, 17-19, 30, 31; T12S R1E sec. 28, 32, 33.

General description: This large site encompasses the eastern part of Unaweep Canyon, the “Canyon with two mouths”. Near the divide between East and West Creeks, dark gray Precambrian cliffs with diagonal slashes of quartz intrusions wall the valley. High on the cliff faces, red alum-root, a tiny rare saxifrage, clings to small crevices. Rare bat species and raptors use the cliffs for their homes. Pools in the perennial stream are home to red spotted toads and canyon tree frogs. Farther downstream, the granite gives way to younger sandstones and shales. The banks of East Creek have scattered cottonwoods, willows and horsetails, while the uplands have pinyon and juniper woodlands with mountain mahogany and Indian rice grass. Several side canyons enter the main canyon, draining the Uncompahgre Plateau. In at least one of these, Nancy Hanks Gulch, widely spaced pinyon and juniper are accompanied by curl-leaf mountain mahogany, comprising a community of interest to science.

Natural Heritage Resource Significance:

element	EO	common name		state	fed	state
		Long-flower cat's eye	G3	S2		
Juniperus osteosperma/Cercocarpus ledifolius	B	Utah juniper/curl-leaf mountain mahogany	G3	S3	-	-
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B,	LE	T
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B,	LE	T
Heuchera rubescens	B	Red alum-root	G4	S1	-	-
Plecotus townsendii pallescens		Townsend's big-eared bat	G4T4		(C2	-
Plecotus townsendii pallescens		Townsend's big-eared bat	G4T4	S3	(C2	-
Plecotus townsendii pallescens		Townsend's big-eared bat	G4T4	S3	(C2	-
Plecotus townsendii pallescens		Townsend's big-eared bat	G4T4	S3	(C2	-
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Rana pipiens		Northern leopard frog	G5		-	SC
Bufo punctatus		Red-spotted toad	G5	S3S4	-	SC
		Corn snake	G5	S3S4	-	-

Protection Urgency rank: P5

Comments: Most of the site is BLM land. The cliff-dwelling species are probably secure because of their inaccessibility.

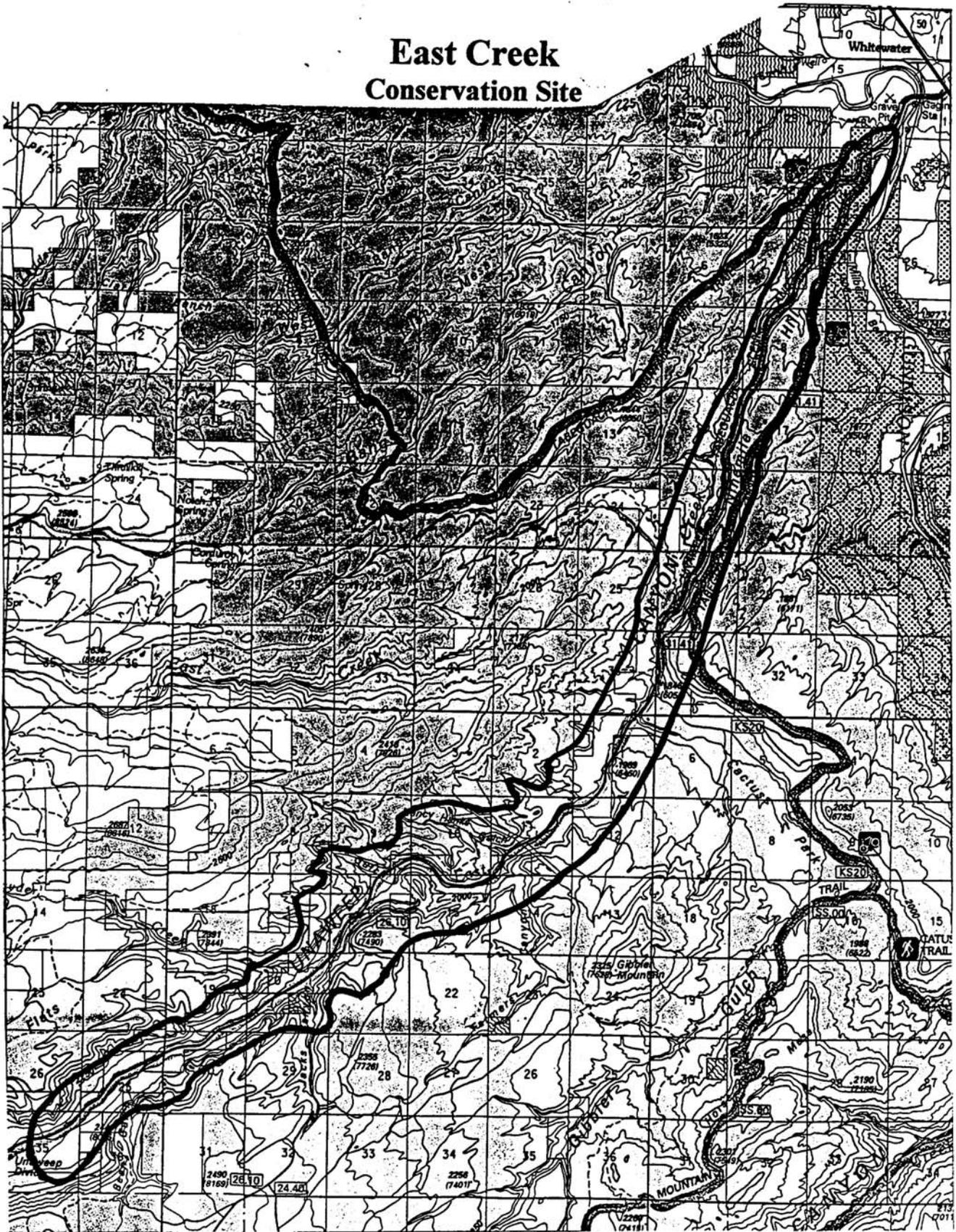
Management Urgency rank: M5

Comments: There are no known threats at this time.

Current Status (ownership): BLM and private, with no formal protection.

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone.

East Creek Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Fleming Point

Size: Approximately 388 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant.

Location (quadrangle): Mesa. T10S R97W sec. 3, 9, 10.

General description: Located north of Plateau Creek and west of the Colorado River, this area includes dry rocky mesas of the Mesa Verde group, and drainages of seasonal streams leading to Plateau Creek. Sagebrush, with an understory of cheatgrass, occupies flat areas, while sparse Utah juniper, mountain mahogany and Utah serviceberry grow on the slopes. There is much bare ground. Soils are sandy, with shale fragments on the surface. The Naturita milkvetch is found on the rim of the mesa. In dry washes of south facing slopes, a large population of Wetherill milkvetch was found this year. It is often the only plant growing on the barren soil in the washes. The area appears to have a high deer population, although there was no evidence of recent cattle grazing. The private land in the area has been subdivided into 40 acre parcels.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state status
Astragalus naturitensis	not	Naturita milkvetch	G2	S2S3	(3C)	-
Astragalus wetherillii	B	Wetherill milkvetch	G3	S3	(3C)	-

Protection Urgency rank: P4

Comments: Although the occurrences above were found on BLM land, the surrounding private land also contains potential habitat for these species. Land conversion and road building may pose a threat.

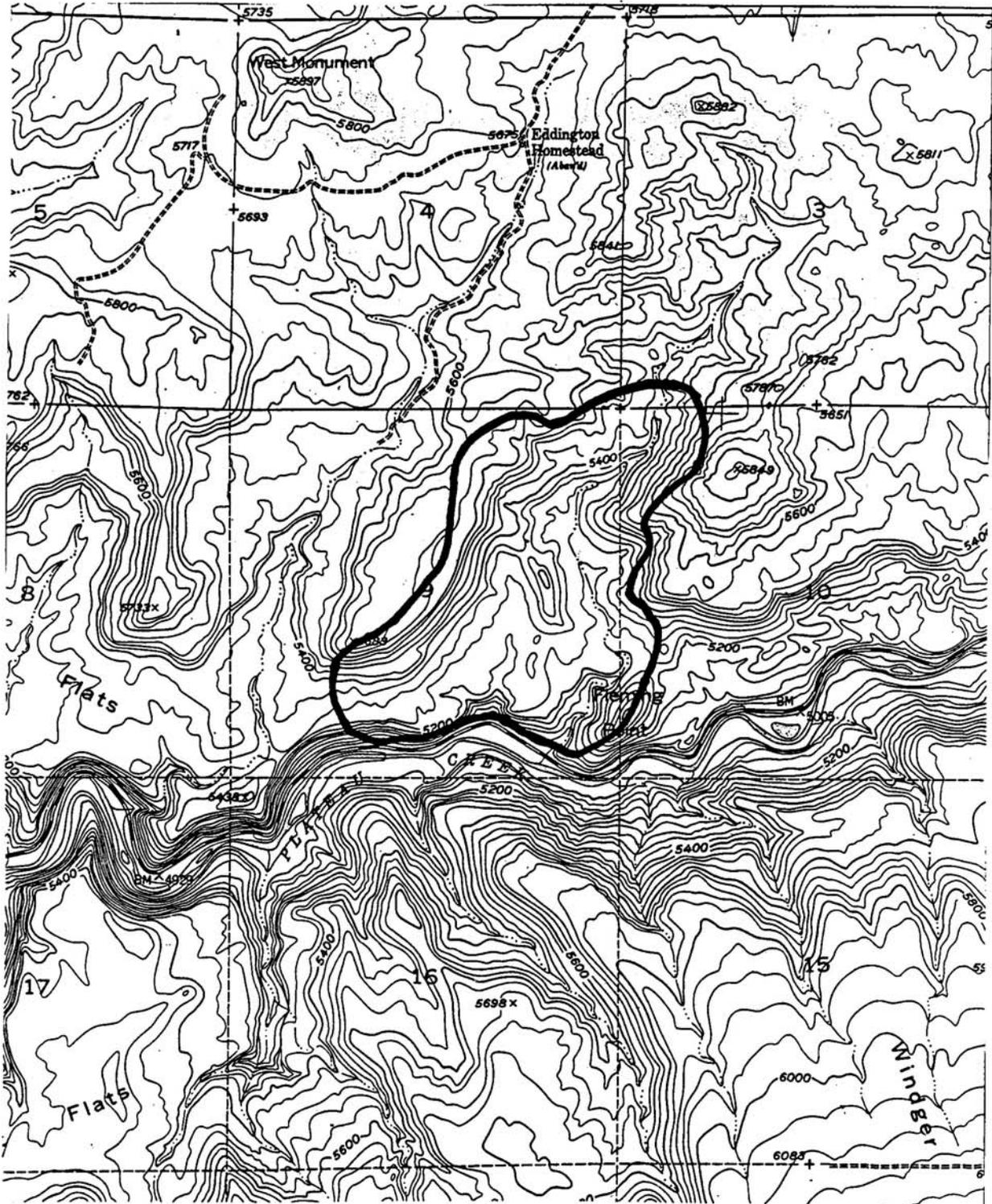
Management Urgency rank: M5

Comments: Present management appears to be adequate to protect the species on BLM lands.

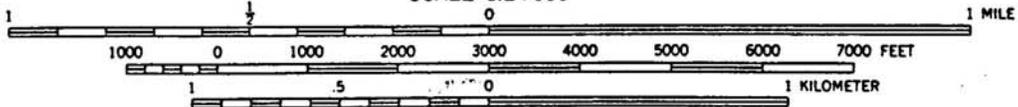
Current Status (ownership): BLM and private, with no formal protection on public or private lands.

Boundary Justification: Boundaries are drawn to include the known populations of *Astragalus naturitensis* and *A. wetherillii*, with intervening similar habitat.

Fleming Point Conservation Site



SCALE 1:24 000



Site name: Granite Creek

Size: Approximately 2,045 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant.

Location (quadrangle): Steamboat Mesa and Two V Basin. T14W R104W sec. 11-21; T14S R103W sec. 6, 7, 18.

General description: The Granite Creek site drains the higher elevations of Pinyon Mesa. Granite Canyon is a very steep, V-shaped canyon with a narrow riparian zone. At the higher elevations, aspen and Douglas-fir grow on the steep slopes. Lower, pinyon-juniper stands dominate the slopes with some sagebrush communities on terraces above the creek and Gambel's oak stands directly adjacent to the riparian area. There is a range of riparian communities. At the upper elevations, the riparian zone is densely covered with shrubs, including Rocky Mountain willow and red-osier dogwood. Farther downstream, cottonwood, birch and alder dominate. Elevations of the site range from approximately 8800 feet to below 6000 feet where the creek crosses into Utah. The site has been used for livestock grazing and there is evidence of an old settlement in the upper canyon. In the lower canyon, a 4-wheel drive road parallels the creek.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Populus angustifolia/Cornus sericea	BC	Narrowleaf cottonwood/Red-osier	G3	S2?	-	-
Populus angustifolia/Betula	B	Narrowleaf cottonwood/River birch	G3	SP	-	-
Betula occidentalis/Cornus sericea	C	River birch/Red-osier dogwood	G3	SU	-	-
Platanthera sparsiflora		Canyon bog orchid	G4G5T3	S2	-	-
Pinus edulis/Cowania mexicana	B	Pinyon pine/cliffrose	G5	S3?	-	-
Quercus gambelii/Paxistima	B	Gambel oak/mountain lover	GU	S?	-	-
Salix monticola/Mesic forb	AB	Rocky mountain willow/mesic forb	GU	SU	-	-

Protection Urgency rank: P2

Comments: Most of the lower elevation land is owned by the Bureau of Land Management. It carries no special status; however, a “no surface occupancy” stipulation applies to oil and gas leasing in Granite Canyon, to protect scenic and natural values (USDI 1987). The land at the higher elevations is currently held by the owners of the Mountain Island Ranch. Historically, the site has been used for cattle and sheep ranching with cattle ranching being the current use. No formal protection is provided, although the adjacent part of the ranch at the headwaters is under conservation easement. Although present management does not threaten the elements, a change in ownership could change management of the site.

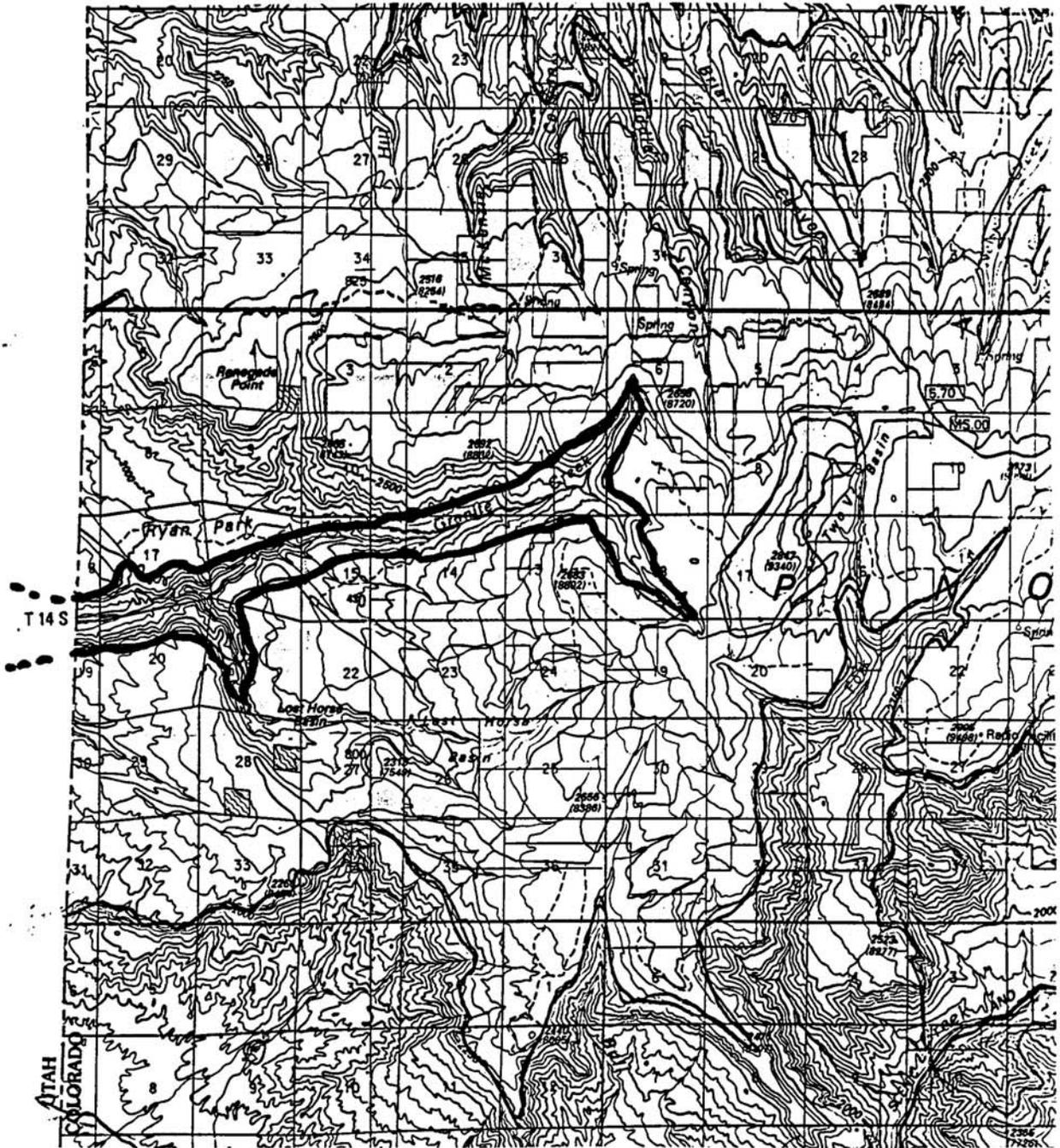
Management Urgency rank: M5

Comments: No serious management needs are known or anticipated at the site.

Current Status (ownership): BLM in the lower portion, and private in the upper.

Boundary Justification: The current boundary protects the occurrences from direct impact, and encompasses most of the slopes of the canyon and major tributaries. This boundary also should protect the hydrologic regime which is necessary for the continued survival of the riparian elements.

Granite Creek Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Highline Lake

Size: Approximately 11,207 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant.

Location (quadrangle): Highline Lake. T9S R103W sec. 1, 2, 11, 12; T2N R3W sec. 1-6, 7, 10-12; T8S R102W sec. 31-33,

General description: This site, north of the Highline Canal contains gently rolling clay hills covered with desert shrubs, separated by shallow washes and greasewood flats. It is an area of low relief, with elevations from 4700 to 5100 ft. Drainages, including Mack Wash and Coyote Wash, flow southeastward into the canal. One major highway, State Highway 139, bisects the site. The Highline Lake State Recreation Area is within the site. Several plant communities typical of this country are represented, forming a mosaic of vegetation types dominated by saltbushes. Three rare plant species are found in the site. In much of the flat bottomland, the native grasses, such as galleta, have been replaced by cheatgrass. The area has been moderately grazed. Prairie dog colonies provide sites for burrowing owls, which use their mounds for nesting and roosting. These owls are uncommon in the Grand Valley, and the species is declining in Colorado. However, the results of this inventory are encouraging. Prior to 1996, there were no Mesa County records for burrowing owls at CNHP. Fourteen new records have been added, mostly in the area between the Bookcliffs and the Highline Canal. Records for Ord’s kangaroo rat were likewise greatly increased, from nine to 32, during the survey.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Atriplex gardneri/Elymus salinus		Gardner saltbush/Salina wildrye	G2?	S2?	-	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata	C	Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
Eriogonum contortum	B	Grand buckwheat	G3	S2	-	-
Eriogonum contortum	B	Grand buckwheat	G3	S2	-	-
Atriplex gardneri/Hilaria jamesii	C	Gardner saltbush/Galleta	G3G5	S1	-	-
Allium nevadense		Nevada onion	G4	S1	-	-
Athene cunicularia			G4	S3S4	(C2)	-
Atriplex corrugata/Shale barren			G5	S2?	-	-
Myotis yumanensis		Yuma myotis	G5	S3	(C2)	-
Ammospermophilus leucurus		White-tailed antelope squirrel	G5T?	S1	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-

Protection Urgency rank: P4

Comments: The area has a combination of public and private land. The majority is BLM, while the area around Highline Lake and the Highline Canal is under Bureau of Reclamation management. There is private land interspersed with the public.

Management Urgency rank: M4

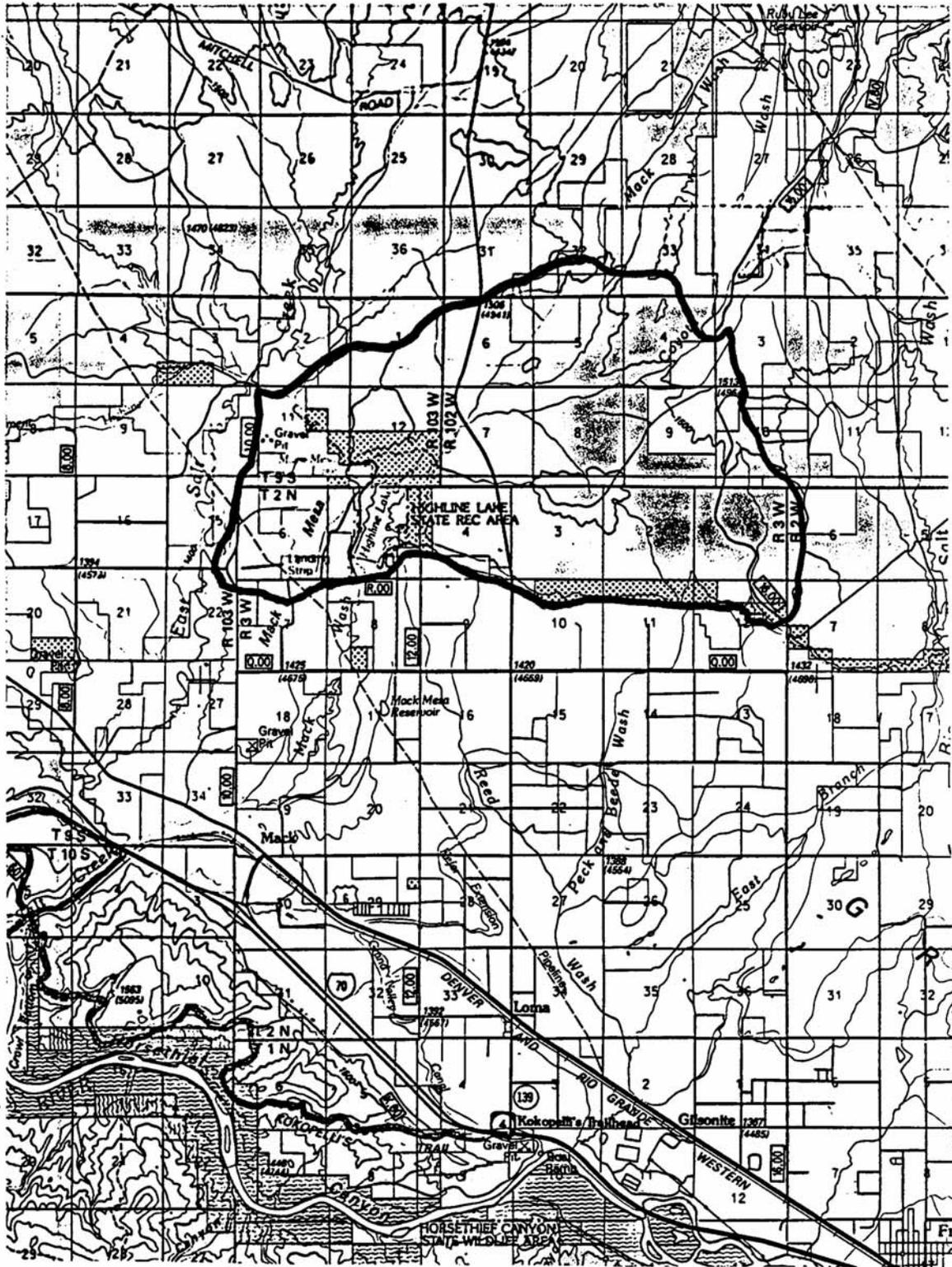
Comments: Present management seems to be adequate for the protection of the rare plant and animal species. Plant communities have been impacted by grazing, and disturbed areas have been invaded by cheatgrass and Russian thistle. Careful grazing management and protection from off-road vehicle use should be considered to encourage native grasses and reduce weed invasion. Exclosures are recommended to assess the results of resting the land.

Current Status (ownership): BLM, Bureau of Reclamation and private, with no formal protection

Boundary Justification: The boundary is drawn to include a collection of element occurrences. It follows the Highline Canal on the south, a gravel road on the east and north and a paved road on the west. Most of the area surrounded by these roads is suitable habitat for the species of concern.

Further research needs: Study effects of protection from disturbance on renewal of native grasses.

Highline Lake Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Jerry Gulch

Size: Approximately 2,529 acres.

Biodiversity rank: B3. High significance. A fair occurrence of a G2 plant.

Location (quadrangle): Molina. T10S R96W sec. 2,3,8-11,14-17.

General description: The Jerry Gulch site includes a portion of Plateau Creek, with bluffs on either side, and large, flat open spaces in the Jerry Gulch drainage. Elevations range from 5400 ft. to 6650 ft. Colorado State Highway 330 follows Plateau Creek, and bisects the site. The steep cliffs above the creek provide winter roosting areas for bald eagles. The Uinta Basin hookless cactus is found in open areas among scattered junipers on the more level areas, while the DeBeque milkvetch was located in a rocky draw of a barren clay hillside. Common plant species in the area include Utah juniper, shadscale, sagebrush, snakeweed, prickly pear cactus, galleta, Indian rice grass, and cheatgrass. The canyon bottom has been degraded, and invaded by exotic species, including tamarisk. The corn snake was found in thick sedges of a wetland along the creek (CNHP 1995).

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Astragalus debequaeus		Debeque milkvetch		S2	(C2)	-
Sclerocactus glaucus	D	Uinta Basin hookless cactus		S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Haliaeetus leucocephalus		Bald eagle	G4	S1B,	LT	T
Elaphe guttata		Corn snake	G5	S3S4	-	-

Protection Urgency rank: P5

Comments: All elements appear to be unthreatened. However, inventory should be conducted for the DeBeque milkvetch and Uinta Basin hookless cactus before any surface disturbing activities are undertaken in the area.

Management Urgency rank: M5

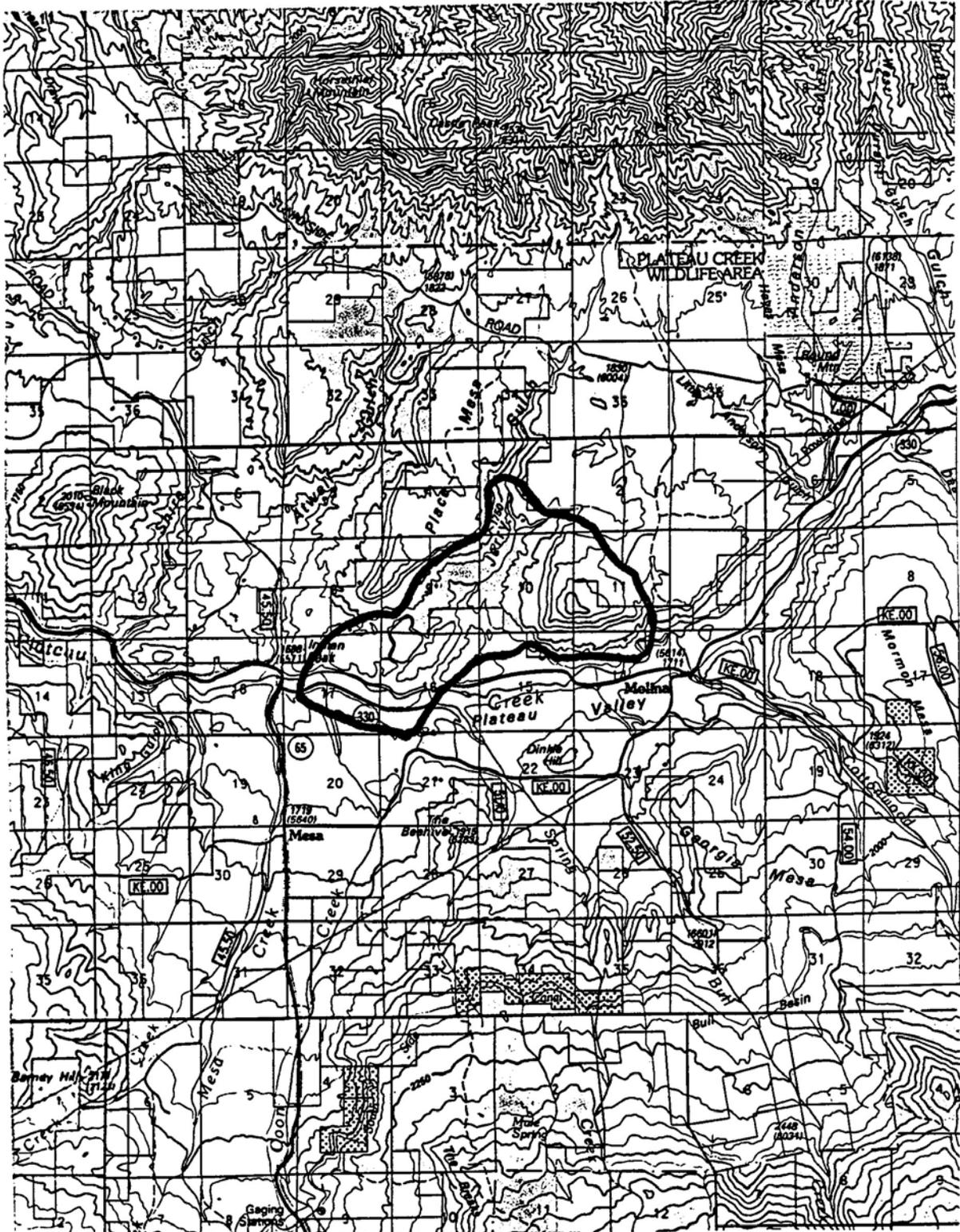
Comments: No management needs are known.

Current Status (ownership): BLM, Ute Water Conservancy, private.

Boundary Justification: The boundary was drawn to include several element occurrences which are clustered in the vicinity.

Further research needs: Further inventory of both rare plants during their flowering season would give a better understanding of the size of the occurrence.

Jerry Gulch Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Little Dolores River Headwaters

Size: Approximately 4,501 acres.

Biodiversity rank: B3. High significance. Multiple good occurrences of communities.

Location (quadrangle): Fish Creek. T14S R102W sec. 3-5, 8-10, 15-117, 21; T13S R102W sec. 33, 34.

General description: The Little Dolores River Headwaters site encompasses some of the highest elevations in the Glade Park - Pinyon Mesa area. The land was originally placed under federal ownership to protect water sources for the town of Fruita. The vegetation is a mixture of grassland, shrubland, riparian, and deciduous and mixed conifer vegetation types. Elevations of the site range from approximately 8400 feet to 9671 feet. Steep north facing slopes at upper elevations have a dense canopy of subalpine fir and Engelmann’s spruce. Aspen forests cover much of the area above 9000 ft. Below the aspen zone, Gambel’s oak shrublands are interspersed with sagebrush and grassland. The site is used extensively for recreation, especially fishing in the three Fruita Reservoirs, and hunting. Numerous 4-wheel drive roads and trails are present and a well used county road passes through the site. Several reservoirs and diversion structures exist along the creeks.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	
Populus tremuloides/Carex geyeri	BC	Aspen/elk sedge	G4	S4	-	-
Abies lasiocarpa/Carex geyeri	B	Subalpine fir/Elk sedge	G5	S2S3	-	-
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Quercus gambelii/Symphoricarpos	BC	Gambel oak/snowberry	GU	S3S4	-	-

Protection Urgency rank: P4

Comments: Most of the area is in National Forest, with no other special designation. Private land is well protected, although informally, under present ownership.

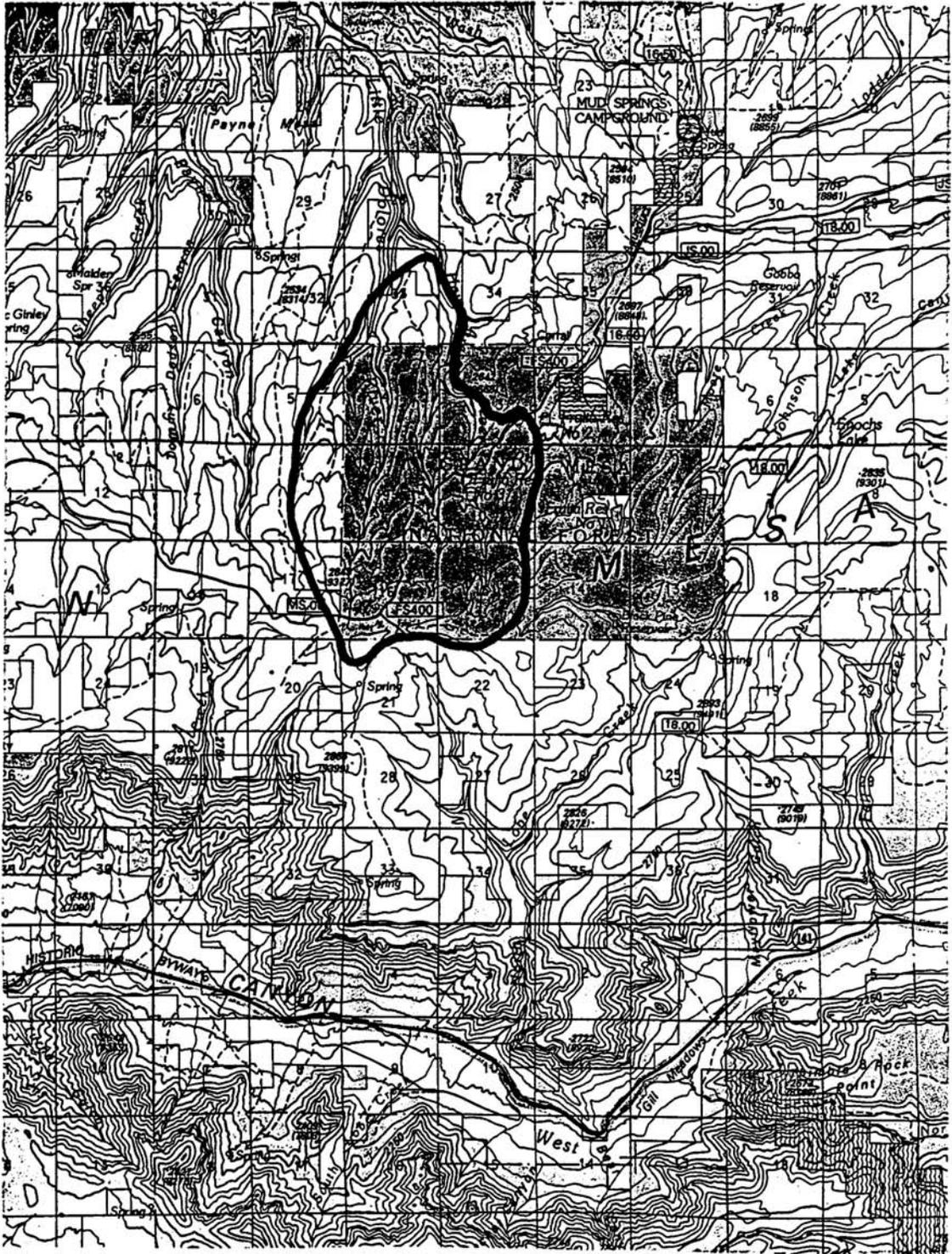
Management Urgency rank: M4

Comments: Although the area is heavily used for recreation, the plant communities do not appear to be threatened under current management, although impacts should be carefully monitored.

Current Status (ownership): Grand Mesa National Forest and private with no formal protection.

Boundary Justification: The current boundary protects the occurrences from direct impact, and encompasses most of the upper watershed. It is thought that this boundary will protect most of the ecological processes needed to support the elements.

Little Dolores River Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Mee Canyon

Size: Approximately 3,864 acres.

Biodiversity rank: B3. High significance. A good occurrence of a G3 plant, and several good occurrences of communities.

Location (quadrangle): Battleship Rock and Ruby Canyon. T10S R104W sec. 35, 36; T10S R103W sec. 30, 31; T11S R103W sec. 2-6, 9-11, 14-16, 23.

General description: This scenic sandstone canyon contains an enormous, 300 foot deep cavern cut by a meander of the small stream which drains to the Colorado River. The canyon is rimmed with red Entrada sandstone, and has steep sides of the Kayenta and Wingate formations. The bottom is ungrazed, and difficulty of access to the upper reaches has probably protected it from human impacts. The narrow riparian area in the canyon bottom has scattered box elders, with good regeneration. The stream bank has a dense growth of scouring rushes, with hundreds of giant helleborine orchids growing among them. Other riparian species include Baltic rush, skunkbush, coyote willow, Rocky mountain willow, and cattails. Not far from the cavern is a grotto with seeping walls covered by mosses and yellow Mancos columbine. Dry slopes on the side of the canyon have scattered Utah juniper, fremont barberry and cliffrose. The mesa at the head of the canyon supports an excellent example of the Utah juniper/Salina wild rye community. Other mesa species are black sage, Indian ricegrass and needle and thread. Raptors nest in the Wingate sandstone cliffs, and the canyon tree frog was found in the stream.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Acer negundo/Hippochaete hyemalis	B	Box elder/Scouring rush	GU	SU	-	-
Salix exigua/Hippochaete hyemalis	B	Coyote willow/horsetail	G?	S?	-	-
Pediomelum aromaticum	B	Paradox breadroot	G3	S2	-	-
Epipactis gigantea	A	Giant helleborine	G4	S2	-	-
Falco peregrinus anatum			G4T4	S2B,	LE	T
		Canyon treefrog	G5	S2	-	SC
Aquilegia micrantha seep		Hanging gardens	GU	SU	-	-
Juniperus osteosperma/Elymus		Utah juniper/Salina wildrye		SU	-	-

Protection Urgency rank: P2

Comments: The area is a part of the Black Ridge BLM Wilderness Study Area, with wilderness designation being actively promoted by local environmentalists and recommended by BLM. It would also make an excellent Research Natural Area. It is notable that the wilderness EIS makes no mention of rare plants (USDI 1989).

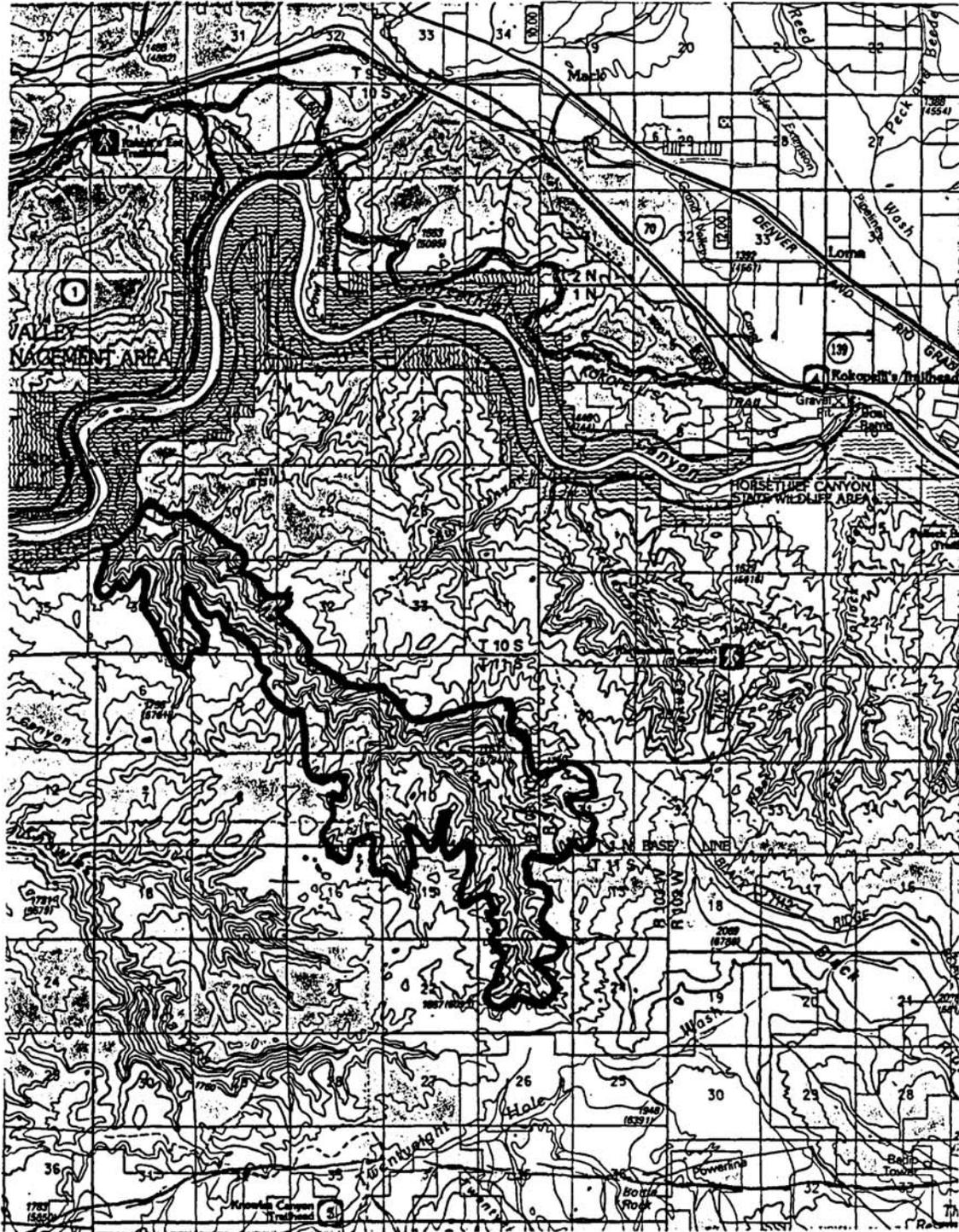
Management Urgency rank: M4

Comments: Although visitor use is not yet high, hiking use would probably increase with publicity. Heavy traffic could damage the riparian areas, and particularly the *Epipactis gigantea*.

Current Status (ownership): BLM, with Wilderness Study Area status.

Boundary Justification: The boundary encompasses the entire canyon, and the juniper/salina wild rye community on the mesa above.

Mee Canyon Conservation Site



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

CONTOUR INTERVAL 50 METERS

(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: No Thoroughfare Canyon

Size: Approximately 449 acres.

Biodiversity rank: B3. High significance. An excellent occurrence of a community.

Location (quadrangle): Glade Park. T112S R101W sec. 20, 21, 28, 29.

General description: This site encompasses two forks at the head of No Thoroughfare Canyon in Colorado National Monument. The canyon is walled by steep cliffs of Wingate sandstone, with slopes of dark red Chinle sandstone at their base. Little Park Road, which becomes CS Road, skirts the canyon rim. Upper slopes have pinyon and juniper, with mountain mahogany, serviceberry and sagebrush, while lower slopes have dense stands of Gambel’s oak. The flat canyon bottom is covered with sagebrush. In some places the creek has eroded a steep sided arroyo in the soft alluvium; in other places it has a broader floodplain. The two foot wide stream is sheltered by a dense canopy of coyote willow, squawbush, wild rose and Gambel’s oak, with an understory of scouring rushes, starry Solomonseal and canyon bog orchids. There are occasional cottonwoods and box elders. Other species in the riparian zone include Rocky Mountain willow and Western river birch. Exotic species are more frequent downstream, and include tamarisk, Russian olive and sweet clover. The upper canyon contains an excellent example of the Coyote willow/Scouring rush community, which was previously undescribed. This community was found to be common in the sandstone canyons of Mesa County, and was documented eight times in 1996.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Salix exigua/Hippochaete hyemalis	A	Coyote willow/horsetail	G?	S?	-	-
Platanthera sparsiflora	A		G4G5T3	S2	-	-
Platanthera sparsiflora	C	Canyon bog orchid	G4G5T3	S2	-	-

Protection Urgency rank: P5

Comments: The site is within Colorado National Monument with adequate protection.

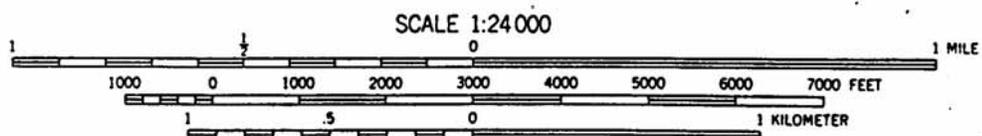
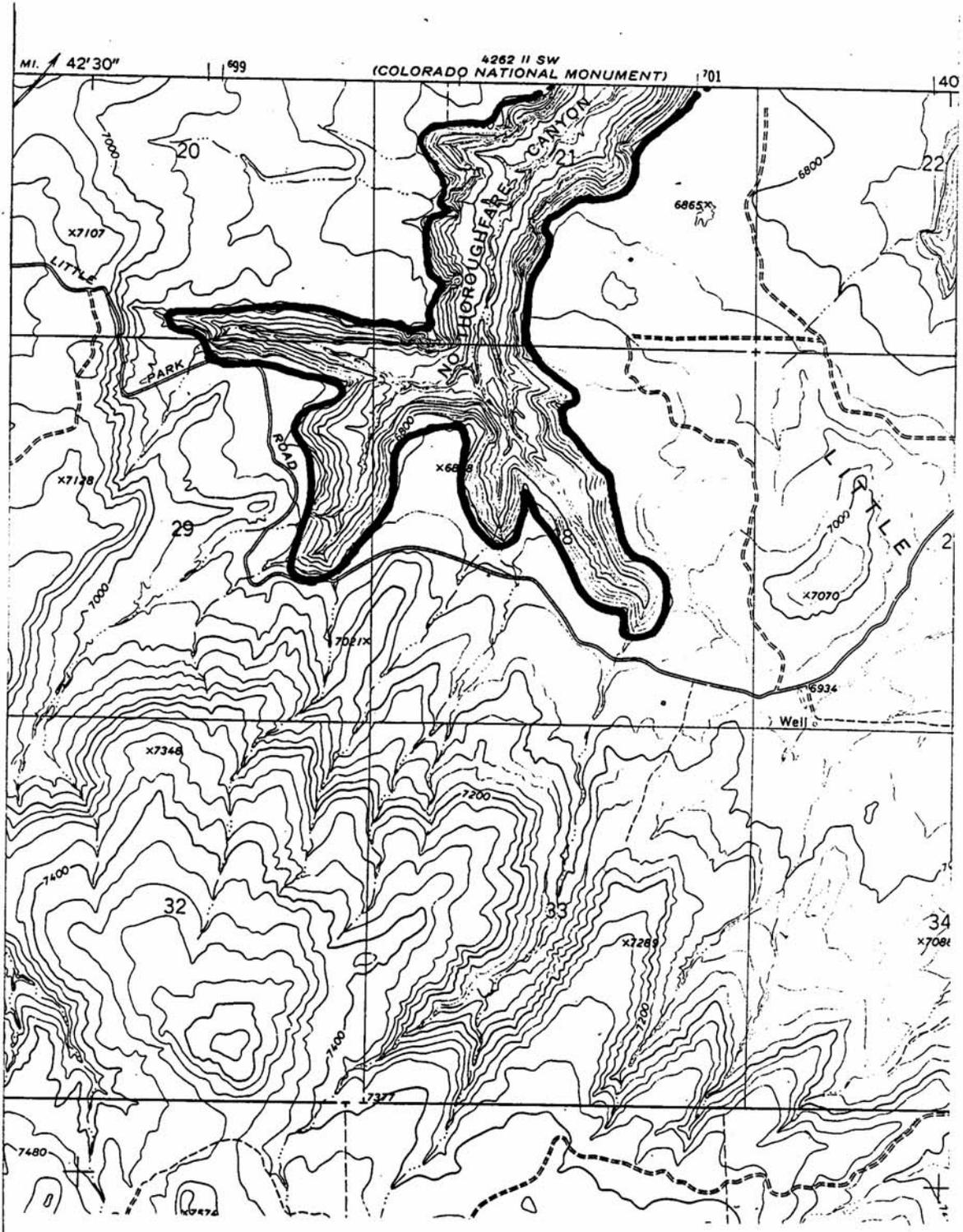
Management Urgency rank: M4

Comments: The site is not easily accessible, and vegetation is so thick along the creek that most hikers will stay on the trail above. However, development of adjacent private lands could negatively affect Colorado National Monument. The Park Service has noted impacts that nearby subdivisions may have on Monument lands. These include: creation of new trails that can damage sensitive soils and degrade the wilderness experience; noise from lawnmowers, dogs and vehicles; loose pets having a negative effect on wildlife; increased fire danger; degradation of air quality by wood smoke; and increase in exotic species invasion (Rodgers, personal communication). These concerns should be considered in the approval of new housing developments.

Current Status (ownership): National Park Service, Colorado National Monument, with no other formal designations.

Boundary Justification: The boundary is drawn to include the canyon bottom in the area of the element occurrences.

No Thoroughfare Canyon Conservation Site



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Site name: Orchard Mesa

Size: Approximately 6,175 acres.

Biodiversity rank: B3. High significance. Several good to excellent occurrences of G3 plants.

Location (quadrangle): Clifton. T1S R1E sec. 35, 36; T2S R1E sec. 1-3; T1S R2E sec. 16, 17, 19-21, 28-32; T2S R2E sec. 5, 6.

General description: Part of the Grand Mesa Slopes cooperative management area, this site consists of low hills of Mancos Shale at the foot of Grand Mesa. The desert shrub vegetation includes shadscale, Gardner saltbush, galleta, Salina wildrye, and woody aster. There are many unmarked roads and ORV trails throughout the area. Power lines cross the site. The soft, erodable clay soil is easily disturbed and subject to invasion by cheatgrass. The area contains much potential habitat for the rare species below, although the populations tend to be small and scattered. A BLM exclosure is located within the site.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Cryptantha longiflora	A	Long-flower cat's eye	G3	S2	-	-
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Cryptantha longiflora	B	Long-flower cat's eye	G3	S2	-	-
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Cryptantha elata	B	Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata	B	Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata	B	Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Townsendia strigosa		Strigose Easter-daisy	G4	S1	-	-

Protection Urgency rank: P5

Comments: The area has a combination of public and private land, and is within the Grand Mesa Slopes cooperative management area.

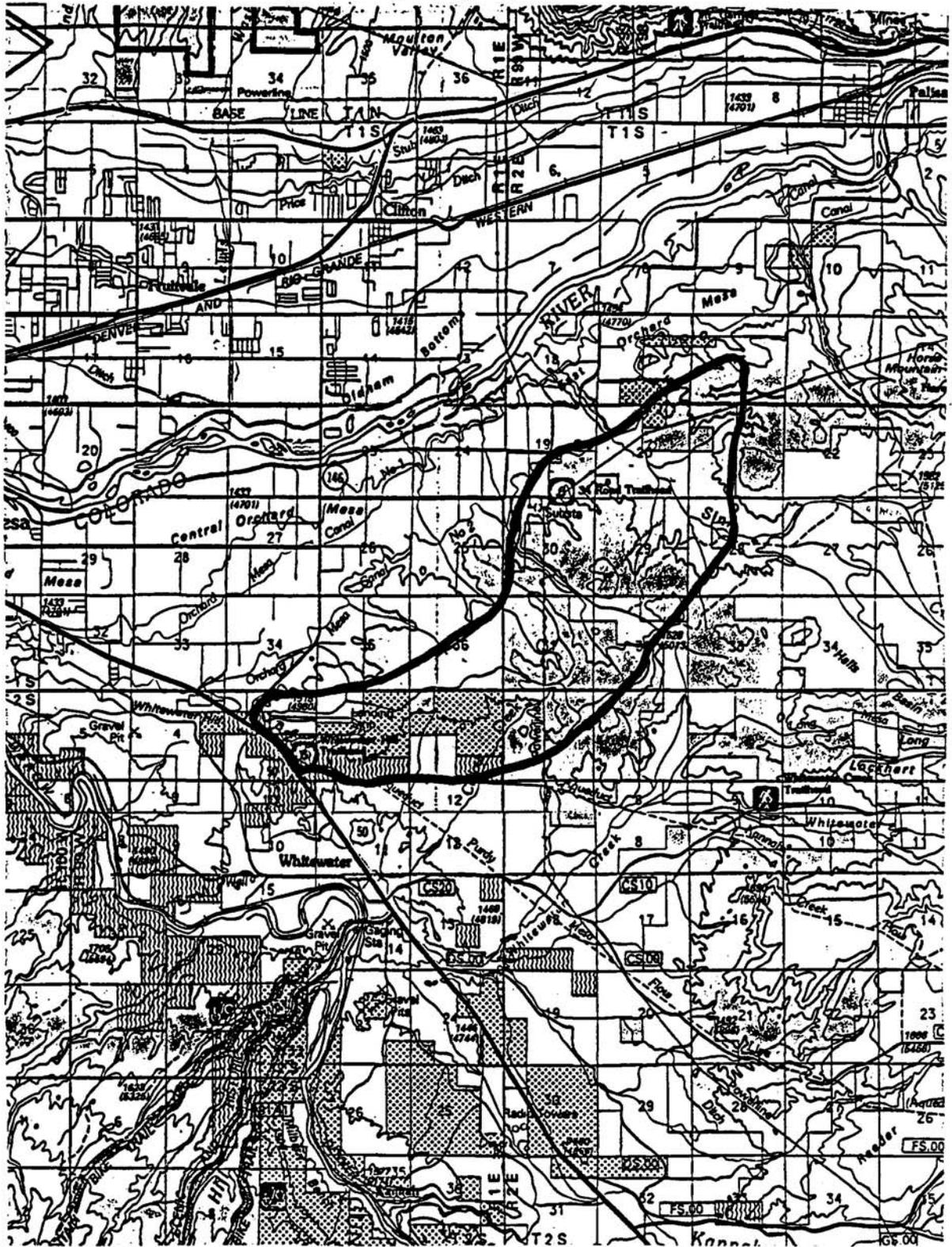
Management Urgency rank: M3

Comments: The site has already been impacted by roads and power lines. Some control of ORV use would be beneficial for the rare plant populations by reducing the destruction of cryptogamic soil and the invasion of weedy species such as *Bromus tectorum*.

Current Status (ownership): BLM, private, and other public lands.

Boundary Justification: Boundaries are drawn to include all element occurrences and a buffer zone.

Orchard Mesa Conservation Site



SCALE 1:100,000
 1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
 (CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Persigo Wash

Size: Approximately 1,945 acres.

Biodiversity rank: B3. High significance. Good occurrences of a G3 plant.

Location (quadrangle): Corcoran Point. T10S R100W sec. 4, 5, 8, 9, 15-17; T1N R1W sec. 1, 2, 11.

General description: The Mancos shale “badlands” of Persigo Wash are surprisingly rich in significant native species. Typical of the area between the Highline Canal and the Bookcliffs, the site has low hills with desert shrubs, and flats with greasewood. The site contains sections of two forks of Persigo Wash and a section of Pritchard Wash. An unpaved road, 25 Road, passes through the site. The area has been heavily grazed, and flats are severely invaded by cheatgrass, halogeton, and Russian thistle. Communities on the hillsides are less impacted and in better condition. The Grand buckwheat occupies small drainages on the slopes, with Gardner saltbush and galleta. The native fauna appears to thrive in spite of the degraded condition of much of the vegetation. The Great Basin spadefoot toad was found in a stock pond (CNHP 1996). Radio collared kit foxes have been detected using the area. Prairie dog colonies on the weedy flats provide habitat for burrowing owls. The desert woodrat makes it home among rocks in arroyos, while the white tailed antelope squirrel was found on flats with large, scattered rocks. Botta’s pocket gopher was found on shale hillsides. The small mammals probably provide important food for the foxes and owls.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Eriogonum contortum	B	Grand buckwheat	G3	S2	-	-
Eriogonum contortum	B	Grand buckwheat	G3	S2	-	-
Atriplex gardneri/Hilaria jamesii		Gardner saltbush/Galleta	G3G5	S1	-	-
Athene cucularia		Burrowing owl	G4	S3S4B	(C2)	-
Athene cucularia		Burrowing owl		S3S4B		-
Neotoma lepida			G5	S1	-	-
Vulpes macrotis			G5		-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5		-	
Ammospermophilus leucurus		White-tailed antelope squirrel ssp.	G5T?	S1	-	
Thomomys bottae howelli		Botta's pocket gopher subspecies	G5T?	S1		-

Protection Urgency rank: P5

Comments: The area is entirely within BLM lands. Already heavily impacted, it does not appear to be further threatened.

Management Urgency rank: M4

Comments: Native fauna appear to be adjusted to the amount of human and cattle impacts that presently exist. Increased human presence, especially ORV use, would reduce habitat and cause stress for kit foxes.

Current Status (ownership): BLM, with no formal designation.

Boundary Justification: Boundaries are drawn to include all known element occurrences and a buffer zone. However, adjacent habitat not included in the site may be equally valuable. A large percentage of the area between the Highline Canal and the Bookcliffs is similar habitat.

Site name: Pinyon Mesa Canyons

Size: Approximately 3,074 acres.

Biodiversity rank: B3. High significance. Multiple excellent and good occurrences of G3 communities.

Location (quadrangle): Bieser Creek. T13S R103W sec. 19-21, 28-31; T13S R104W sec. 24, 25, 27.

General description: The Pinyon Mesa Canyons site encompasses five canyons and their side canyons draining off Pinyon Mesa to the north, ranging from about 7400' to 8400' in elevation. The site is mostly underlain by Precambrian igneous rock in the canyons and the Triassic Chinle Formation on steep canyon slopes. The site includes a mosaic landscape of riparian areas, and gentle to precipitous canyon slopes with a variety of relatively intact plant associations. At the canyon rims, on moderately sloping uplands there are nearly pure patches of manzanita (*Arctostaphylos patula*), a community that occurs very rarely in Colorado, this being the eastern edge of its range. At the edges of nearly monospecific Manzanita patches, one can observe oak, pinyon pine, ponderosa pine, or mountain big sagebrush. Pinyon pine may also be scattered in manzanita stands. On gently sloping canyon rims, on deeper soils, there are patches of grassland dominated in places by exotic pasture grasses, but sometimes consisting of nearly pure needle and thread grass. Other shrubs that may occur, and even co-dominate, include serviceberry and squaw apple. At the bottom of these v-shaped canyons lie relatively narrow riparian zones with predominantly shrubby vegetation. Shrubs commonly observed include river birch, red-osier dogwood, thin leaf alder, and Rocky Mountain willow right along the creek, with a band of wild cherry and occasionally oaks just above the true riparian zone. Parts of this site remain in excellent condition, while other areas are more or less impacted by human activities including cattle grazing and recreation. The site is not impacted by housing development at this time, however it is somewhat fragmented by roads. Recreational impacts are concentrated along public access roads and include litter and off road vehicle tracks. Weedy species, especially non-native weeds, are far more common along roads than elsewhere in the site. While there is some grazing in the canyons, parts of them are relatively steep and inaccessible, and therefore less impacted.

Natural Heritage Resource Significance:

element	EO	common name	global	state		state
Betula occidentalis/Mesic forb	C	River birch/Mesic forb	G2G3	S?		-
Betula occidentalis/Cornus sericea	C		G3	S2	-	-
	B	River birch/Red-osier dogwood	G3		-	
Betula occidentalis/Cornus sericea	B	River birch/Red-osier dogwood	G3	S2	-	-
Betula occidentalis/Cornus sericea	B	River birch/Red-osier dogwood		S2	-	-
Betula occidentalis/Cornus sericea	B	River birch/Red-osier dogwood	G3	S2	-	-
Juniperus osteosperma/Cercocarpus ledifolius	A		G3	S3	-	-
Populus tremuloides/Cornus sericea		Aspen/Red-osier dogwood	G3	S3	-	-
Quercus gambelii/Cercocarpus montanus		Gambel oak/mountain mahogany	G3	S3	-	-
Betula occidentalis-Cornus sericea	B	River birch/Red-osier dogwood		SU	-	-
Artemisia tridentata/Symphoricarpos	B	Big sagebrush/Snowberry	G3?	S3?	-	-
Alnus incana/Cornus sericea	B	Thinleaf alder/red-osier dogwood	G4		-	-
Pinus edulis/Artemisia tridentata	C	Pinyon pine/Big sagebrush	G5		-	
Eleocharis palustris	D	Common spikerush wetlands	G5	S3S4	-	
Quercus gambelii/Symphoricarpos oreophilus	A	Gambel oak/snowberry	G5	S3S4	-	-
Quercus gambelii/Symphoricarpos oreophilus	A	Gambel oak/snowberry	G5	S3S4	-	-
Artemisia tridentata/Stipa comata	B	Big sagebrush/Needle and thread	G5		-	-
Pinus edulis/Cercocarpus montanus	B	Pinyon pine/Mountain mahogany	G5		-	
Populus tremuloides/Symphoricarpos	A	Aspen/Snowberry	G5	S5	-	

Pinus edulis/Peraphyllum ramosissimum	B	Pinyon pine/Squawapple	GU	SU	-	-
Quercus gambelii-Padus virginiana/Poa	B	Gambel oak-chokecherry/Prairie	GU	SU	-	-
Quercus gambelii/Poa agassizensis	C	Gambel oak/prairie bluegrass	GU		-	-
Picea pungens/Amelanchier alnifolia-Cornus	A	Blue spruce/Serviceberry	GUQ		-	

Protection Urgency rank: P3

Comments: This site is currently under public (Bureau of Land Management) and private ownership. It is potentially threatened by roads, recreational use and development, although the time frame of the threat is unknown.

Management Urgency rank: M3

Comments: The current ranch manager practices rotational grazing and has rested the pastures within this site. While current and past land uses have preserved the site in its present state, no management is directed towards preserving the known and suspected natural heritage elements at this site. Action will likely need to be taken within five years to prevent spread of weedy exotic species.

Current Status (ownership): BLM and private with no formal designation.

Boundary Justification: The site boundary is drawn to protect the intact and interacting plant associations found within the site. It encompasses the Natural Heritage elements as well as buffers to protect ecological processes, especially hydrologic cycles within this canyon system.

Site name: Rough Canyon

Size: Approximately 3,988 acres.

Biodiversity rank: B3. High significance. An excellent occurrence of a G3 plant.

Location (quadrangle): Island Mesa. T12S R100W sec. 19022, 27-33; T13S R100W sec. 5, 6; T12S R101W sec. 25, 36.

General description: Rough Canyon comprises one of several parallel drainages on the Uncompahgre Plateau, leading east to the Gunnison River. The canyon cuts across the flank of a large faulted monocline, and has been recognized by the Colorado Natural Areas Program for its structurally complex and informative geology. Upper elevations of the site are in the Morrison formation, which is the preferred substrate of the Grand Junction milkvetch. The canyon rim is Entrada slickrock, and is the route of a popular bicycle trail. The red rock is dotted with small pockets of soil supporting Utah juniper, pinyon pine, blackbrush, yucca, and cliff fendlerbush. Downstream in the steep sided canyon, a series of deep pools are home to the canyon tree frog.

Natural Heritage Resource Significance:

element	EO	common name	global		federal	state
Pinus edulis/Coleogyne ramosissima		Pinyon pine/blackbrush	G3	S3	-	
Astragalus linifolius	A	Grand Junction milkvetch	G3	S3	(3C)	-
Astragalus linifolius	B	Grand Junction milkvetch	G3	S3	(3C)	-
Astragalus linifolius			G3	S3	(3C)	-
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
Bufo punctatus		Red-spotted toad	G5	S3S4	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC

Protection Urgency rank: P3

Comments: Part of the area is within a BLM Research Natural Area and Area of Critical Environmental Concern; the same area has been designated a State Natural Area. However, the best populations of the Grand Junction milkvetch are not included within those boundaries. The area with special status should be enlarged.

Management Urgency rank: M3

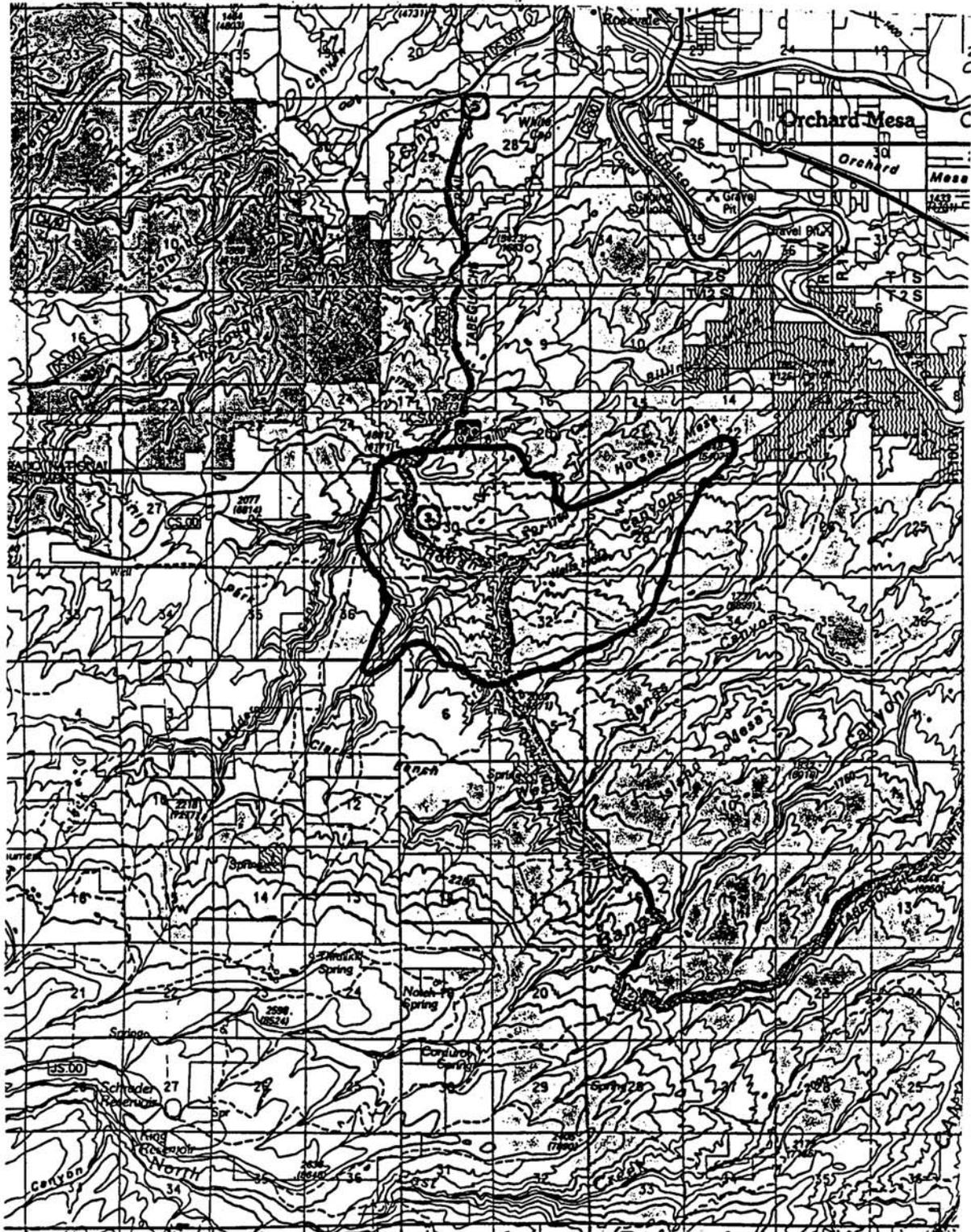
Comments: The area is a popular recreation site, with a large parking area and a designated slickrock trail. However, there is evidence of off-trail ORV use, and damage to cryptogamic crusts.

Current Status (ownership): BLM

Boundary Justification: The boundary includes the present ACEC, the state designated Natural Area, and the element occurrences.

Further research needs: Taxonomic decisions are needed on the status of *Astragalus linifolius*.

Rough Canyon Conservation Site



SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 50 METERS
(CONVERSION OF SPOT ELEVATIONS TO FEET SHOWN IN PARENTHESES)

Site name: Shadow Lake Draw

Size: approximately 2,087 acres

Biodiversity rank: B3. High significance. A good occurrence of a G4S1 plant, and multiple unranked occurrences of state rare animal species.

Location (quadrangle): Grand Junction, Colorado National Monument. T1S R1W sec. 16-21, 29, 30.

General description: This site is located at the base of Colorado National Monument, close to a heavily populated urban area, but still remains undeveloped. Although nearby flat areas are heavily invaded by weeds, especially cheatgrass, the barren slopes of the Morrison formation, and the small drainages remain in a natural condition. The striking, powder-blue Jones blue star was found thriving in one of several small draws with junipers, sagebrush and . Remnants of native grasses survive in Red Canyon, and suggest that with protection, they may become more abundant. The area is valuable as undeveloped open space and for recreation. Gravel roads and “unofficial” trails throughout are popular with bicyclists and hikers. Local residents and the Urban Trails group of Grand Junction have taken an interest in the area, and hope to preserve it as recreational and open space. They have given the area the name “Colinas del Valle”, or “Little Hills of the Valley”.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	fede	state
Amsonia jonesii	B	Jones blue star	G4		-	-
Ammospermophilus leucurus		White-tailed antelope squirrel ssp.	G5T?		-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Coluber constrictor mormon		Western yellowbelly racer	G5T5	S2S3	-	-
Coluber constrictor mormon		Western yellowbelly racer	G5T5	S2S3	-	-

Protection Urgency rank: P3

Comments: The area may be threatened by urban expansion in the near future. Its proximity to the city and present use for hiking and bicycling make it a candidate for protection as open space. The presence of two small mammals, a snake and a plant which are all rare or imperiled in the state further justifies efforts at protection.

Management Urgency rank: M3

Comments: Efforts should be made to keep motorized vehicles on existing roads.

Current Status (ownership): Private, except for a 40 acre isolated parcel of BLM land.

Boundary Justification: The site includes the element occurrences and the remaining undeveloped habitat for the vertebrate species of the area.

Site name: Tom’s Canyon Mesa

Size: Approximately 403 acres.

Biodiversity rank: B3. High significance. An excellent occurrence of a plant community.

Location (quadrangle): Bieser Creek. T12S R103W sec. 31; T12S R104W sec. 36; T13S R103W sec. 6; T13S R104 sec. 1.

General description:

The Toms Canyon Mesa site encompasses an isolated mesa overlooking the Coates Creek valley. The vegetation is dominated by pinyon-juniper woodlands on the slopes and mesa top, surrounded by sagebrush communities on the flats below. The large trees on the mesa top provide an excellent example of old growth pinyon-juniper woodland. The uncommon plant association Pinyon pine/Curl leaf mountain mahogany is found along the south rim of the mesa. Elevations of the site range from approximately 6800 feet to over 7200 feet on the mesa top. The mesa is somewhat isolated, but evidence of very light cattle use is present. Several roads exist adjacent to the site and a county road passes nearby. The Coates Creek floodplain has been heavily altered by agricultural practices and grazing.

Natural Heritage Resource Significance:

element	EO	common name	global	fede	state
Pinus edulis/Cercocarpus ledifolius		Pinyon pine/curl-leaf mountain mahogany		S3	-
Pinus edulis/Cercocarpus montanus	A	Pinyon pine/Mountain mahogany		S4	-

Protection Urgency rank: P4

Comments: The site is currently owned by the Bureau of Land Management. No formal protection is provided.

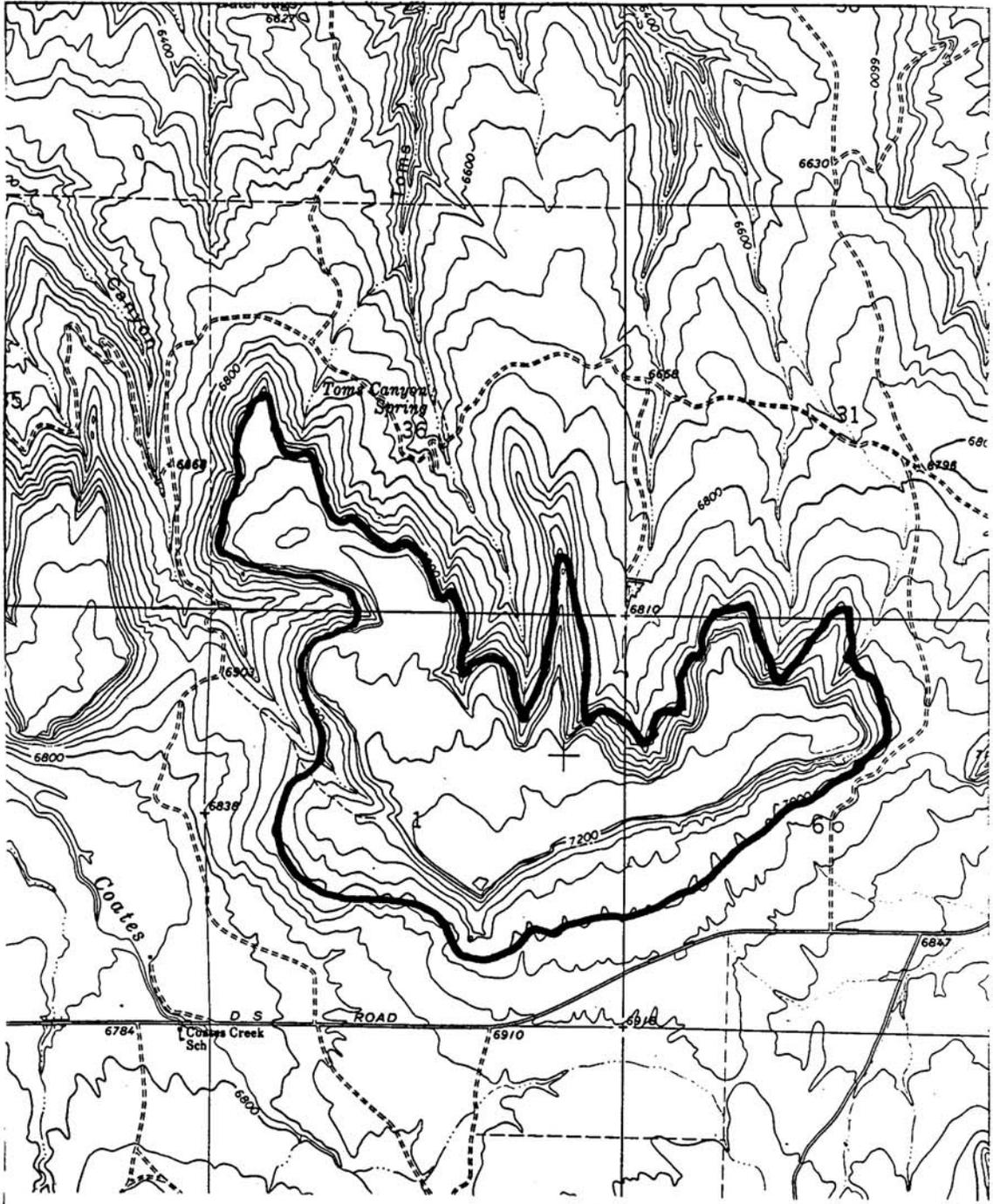
Management Urgency rank: M5

Comments: The site appears to receive little use by humans or livestock (personal observation).

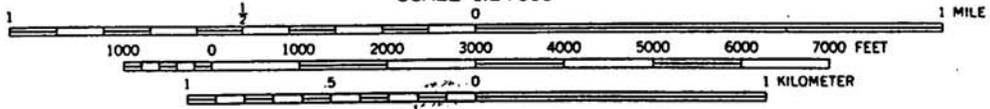
Current Status (ownership): BLM

Boundary Justification: The current boundary protects the occurrences from direct impact, and encompasses the mesa top and slopes.

Tom's Canyon Mesa Conservation Site



SCALE 1:24 000



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

B4 Sites:

Site name: Adobe Creek

Biodiversity rank: B4

Location (quadrangle): Corcoran Point. T9S R101W sec. 25, 36.

Natural Heritage Resource Significance:

element	EO	common name		state rank	federal status	state
Eriogonum contortum		Grand buckwheat	G3	S2		-

Comments: Not visited in 1996, but probably similar to Badger Wash and others in the Grand Valley North macrosite.

Site name: Bangs Canyon

Biodiversity rank: B4

Location (quadrangle): Island Mesa and Whitewater. T13S R100W sec. 1,2,10-12,15,16,20,21; T12S R100W sec. 36; T12S R001E sec. 29-32.

Natural Heritage Resource Significance:

element	EO rank	common name	global rank	state	federal status	state
Accipiter cooperii		Cooper's hawk	G4	S3S4	-	-
Bufo punctatus		Red-spotted toad	G5	S3S4	-	SC
Bufo punctatus		Red-spotted toad	G5	S3S4		SC
Bufo punctatus		Red-spotted toad	G5	S3S4		SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC

Comments: Bangs Canyon is one of several parallel drainages of the northern part of the Uncompahgre Plateau, leading to the Gunnison River. The Tabebeguache Trail runs through the site, but receives very little use. At its upper elevations, riparian areas are forested with Ponderosa pine and Douglas fir, while the side slopes have pinyon and juniper woodlands with mountain shrubs. The creek bottoms have narrowleaf cottonwoods, skunk bush, red-osier dogwood, and Rocky Mountain junipers. A cooper's hawk nest was located here in a Douglas fir tree. Dozens of tadpoles of the red-spotted toad were found in pools of the intermittent stream. An interesting comparison of grazed and ungrazed areas can be seen at the fence line of a water catchment installation near the eastern end of this site. Inside the fence is an abundant stand of Indian rice grass; outside the species is completely absent. The area has been proposed as wilderness, with proponents citing values of remoteness, and opportunities for solitude and primitive recreation (Colorado Environmental Coalition 1995). The site encompasses approximately 2,842 acres.

Site name: Big Salt Wash

Biodiversity rank: B4

Location (quadrangle): Fruita. T9S R101W sec.25, 36.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Sclerocactus glaucus	not	Uinta Basin hookless cactus	G3	S3		-

Comments: This site was not visited in 1996. CNHP has a report of *Sclerocactus glaucus* at this location from the U. S. Fish and Wildlife Service Status Report of the species in 1981. The site should be revisited to update records during the brief flowering season in 1997.

Site name: Carson Lake

Biodiversity rank: B4

Location (quadrangle): Hell’s Kitchen. T12S R96W sec. 22.

Natural Heritage Resource Significance: Penstemon mensaurum

element	EO	common name	global rank	state rank		state
		Grand Mesa penstemon	G3	S3	(C2)	-

Comments: Special designation should not be necessary. Impacts from grazing and recreation should be assessed.

Site name: Cheney Reservoir

Biodiversity rank: B4

Location (quadrangle): Juniata Reservoir. T3S R2E sec. 24; T3S R98W sec. 35.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Vulpes macrotis		Kit fox	G5	S1		SC
Sclerocactus glaucus	C	Uinta Basin hookless cactus	G3	S3		-

Comments: This site was created in order to represent all known locations of *Sclerocactus glaucus* in Mesa County. *Sclerocactus glaucus* is the only Mesa County plant which is listed as threatened under the Endangered Species Act.

Site name: Deer Creek East

Biodiversity rank: B4

Location (quadrangle): Juniata Reservoir. T3S R97W sec. 30, 31.

Natural Heritage Resource Significance:

element	EO	common name	global	state rank	fed	state
Sclerocactus glaucus	C	Uinta Basin hookless cactus	G3	S3	LT	-

Comments: This site was not visited by CNHP in 1996. A 1983 report states that a few plants of “pure” Uinta Basin hookless cactus (having the straight central spine character) were found growing between basalt boulders in protection of crevices. The site exhibited typical characteristics of *Sclerocactus* habitat: Mancos shale overlain with basalt cobbles, in a community of shadscale, greasewood and sagebrush. The site should be revisited during the short flowering season in 1997.

Site name: Deer Creek West

Biodiversity rank: B4

Location (quadrangle): Dominguez. T3S R2E sec. 33-35; T4S R98W sec. 8, 9.

Natural Heritage Resource Significance:

element	EO	common name	global		fede	state
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3		
Sclerocactus glaucus	C	Uinta Basin hookless cactus	G3	S3	LT	-
Lanius ludovicianus		Loggerhead shrike	G4G5	S3B, SZ	(C2)	-
Amphispiza bilineata		Black-throated sparrow	G5		-	-

Comments: Deer Creek flows southwesterly into the Gunnison River. A gravel road follows the creek, south of Highway 50. Benches above the creek are covered with salt desert shrub vegetation--shadscale, four-wing saltbush and galleta, and are heavily invaded by cheatgrass. Eleven hookless cacti were found here in late May of 1996. Often they were hidden under shrubs, which protect them from desiccation and trampling. This site should be revisited a little earlier in the season, when the flowers make the cacti more visible.

Site name: Desert Reservoir

Biodiversity rank: B4

Location (quadrangle): Whitewater. T2S R2E sec. 30, 31; T2S R1E sec. 25, 36.

Natural Heritage Resource Significance:

element	EO	common name		state	federal	
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sarcobatus vermiculatus/Distichlis spicata		Saline bottomland shrublands	G3	S1		

Comments: This site was created in order that all occurrences of *Sclerocactus glaucus* would be represented.

Site name: Divide Forks

Biodiversity rank: B4

Location (quadrangle): Casto Reservoir. T51N R16W sec. 19.

Natural Heritage Resource Significance:

element	EO	common name	global	state	fed	
Senecio dimorphophyllus var. intermedius		Different groundsel	G4T2	S2	-	

Comments: This site is within the Uncompahgre National Forest, on the Uncompahgre Plateau. No immediate threats have been identified. However, periodic monitoring should be conducted to assess impacts from grazing and fuel wood cutting.

Site name: Horse Mountain

Biodiversity rank: B4

Location (quadrangle): Palisade. T1S R2E sec. 13-16, 21-24.

Natural Heritage Significance

element	EO	common name	global rank	state		state
	D	Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-

Comments: This site was created in order that all occurrences of *Sclerocactus glaucus* would be represented. Horse Mountain is located south of Palisade. Very gentle slopes lead up to summit from the north side. These slopes have been heavily invaded by cheatgrass. There are some patches near the top with fairly good galleta, Indian rice grass and needle and thread. The south side of the mountain is dominated by Utah juniper, black sagebrush, Indian ricegrass, Salina wild rye, galleta and cheatgrass. Three power lines cross the area, and gravel roads surround the mountain at its base. BLM signs prohibit off-road vehicle use.

Site name: Hunter Canyon East

Biodiversity rank: B4

Location (quadrangle): Corcoran Point. T9S R100W sec. 2, 3; T8S R100W sec. 34, 35.

Natural Heritage Resource Significance:

element	EO	common name	global	state	federal	state
Eriogonum contortum	B	Grand buckwheat	G3	S2	-	-

Comments: This site was not visited 1996. According to CNHP records, a large population of *Eriogonum contortum* was found on bluish Mancos Shale. Associated species were *Atriplex*, *Artemisia tridentata*, *Oryzopsis hymenoides*, and *Bromus tectorum*.

Site name: Indian Creek

Biodiversity rank: B4

Location (quadrangle): Juniata Reservoir. T3S R2E sec. 4, 9, 10, 15

Natural Heritage Resource Significance:

element	EO	common name	global	state rank	fede	state
Sclerocactus glaucus		Uinta Basin hookless cactus		S3	LT	-
Sclerocactus glaucus			G3	S3	LT	-

Comments: This site was created in order that all occurrences of *Sclerocactus glaucus* would be represented.

Site name: Little Dominguez Creek

Biodiversity rank: B4

Location (quadrangle): Triangle Mesa. T15S R98Wsec. 5-8,17,18

Natural Heritage Resource Significance:

element	EO	common name	global	state	federal	state
Astragalus linifolius		Grand Junction milkvetch		S3	(3C)	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-

Comments: This site includes the red sandstone canyon of Little Dominguez Creek, which joins Big Dominguez Creek just upstream from its confluence with the Gunnison River. Elevations range from 5340 to 6200 ft. The Bar X Bench stock trail passes through the otherwise roadless area. This site was not visited in 1996. Two rare plant species are found in the canyon among desert shrubs and grasses. Associated plant species are shadscale, galleta, rabbitbrush, hairy golden aster, peppergrass, and cheatgrass. The area is on BLM land with no special designation. The absence of roads affords good protection.

Site name: Long Canyon

Biodiversity rank: B4

Location (quadrangle): Uncompahgre Butte. T50N R17W sec. 13, 23, 24; T50N R16W sec. 18.

Natural Heritage Resource Significance:

element	EO	common name	global	federal	state
Picea pungens/Cornus sericea		Blue spruce/Red-osier dogwood	G4	-	

Comments: This 455 acre site on the Uncompahgre Plateau contains an excellent example of the Montane Riparian Forest, dominated by Colorado blue spruce and red-osier dogwood. Other members of the community include aspen, river birch, Rocky Mountain willow. The site is entirely within the Uncompahgre National Forest. There is ongoing prescribed burning in the vicinity, but impacts on this community are not anticipated.

Site name: Mack

Biodiversity rank: B4

Location (quadrangle): Mack. T2N R3W sec. 31, 32; T2N R103W sec. 10, 15; T1N R3W sec. 15| 4-6, 8, 9

Natural Heritage Resource Significance:

element	EO	common name	global	state rank	fede	state
Artemisia nova/Elymus salinus	B		G?	S?	-	-
Astragalus musiniensis			G3	S1	-	-
Atriplex confertifolia/Elymus salinus	B	Shadscale/Salina wildrye	G3G5	S3	-	-
Atriplex confertifolia/Hilaria jamesii	D	Shadscale/Galleta	G3	S3	-	-
Coluber constrictor mormon	H	Western yellowbelly racer	G5T5	S2S3	-	-
Juniperus osteosperma/Elymus salinus	B		GU	SU	-	-

Juniperus osteosperma/Elymus salinus	B		GU	SU	-	-
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Comments: This area south of Mack, above the Colorado River, has a mosaic of desert shrub communities, including shadscale/Salina wild rye, shadscale/galleta, and Utah juniper/Salina wild rye. Other associated species include black sage, Hood's phlox, Eastwood's milkvetch and Sandburg bluegrass. The site encompasses about 1,570 acres.

Site name: Miracle Rock

Biodiversity rank: B4

Location (quadrangle): Payne Wash. T12S R103W sec. 26, 35; T13S R103W sec. 1, 2.

Natural Heritage Resource Significance:

element	EO		global	state	fede	state
Pinus edulis/Cercocarpus ledifolius	C		G3	S3	-	-
Pinus edulis/Cercocarpus montanus	B		G5	S4	-	-

Comments: This 439 acre site, overlooking the Coates Creek and Little Dolores River valleys, has good examples of two pinyon pine dominated communities. The curl leaf mountain mahogany occurs on shallow soils derived from the Wingate sandstone, above the "true" mountain mahogany. The area includes the BLM Miracle Rock Recreation Site.

Site name: Mountain Island Mesa

Biodiversity rank: B4

Location (quadrangle): Bieser Creek. T12S R103W sec. 27, 28, 33, 34

Natural Heritage Resource Significance:

element	EO	common name	global	state	federal	state
Pinus edulis/Cercocarpus montanus	B	Pinyon pine/Mountain mahogany	G5	S4	-	-

Comments: This small, relatively isolated mesa is a good example of a common community in Mesa County. The sparse understory here contains Indian rice grass and hairy golden aster, with few weeds. Inaccessible mesas have been targeted for inventory because they may contain relicts of undisturbed communities. However, in Mesa County we found that non-native species have usually found their way to the tops of the mesas, even without the assistance of cattle.

Site name: Payne Wash

Biodiversity rank: B4

Location (quadrangle): Payne Wash. T13S R102W sec. 33, 34; T14S R102W sec. 3-5, 8-10, 15-17, 21.

Natural Heritage Resource Significance:

element	EO	common name		state	fed	state
Juniperus scopulorum/Cornus sericea	C	Rocky Mountain juniper/Red-osier dogwood	G4	SU	-	-
Pinus edulis/Quercus gambelii	B	Pinyon pine/Gambel's oak		S5	-	-

Comments: This site along the Little Dolores River contains a fair example of a riparian community, and a good example of a more common upland community. Where hillsides are steep enough to discourage cattle use, there are few exotic species.

Site name: Reeder Mesa

Biodiversity rank: B4

Location (quadrangle): Juniata Reservoir. T2S R2E sec. 21,22,26-28,33-35

Natural Heritage Resource Significance:

element	EO	common name	global rank	state		state
Atriplex confertifolia/Elymus salinus	B	Shadscale/Salina wildrye	G3G5	S3	-	-
	C	Long-flower cat's eye	G3	S2	-	-
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-

<i>Sclerocactus glaucus</i>	CD	Uinta Basin hookless cactus	G3	S3	LT	-
<i>Sclerocactus glaucus</i>	D	Uinta Basin hookless cactus	G3	S3	LT	-

Comments: This site on the lower slopes of Grand Mesa has Mancos shale littered with basalt cobbles. There is a diversity of species of the desert shrub community, including Gardner saltbush, woody aster, longleaf phlox, paper flower, scarlet globemallow, and Indian rice grass. The hookless cactus population found here seems to be intermediate with *S. parviflorus*, in that some plants have hooked central spines, while adjacent plants have straight spines.

Site name: Reservoir Ditch

Biodiversity rank: B4

Location (quadrangle): DeBeque. T8S R97W sec. 17, 20

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
<i>Sclerocactus glaucus</i>		Uinta Basin hookless cactus	G3	S3	LT	-

Comments: This site was created in order that all occurrences of *Sclerocactus glaucus* would be represented.

Site name: Sewemup Mesa

Biodiversity rank: B4

Location (quadrangle): Juanita Arch (Mesa County), Roc Creek and Red Canyon (Montrose County).

Mesa County: T50N R19W sec. 35, 36; T50N R18W sec. 31; T49N R19W sec. 1-3,10-15,22-24; T49N R18W sec. 5-8,17-20; also T49N R18W sec. 28,32,33,34; T48N R18W sec. 5, 6.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Mimulus eastwoodiae		Eastwood monkey-flower	G3	S1S2	-	-
		American peregrine falcon	G4T4		LE	T
<i>Adiantum capillus-veneris</i>		Southern maidenhair fern	G5	S2	-	-
<i>Adiantum capillus-veneris</i>		Southern maidenhair fern	G5	S2	-	-
<i>Aquilegia micrantha/Mimulus eastwoodiae</i>	AB	Hanging gardens	GU	SU	-	-

Comments: This large mesa west of the Dolores River Canyon extends into Montrose County. Access to the site is difficult, so natural communities have been little disturbed. The significant elements above are found in the steep sandstone cliffs surrounding the mesa. Several seeps above the Dolores River provide the habitat for the rare Southern maidenhair fern and Eastwood's monkey-flower. *Adiantum capillus-veneris* is one of the few ferns found at lower elevations in Mesa County. It is distinctive in its broad, delicate, fan-shaped leaflets. The area is currently a BLM Wilderness Study Area (WSA). It is open to mineral exploration and development until designated by congress as wilderness, but is closed to oil and gas leasing.

Site name: Spruce Point

Biodiversity rank: B4

Location (quadrangle): Mesa Lakes. T11S R96W sec. 22, 27.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
<i>Penstemon mensarum</i>		Grand Mesa penstemon	G3	S3	(C2)	-

Comments: This is one of several sites on Grand Mesa where the Grand Mesa penstemon can be found. The plant appears to be more common and less threatened than previously believed. Its rank was changed from G2S2 to G3S3.

Site name: Two V

Biodiversity rank: B4

Location (quadrangle): Two V Basin. T14S R103W sec. 8, 9, 16, 17, 20

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
	B	Montane grasslands	G3	S1	-	-
Populus tremuloides/Tall forbs	B	Aspen/tall forbs	G5	S5	-	-

Comments: This site contains good quality examples of a common aspen community and a less common grassland. The aspen site is grazed in fall only, and supports a dense and diverse forb population. The grass community is one of the best seen in the county, with a 90% cover of grass species. Although there are no documented leks for Gunnison sage grouse in this site, grouse have been seen here (Woods and Braun 1995).

Site name: West Creek at Fall Creek

Biodiversity rank: B4

Location (quadrangle): Snyder Flats. T15S R101W sec. 4, 5

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state
Grus canadensis tabida		Greater sandhill crane	G5T4	S2B, S4N	-	

Comments: This is the only documented nesting site in Mesa County for the sandhill crane. The owner of the site has observed a nesting pair here, in a cattail marsh surrounded by a hayfield, for at least five years (personal communication to L. Renner).

Site name: West Salt Creek

Biodiversity rank: B4

Location (quadrangle): Badger Wash. T9S R104W sec. 2,3,10,11, 12, 14

Natural Heritage Resource Significance:

element	EO	common name	global	state	federal	state
Atriplex gardneri/Elymus salinus	B	Gardner saltbush/Salina wildrye	G2?	S2?	-	-
Cryptantha elata	C	Tall cryptanth	G3	S2	(3C)	-
Cryptantha elata		Tall cryptanth	G3	S2	(3C)	
Atriplex corrugata/Shale barren	B	Mat saltbush/Shale barren	G5	S2?	-	-
Sarcobatus vermiculatus/Suaeda torreyana	C	Greasewood/seablight	GU?	SU		-

Comments: This site has one of the largest expanses of mat saltbush and barren shale known in Mesa County. The Greasewood/seablight community is heavily invaded by cheatgrass, Russian thistle, and halogeton, but has enough of the seablight to indicate that it would be the dominant native understory species. The Gardner saltbush/Salina wildrye community occurs on higher ground, and was the site of the tall cryptanth. The three communities form a mosaic pattern on the landscape. This site is typical of the condition of the salt desert shrublands in the county. BLM has taken steps to reduce off road vehicle use, but cattle grazing seems to have changed the vegetation composition of the area. An enclosure to test natural recovery would be of interest.

B5 Sites

Site name: Bull Creek Reservoir

Biodiversity rank: B5

Location (quadrangle): Mesa Lakes. T11S R95W sec. 28, 29.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state
		Hot springs physa	G?		-	-

Comments: Special area designation should not be necessary if management issues are adequately addressed. Impacts of fluctuating water levels at private reservoirs need to be assessed.

Site name: Little Muddy Gulch

Biodiversity rank: B5

Location (quadrangle): Flatiron Mountain. T9S R91W sec. 6, 7.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state
Accipter gentilis	not	Northern goshawk	G5	S3B, S4N		

Comments: This site is on Grand Mesa, within the Grand Mesa National Forest. There is little activity in the area during the goshawk's nesting season; however, project evaluations should be done for all activities which could disturb the nesting site.

Site name: Mountain Haven

Biodiversity rank: B5

Location (quadrangle): Cameo, Clifton, Round Mountain.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
		American peregrine falcon	G4T4	S2B, SZ	LE	T

Comments: This site includes the steep sides of Mount Garfield and Mount Lincoln, where peregrine falcon nesting sites have been located. Exact locations are intentionally not given, to protect the falcons from collectors.

Site name: Sulphur Gulch East

Biodiversity rank: B5

Location (quadrangle): Wagon Track Ridge. T9S R97W sec. 18; T9S R98W sec. 13.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Sclerocactus glaucus	D	Uinta Basin hookless cactus	G3	S3		-

Comments: This site is included so that all locations of *Sclerocactus glaucus*, the only federally listed plant, are represented. However, only two plants were documented. The population may be larger, but is widely scattered.

Site name: Willow Creek

Biodiversity rank: B5

Location (quadrangle): Grand Mesa

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
		Boreal owl	G5	S2	-	-

Comments: The boreal owl is a year-round resident in higher mountains throughout most of the state. It inhabits dense coniferous forest, mixed forest, and thickets of alder, aspen, or stunted spruce. Often its nest is in close proximity to open grassy places.

Macrosites

Site name: Black Ridge

Size: approximately 77,199 acres

Biodiversity rank: B3

Location

USGS quadrangles: Battleship Rock, Bitter Creek Well, Colorado National Monument, Fruita, Mack, Ruby Canyon, Sieber Canyon, Westwater.

Legal description: all or part of T12S R104W sec. 1-11; T11S R104W sec. 1-4, 7-36; T10S R104W sec. 34-36, 24, 25; T11S R103W sec. 18-22, 27-34; T1N R3W sec. 13-36; T11S R102W sec. 13-36.

Elevation: 4600 - 7090 ft.

Site Description: This macrosite encompasses the area between the Colorado River and the top of Black Ridge, west of Colorado National Monument. It includes the Rattlesnake Canyon and Mee Canyon standard sites which are described above. It also includes Devil’s, Flume, Pollack, Bull, Moore, Knowles and Jones Canyons, all of which flow north into the Colorado River. The entire area has been proposed as wilderness (Colorado Environmental Coalition 1995). The ridges and mesa tops have pinyon and juniper woodlands with mountain sage, black sage and native grasses in the understory. Some areas have been invaded by cheatgrass or planted with crested wheat grass. The elements listed above are those not included in the two standard sites.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal	state
Cryptantha longiflora		Long-flower cat's eye	G3	S2	-	-
	C		G3	S2	-	
Pediomelum megalanthum	B	Large-flowered breadroot	G3	S3	-	
Allium nevadense				S1	-	-
Hyla arenicolor		Canyon treefrog			-	SC
Ammospermophilus leucurus		White-tailed antelope squirrel ssp.			-	-
Ammospermophilus leucurus		White-tailed antelope squirrel ssp.			-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.			-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.			-	-
Accipiter cooperii		Cooper's hawk			-	-
Pinus edulis/Cercocarpus montanus		Pinyon pine/Mountain mahogany				
Juniperus osteosperma/Elymus		Utah juniper/Salina wildrye				

Protection Urgency rank: P2. The site is currently a wilderness study area, and has been recommended for wilderness designation by BLM. Protection by special status designation is desirable in anticipation of threats to the ecosystem from increased visitor use within five years. The area has been closed to oil and gas leasing; however, closure to mineral exploration and development would occur only after designation as wilderness by congress.

Management Urgency rank: M2. Management action to protect the element occurrences from damage by heavy visitor use is needed within five years. See discussion under Mee Canyon and Rattlesnake Canyon sites.

Current Status (ownership): BLM, with some private. The area is a Wilderness Study Area (WSA).

Boundary Justification: The site encompasses the area between the Colorado River megasite on the north, and the Glade Park macrosite on the south. It unites into one site a series of canyons running to the Colorado River, with their intervening mesas. The macrosite is believed to be large enough to sustain natural ecological processes such as fire.

Further research needs: Continued searching for additional *Lomatium latilobum* sites on the Entrada formation in upper canyons is needed.

Site name: Colorado National Monument Macrosite

Size: Approximately 27,317 acres.

Biodiversity rank: B1

Location:

quadrangle: Colorado National Monument, Glade Park, Grand Junction, Island Mesa.

legal description: all or part of T12/s /r101W, sec. 2-11, 13-29; T12S R100W sec. 8, 17; T11S R101W sec 16-22, 27-35; T11S R102W sec. 13, 24, 25, 36. T1N R2W sec. 29-33.

Elevation: 4670 ft.-7000 ft.

General description: This macrosite includes three standard sites: Fruita and Monument Canyons, Devil’s Kitchen, and No Thoroughfare Canyon, as well as the parts of Colorado National Monument between those sites. The elements listed below are in addition to those which are included in the standard sites. The biological diversity of Colorado National Monument has been studied far more than other areas of Mesa County. This, in part, accounts for the great number of records of rare plants and animals. In addition, however, natural communities have been protected in the Monument, conserving its diversity. The Monument provides excellent examples of common plant communities in near pristine condition, and is therefore useful as a reference to compare the condition of other similar communities.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	fed	state
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Cryptantha osterhoutii		Osterhout cryptanth	G3	S1S2	-	-
Pediomelum megalanthum	B	Large flowered breadroot	G3	S3	-	-
Pediomelum megalanthum		Paradox breadroot	G3	S3	-	-
Epipactis gigantea	C	Giant helleborine	G4	S2	-	-
Epipactis gigantea		Giant helleborine	G4	S2	-	-
Accipiter cooperii		Cooper’s hawk	G4	S3S4B,S4N	-	-
Platanthera sparsiflora		Canyon bog orchid	G4G5T3	S2	-	-
Falco peregrinus anatum		American peregrine falcon	G4T4	S2B, SZ	LE	T
Centaureum exaltum		Great Basin centaury	G5	S1	-	-
Centaureum exaltum		Great Basin centaury	G5	S1	-	-
Centaureum exaltum		Great Basin centaury	G5	S1	-	-
Tantilla hobartsmithi		Southwestern blackhead	G5	S1	-	-
Tantilla hobartsmithi		Southwestern blackhead	G5	S1	-	-
Tantilla hobartsmithi		Southwestern blackhead	G5	S1	-	-
Tantilla hobartsmithii		Southwestern blackhead	G5	S1	-	-
Vulpes macrotis		Kit fox	G5	S1	-	SC
Gambelia wislizenii		Longnose leopard lizard	G5	S2	-	-
Gambelia wislizenii		Longnose leopard lizard	G5	S2	-	-
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC
Hyla arenicolor		Canyon treefrog	G5	S2	-	SC

Scaphiopus intermontanus		Great Basin spadefoot toad	G5	S2	-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5		-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5	S2	-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5		-	SC
Scaphiopus intermontanus		Great Basin spadefoot toad	G5	S2	-	
Myotis yumanensis		Yuma myotis	G5	S3	(C2	
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Ammospermophilus leucurus		White-tailed antelope squirrel	G5T?	S1	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
		Ord's kangaroo rat ssp.	G5T?	S2	-	-

Protection Urgency rank: P4

Comments: Colorado National Monument is well protected within its boundaries. However, impacts from development just outside the Monument may be a problem. Buffer zones should be maintained wherever possible.

Management Urgency rank: M4

Comments: Many of the plant element occurrences are based on records more than ten years old. Locations should be checked to verify the presence and condition of the occurrences.

Current Status (ownership): National Park Service, with small areas of adjacent BLM and private lands.

Boundary Justification: The boundary includes Colorado National Monument and a small adjacent area.

Further research needs: Monitoring of rare plant occurrences.

Site name: Colorado River megasite

Size: approximately 36, 216 acres

Biodiversity rank: B1

Location:

quadrangles (Mesa County only): Westwater, Bitter Creek Well, Ruby Canyon, Mack, Fruita, Colorado National Monument, Grand Junction, Clifton, Palisade, Cameo, Wagon Track Ridge, DeBeque.

legal description (Mesa County only): all or part of T1N R3W sec 7-14, 16-18; T10S R103W sec. 4-8, 15-19, 21, 22; T10S R104W sec. 23-28; T1N R2W sec. 18-20, 26-30, 33-36; T11S R101W sec. 14, 15; T1S R1W sec. 6-9, 15, 16, 19, 22, 23; T1S R1E sec. 13, 14, 19-22-24; T1S R2E sec. 2-5, 7-9, 17, 18; T11S R98W sec. 2, 3, 9-11; T9S R97W sec. 8, 17-19, 29-31; T9S R98W sec. 25, 36; T10S R 97W sec. 6,7,18; T10W R98W sec. 12, 13, 22- 24, 26, 27, 33- 35; T9S R97W sec. 4, 5, 8, 9; T8S R97W sec. 13, 22-24. 26-28, 32, 33; T8S R96W sec. 7, 18.

Elevation: approximately 4400 ft. to 4960 ft.

General description: The Colorado River megasite includes the whole of the Colorado River and its flood plain in Colorado. It encompasses several standard sites, including Ruby Canyon, the Colorado River at Grand Junction, and DeBeque Canyon sites in Mesa County. The element occurrences below are those that were outside the three standard sites.

Natural Heritage Resource Significance:

element	EO		global rank	state	federal status	state
Xyrauchen texanus	H	Razorback sucker	G1	S1	LE	E
Xyrauchen texanus	H	Razorback sucker	G1	S1	LE	E
Populus deltoides ssp wislizenii/Rhus	C	Fremont cottonwood/skunkbush	G2	S2	-	-
Populus deltoides ssp wislizenii/Rhus	C		G2	S2	-	-
Ardea herodias		Great blue heron	G5	S3B,	-	-
Ardea herodias		Great blue heron	G5	S3B,	-	-
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Dipodomys ordii sanrafaeli		Ord's kangaroo rat ssp.	G5T?	S2	-	-
Coluber constrictor mormon		Western yellowbelly racer	G5T5	S2S3	-	-

Protection Urgency rank: P3. Various parts of the river corridor are currently protected by a variety of designations. Ruby Canyon and DeBeque Canyon carry no surface occupancy stipulations for oil and gas development. Four thousand acres on the north side of Ruby Canyon are closed to mineral location to protect the recreational setting (USDI 1987). This protection is warranted for the entire site.

Management Urgency rank: M3. BLM Management plans for Ruby Canyon call for managing wildlife habitat primarily for endangered and riparian species, with a focus on improving and increasing cottonwood stands. Surface disturbance is to be prohibited in riparian areas. ORV use is prohibited or limited to existing roads. This prescription would be appropriate for the entire river corridor.

Current Status (ownership): BLM and private. The south side of the river at Ruby Canyon is a BLM Wilderness Study Area.

Boundary Justification: The boundary encompasses the entire river in Mesa County, with its riparian area. The interdependence of all parts of the river corridor make protection of the entire area a high priority.

Site name: DeBeque South Macrosite

Size: 39,795 acres

Biodiversity rank: B2

Location:

quadrangle: Cameo, DeBeque, Mesa, Molina, Wagon Track Ridge

legal description: T8S R97W sec. 26, 27, 34-36; T9S R97W sec. 1-4, 9-17, 20-29, 32-36; T8S R96W, sec. 30, 31; T9S R96W sec. 6, 7, 18, 19, 28-33; T10S R97W sec. 1-13, 17, 18; T10S R96W, sec. 2-11, 14-18.

Elevation: 4940 ft.-7844 ft.

Site description: This macrosite encompasses several standard sites which are discussed above: DeBeque Cutoff, Atwell Gulch, Horsethief Creek, Horsethief Mountain, Fleming Point, and Jerry Gulch. These sites share a common landscape and the rare species *Astragalus debequaeus* and *Phacelia submutica*. The element occurrences below are those that fall within the larger macrosite, but between the standard sites.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state rank	federal status	state
Phacelia submutica		Debeque Phacelia	G2	S2	C	-
Phacelia submutica		Debeque Phacelia	G2	S2	C	-

Protection Urgency rank: P5

Comments: The BLM management plan for the area includes the statement: “Protect known important habitat sites of sensitive animal and plant species from disturbing activities” (USDI 1987). This should provide adequate protection for known sites. Present uses appear to be compatible with the existence of the rare plants.

Management Urgency rank: M5

Comments: The BLM lands of this site are managed with emphasis on oil and gas development. Surface disturbing activities could pose a threat to the rare and imperiled plants of the area. Known locations of these plants should be protected, as called for in the management plan (USDI 1987), and nearby areas with similar habitat should be inventoried before new projects are allowed. Most of the plant occurrences are in small enough areas that they could be avoided. So far, current use does not appear to have negatively affected the plants.

Current Status (ownership): BLM and private

Boundary Justification: The boundary is drawn to encompass a concentration of occurrences of rare or imperiled plants which occur in drainages on both sides of the DeBeque Cutoff Road. The site includes several small draws with similar habitat. Additional inventory within the sites could result in boundary modifications.

Site name: Glade Park Macrosite

Size: 92,378 acres

Biodiversity rank: B3

Location:

quadrangle: Battleship Rock, Bieser Creek, Colorado National Monument, Glade Park, Marble Canyon, Payne Wash, Sieber Canyon, Westwater.

legal description: all or part of T12S R104W sec. 1, 2, 9-36; T12S R103W sec. 1-36; T12S R102W sec. 1-36; T13S R104 W sec. 1-15, 22-24; T13S R103W sec. 1-18, 20; T13S R 102W sec. 1-12; T11S R103W sec. 31-36; T11S R 102W sec. 31-36.

Elevation: 5400 ft.-7400 ft.

Site description: The Glade Park macrosite includes the following standard sites: Fish Park, Tom’s Canyon Mesa, Miracle Rock, and Mountain Island Mesa. It is located south of the Black Ridge macrosite and north of the Pinyon Mesa macrosite. The element occurrences above are those that did not fall within standard sites.

Natural Heritage Resource Significance:

element	EO	common name		state	fed	state
Populus angustifolia/Salix exigua		Narrowleaf cottonwood/Coyote willow	G3	S3		-
Quercus gambelii/Amelanchier utahensis	B	Gambel oak/Utah serviceberry	G3G5	S3S5		-
	C	Red-oshier dogwood	G4	S3	-	-
Pinus edulis/Cercocarpus montanus		Pinyon pine/Mountain mahogany	G5	S3	-	-
Pinus edulis/Cercocarpus montanus	B	Pinyon pine/Mountain mahogany	G5	S3	-	-
Dipodomys ordii sanrafaeli		Ord’s kangaroo rat ssp.	G5T?	S2	-	-
Thomomys bottae howelli		Botta’s pocket gopher subspecies	G5T?	S1	-	-
Quercus gambelii/Symphoricarpos	B	Gambel oak/snowberry	GU	S3S4	-	-

Protection Urgency rank: P3. The Glade Park macrosite contains the largest amount of suitable habitat for the Gunnison sage grouse in the county. Although the present location of the grouse is confined to a small area within the macrosite, protection of the entire ecosystem is warranted. Opportunities for cooperative planning for the entire area by private and public landholders are being explored. A variety of conservation tools are available, and some have already been implemented.

Management Urgency rank: M2. Some habitat manipulation for the benefit of the Gunnison sage grouse should be undertaken. See the discussion under the Fish Park site.

Current Status (ownership): BLM, USFS, private. The only BLM land with special designation is the Miracle Rock Recreation site of 40 acres, for which oil and gas leasing carries a “no surface occupancy” stipulation, and which is closed to mineral location (USDI 1987).

Boundary Justification: The Glade Park macrosite was designed to encompass the area between the Black Ridge and Pinyon Mesa macrosites. Although much of this large landscape is highly altered, the entire ecosystem and its ecological processes should be considered for planning purposes.

Site name: Grand Valley North macrosite**Size: approximately 148,678 acres****Biodiversity rank: B4****Location:**

quadrangle: Badger Wash, Bar X Wash, Bitter Creek Well, Corcoran Peak, Corcoran Point, Fruita, Highline Lake, Ruby Canyon, Ruby Lee Reservoir.

legal description: all or part of T8S R105W sec. 24, 25, 36; T8S R104W sec. 2-4, 9-36; T8S R103W sec. 1-36; T8S R102W sec. 4-10, 13-36; T8S R101W sec. 13-35; T9S R104W sec. 1-36; T9S R103W sec. 1-12, 15-22, 27-34; T2N R3W sec. 1-7, 10-12; T2N R2W sec. 1-16, 22-26, 36; T9S R102W sec. 1-12; T9S R101W sec. 11-15, 22-27, 34-36; T9S R100W sec. 4-10; T10W R100W sec. 1-12; T10S R101W sec. 1-3, 10-12; T1N R1W sec. 11-6, 8-11, 15.

Elevation: approximately 4700 ft. to 7000 ft.

Site Description: The large area north of the Highline Canal and south of the Bookcliffs is home to many small mammals and birds. Much of the landscape is similar to that of the standard sites that are included in the macrosite: Highline Lake, Adobe Creek, Badger Wash, Bar X Wash, Big Salt Wash, Persigo Wash, Six and Fifty Reservoir, Rabbit Valley, Hunter Canyon East, Mack, and Corcoran Point. Because they are scattered across the broad landscape, the occurrences above were not included in the standard sites of the area. Rather than create many small sites for these occurrences, we have combined them in this macrosite.

Natural Heritage Resource Significance

element	EO	common name	global rank	state	federal	state
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel	G5T?	S1	-	-
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel	G5T?	S1	-	-
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel	G5T?	S1	-	-
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel	G5T?	S1	-	-
<i>Ammospermophilus leucurus pennipes</i>		White-tailed antelope squirrel	G5T?	S1	-	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Athene cucularia</i>		Burrowing owl	G4	S3S4B	(C2)	-
<i>Coluber constrictor mormon</i>		Western yellowbelly racer	G5T5	S2S3	-	-
<i>Dipodomys ordii sanrafaeli</i>		Ord's kangaroo rat ssp.	G5T?	S2	-	-
<i>Dipodomys ordii sanrafaeli</i>		Ord's kangaroo rat ssp.	G5T?	S2	-	-
<i>Dipodomys ordii sanrafaeli</i>		Ord's kangaroo rat ssp.	G5T?	S2	-	-
<i>Dipodomys ordii sanrafaeli</i>		Ord's kangaroo rat ssp.	G5T?	S2	-	-
<i>Gambelia wislizenii</i>		Longnose leopard lizard	G5	S2	-	-
<i>Neotoma lepida</i>		Desert woodrat	G5	S1	-	-
<i>Rana pipiens</i>			G5	S3	-	SC
<i>Scaphiopus intermontanus</i>			G5	S2	-	SC
<i>Thomomys bottae howelli</i>		Botta's pocket gopher	G5T?		-	

Thomomys bottae howelli		Botta's pocket gopher		S1	-	-
Thomomys bottae howelli		Botta's pocket gopher		S1		-
Thomomys bottae howelli			G5T?	S1		-
			G5T?	S1	-	-
Thomomys bottae howelli		Botta's pocket gopher	G5T?	S1	-	
Vulpes macrotis		Kit fox		S1	-	

Comments: Protection Urgency rank: P4. Most of the area is BLM land. There are many known geologic structures indicating potential oil and gas resources. Protection tools are available and are utilized by BLM. Much of the site has been designated as a seasonal or no surface occupancy stipulation area. Although formal protection of the entire area is not feasible, surface disturbing activities should be evaluated individually for their effects on the rare and imperiled plant and animal species.

Management Urgency rank: M4. Watershed management of the Grand Valley desert area, including sediment and salinity reduction, has been identified as a high priority for BLM. Improvement of water quality here will benefit the areas downstream. The Grand Valley is managed by BLM as an intensive recreation area. It has been closed to motorized vehicles except on existing roads and trails, and in designated ORV areas. A few small sites have been closed to all vehicles (USDI 1987). This should afford protection to the rare plant and animal species. Grazing management plans are designed to protect the resources.

Current Status (ownership): Mostly BLM, with some private. Included in the macrosite are the Fruita (280 acres) and Rabbit Valley (40 acres) RNAs, and the Badger Wash ACEC (1520 acres) (USDI 1987).

Boundary Justification: This large desert area contains scattered occurrences of many elements, listed above. The area as a whole defines an excellent example of a desert shrub ecosystem. The macrosite is believed to be large enough to sustain viable populations of all rare or imperiled species currently known to inhabit the area.

Site name: Gunnison River macrosite

Size: Approximately 13,125 acres (8,901 acres in Mesa County).

Biodiversity rank: B2

Location (quadrangle): Dominguez, Grand Junction and Whitewater. T1S R1W sec. 22, 23, 26, 27, 34-36; T1S R1E sec 31; T12S R100W sec. 11, 12; T2S R1E sec. 5, 6.

General description: Although the endangered fish of the Colorado and Gunnison Rivers were not addressed during the Mesa County Natural Heritage Survey, their importance cannot be ignored. The original native razorback suckers disappeared from the Gunnison River in Mesa County as a result of predation by non-native fish, and loss of habitat. Efforts are underway to reintroduce the fish, and to connect the Gunnison and Colorado River ecosystems. A fish ladder was recently constructed on the Gunnison, about two miles upstream from the confluence with the Colorado River. This should enable the migration of fish from the Colorado River, and the genetic mixing of the population with that twenty miles upstream in the Gunnison River (Anderson, personal communication). In addition to the fish, another federally listed species, the Uinta Basin hookless cactus, is found on alluvial soils near the river. Elements listed below are those found in Mesa County; however, the site extends into Delta and Montrose Counties.

Natural Heritage Resource Significance:

element	EO	common name	global rank		federal status	state
Ptychocheilus lucius	(Colorado squawfish		S1	LE	E
Ptychocheilus lucius		Colorado squawfish	G1	S1	LE	E
Gila robusta		Roundtail chub	G3	S2	(C2)	
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3		-
Sclerocactus glaucus			G3		LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3		LT	-
Sclerocactus glaucus		Uinta Basin hookless cactus	G3	S3	LT	
Rana pipiens		Northern leopard frog	G5	S3	-	SC
Lampropeltis triangulum taylori	H	Utah milk snake	G5T4	S2	-	-

Protection Urgency rank: P4. The Colorado squawfish and the Uinta Basin hookless cactus are protected under the endangered species act. Present management of the riparian area should be adequate to protect the Northern leopard frog and Utah milk snake.

Management Urgency rank: M4. BLM’s management plan calls specifically for protection of the Uinta Basin hookless cactus and “known habitat sites of sensitive plant and animal species from surface-disturbing activities.” A “no surface occupancy” stipulation for oil and gas leasing in the Gunnison River corridor is in place, and the corridor has been identified as unsuitable for public utilities. In addition, the plan prohibits surface disturbance within 100 feet of perennial streams. Woody riparian habitat is to be maintained “to favor the tallest plant species native to each site while promoting diversity in plant heights and species” (USDI 1987). This may require active management, including protection of existing cottonwoods and removal of tamarisk and other weedy non-native species.

Current Status (ownership): BLM and private

Boundary Justification: Boundaries are drawn to include the Gunnison River from the confluence with the Uncompahgre River to the confluence of the Colorado River; element occurrences on its flood plain; and nearby occurrences of *Sclerocactus glaucus*.

Site name: Pinyon Mesa Macrosite

Size: 88,791 acres

Biodiversity rank: B2

Location:

quadrangle: Bieser Creek, Fish Creek, Glade Park, Marble Canyon, Payne Wash, Steamboat Mesa, Two V Basin.

legal description: all or part of T13S R104W sec. 14-36; T14S R104W sec. 1-36; T15S R104W sec. 1,2,,11,12; T13S R103W sec. 13-36; T14S R103W sec. 1-32; T13S R102W sec. 1-5, 7-35; T14S R102W sec. 2-110, 15-22, 27-30, 32-34.

Site Description: The Pinyon Mesa macrosite contains six standard sites: Granite Creek, Pinyon Mesa Canyons, Little Dolores River, Payne Wash, Two V, and Pinyon Mesa. The element occurrences above did not fall within standard sites.

Natural Heritage Resource Significance:

element	E	common name	global	state	fed	state
Quercus gambelii/Symphoricarpos oreophilus	B	Gambel	GU	S3S4		-
Rana pipiens	C	Northern leopard	G5	S3		SC

Protection Urgency rank: P3. See comments under the included standard sites. Opportunities exist for cooperative efforts between private and public landowners to use a variety of tools to protect important sites on Pinyon Mesa. A landscape approach to planning for the entire area can ensure that all elements are protected, and take into account the ecological processes necessary to maintain necessary habitat.

Management Urgency rank: M4. See comments under the included standard sites.

Current Status (ownership): BLM, USFS and private.

Boundary Justification: The macrosite boundary was drawn to incorporate a large contiguous natural geographic area which includes several important standard sites.

Site name: South Shale Ridge Macrosite

Size: 41,225 Acres

Biodiversity rank: B3

Location:

quadrangle: Corcoran Peak, DeBeque, Wagon Track Ridge, Winter Flats

legal description: all or part of T8S R100W sec. 23-27, 34-36; T8S R99W sec. 13-36; T8S R98W sec. 16-36; T8S R97W sec. 19, 29-32; T9S R100W sec. 1-3; T9S R99W sec. 1-6, 111, 112; T9S R98W sec. 11-9, 12; T9S R97W sec. 5-7.

Elevation: 4960 ft. to 8076 ft.

Site Description: The South Shale Ridge macrosite includes the standard sites: Coon Hollow, Pyramid Ridge, Pyramid Rock, Sulphur Gulch, South Dry Fork and Corcoran Wash. The element occurrence below was located between the standard sites.

Natural Heritage Resource Significance:

element	EO	common name	global rank	state	federal status	state
Penstemon osterhoutii		Osterhout's penstemon		S2S3	-	-

Protection Urgency rank: P3. The only part of the macrosite with special status is the Pyramid Rock RNA and ACEC, with 4,570 acres carrying a “no surface occupancy” stipulation for oil and gas development. BLM’s management plan emphasizes oil and gas leasing, which would threaten the rare and imperiled plants in the area. Off road vehicle use also constitutes a threat to the rare plant populations. Their use is limited to designated roads and trails only in the Pyramid Rock RNA (470 acres) and South Shale Ridge (22,500 acres). Special designation similar to that of Pyramid Rock is recommended for Pyramid Ridge, Coon Hollow, Sulphur Gulch, South Dry Fork and Corcoran Wash.

Management Urgency rank: M3. The conservation sites recommended here are worthy of the same management plan now in place for the Pyramid Rock RNA. This includes a no surface occupancy stipulation for oil and gas, closure to mineral materials sales and free use permits, designation as unsuitable for public utilities, and closure to ORV use except on designated roads and trails.

Current Status (ownership): BLM. Special status is given for only 470 acres of Pyramid Ridge RNA.

Boundary Justification: The boundary was drawn to encompass a cluster of known sites of rare and imperiled plants. Much potential habitat for these species exists between the known locations. However, habitat requirements of each species limit them to particular identifiable landforms and substrates, so the macrosite also contains some area which is not likely habitat.

Literature Cited

- Anderson, Rick. 1996. Colorado Division of Wildlife. Personal communication to Mike Wunder, CNHP.
- Andrews, R. R. and R. R. Righter. 1992. Colorado Birds. Denver
- Aplet, Gregory H., Richard D. Laven, and Frederick W. Smith. 1988. Patterns of Community Dynamics in Colorado Engelmann Spruce-Subalpine Fir Forests. Ecology 69(2): 312-319.
- Armstrong, David M. 1972. Distribution of Mammals in Colorado. Museum of Natural History, University of Kansas.
- Atwood, D., J. Holland, R. Bolander, B. Franklin, D. E. House, L. Armstrong, K. Thorne, and L. England. 1991. Utah Threatened, Endangered, and Sensitive Plant Field Guide. US Forest Service Intermountain Region, National Park Service, Bureau of Land Management, Utah Natural Heritage Program, US Fish and Wildlife Service, Environmental Protection Agency, Navajo Nation, and Skull Valley Goshute Tribe.
- Bailey, R. G., P. E. Avers, T. King, and W. H. McNab. 1994. Ecoregions and Subregions of the United States. Prepared for the USDA Forest Service by the U. S. Geological Survey, Fort Collins, CO.
- Barbour, R. W.. and W. H.. Davis. 1969. Bats of America. The University of Kentucky Press, Lexington.
- Barneby, R. C. 1964. Atlas of North American Astragalus. Memoirs of New York Botanical Garden, vol. 13. New York Botanical Garden, Bronx, NY.
- Blaisdell, James P. and Ralph C. Holmgren. 1984. Managing Intermountain Rangelands--Salt-Desert Shrub Ranges. Gen. Tech. Report INT-163. U. S. D. A. Forest Service, Intermountain Forest and Range Experiment Station, Ogden UT. Boulder, CO.
- Bourgeron, P. S. and L. D. Engelking, eds. 1994. A Preliminary Vegetation Classification of the Western United States. Unpublished report prepared by the Western Heritage Task Force for the Nature Conservancy, Boulder, CO.
- Braun, Clait. 1997. Personal communication to Chris Pague.
- Cole, C. J., and L. M. Hardy. 1981. Systematics of North American colubrid snakes related to *Tantilla planiceps*. (Blainville). Bull. Am. Mus. Nat. Hist. 171:199-284.
- Colorado Department of Local Affairs. 1995. Smart Growth and Development. Interregional Council Recommendations for the State of Colorado. Denver, CO. Colorado Division of Wildlife, Denver. vii + 131 pp.
- Colorado Department of Natural Resources. 1994. Colorado's Designated Natural Areas. Denver, CO.
- Colorado Environmental Coalition, Sierra Club, et al. 1995. Conservationists' Recommendations for BLM Lands. Denver, CO.

- Colorado Natural Heritage Program. 1996. Biological and Conservation Datasystem: Element Occurrence Records, Species Characterization Abstracts, Site Basic Records.
- D'Antonio, C. M. and P. M. Vitousek. 1992. Biological invasions by exotic grasses: the grass/fire cycle and global change. *Ann. Rev. Ecol. and Syst.* 23:63-87.
- Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Shuster, Inc., New York. 785 pp.
- Erdman, James A. 1970. Pinyon-Juniper Succession after Natural Fires on Residual Soils of Mesa Verde, Colorado. Brigham Young University Science Bulletin, Biological Series, Volume XI, Number 2.
- Finley, Robert B. Jr. 1958. The Wood Rats of Colorado: Distribution and Ecology. University of Kansas Museum of Natural History. Vol 19, No. 6, pp 213-552. Lawrence, Kansas.
- Fitzgerald, James P., David Armstrong, James Halfpenny, Jerry Freeman, Bruce Bauerle, and Charles Tourtillott. 1982. Small Mammals, Furbearers, and Small Game Mammals of Northwestern Colorado- A Review and Synopsis of Information.
- Floyd, M. L., and D. D. Hannah. 1994. *Lomatium latilobum* (Umbelliferae) population maintenance in Arches National Park, Utah: Methods comparison and preliminary data. Farmington NM.
- Franklin, M. A. 1995. Field Survey for *Lomatium latilobum* (Rydb.) Mathias in the Grand Resource Area, Grand and San Juan Counties, Utah. Utah Natural Heritage Program. Salt Lake City, UT.
- Hammerson, G. A. 1982. Amphibians and Reptiles in Colorado.
- Hunter, J. E. 1991. Grazing and pocket gopher abundance in a California annual grassland. *Southwest. Nat.* 36:17-18.
- James, D. 1993. The threat of exotic grasses to the biodiversity of semiarid ecosystems. *Aridlands Newsletter* 37:6-7.
- Johnston, Barry. 1987. Plant Associations of Region Two, Edition 4. USDA Forest Service, Lakewood, CO.
- Kittel, Gwen, Renee Rondeau, Nan Lederer and Dan Randolph. 1994. A Classification of the Riparian Vegetation of the White and Colorado River Basins, Colorado. Colorado Natural Heritage Program, Boulder, CO.
- Kleiner, Edgar F. and K. T. Harper. 1976. Occurrence of four major perennial grasses in relation to edaphic factors in a pristine community. *Journal of Range Management* 30(4): 286-289.
- Knight, Dennis H. 1994. Mountains and Plains. Yale University Press, New Haven.
- Knopf, F. L., R. R. Johnson, T. Rich, F. B. Samson, and R. C. Sears. 1988. Conservation of riparian ecosystems in the United States. *Wilson Bull.* 10(2):272-284.
- Lambeth, Ron. 1996. Wildlife Biologist, BLM Grand Junction Resource Area. Personal communication to P. Lyon.
- Leupschen, Norman S. (Mesa County Horticulture Pest Inspector). 1995. Pest Inspector's Report for 1995. Grand Junction, CO. Museum of Natural History, Denver. 442 pp.

- Miller, R. F. and P. E. Wigand. 1994. Holocene changes in semiarid pinyon-juniper woodlands. Bioscience 44(7):465-474.
- Mutel, C. F. and J. C. Emerick. 1992. From Grassland to Glacier. Johnson Book, Boulder, Colorado.
- Nature Conservancy, The. 1996. Glade Park/Dolores River Triangle Conservation Plan. Boulder, CO.
- Nussbaum, R. A., E. D. Brodie, Jr., and R. M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. Univ. Press of Idaho. 332 pp.
- O’Kane, Steve L. Jr. 1988. Colorado’s Rare Flora. Great Basin Naturalist 48(4):434-484.
- Pague, C. A. 1996. Personal communication.
- Pague, C. A., and M. Carter. 1996. Unpublished data.
- Peet, R. K. 1988. Forests of the Rocky Mountains. In M. G. Barbour and W. D. Billings (eds.) North American Terrestrial Vegetation. Cambridge Univ. Press, New York.
- Rodgers, Bill. 1996. USDI National Park Service, Colorado National Monument. Personal communication.
- Scheck, C. 1994. Special Status Plants Handbook. Glenwood Springs Resource Area. Unpublished report prepared for the Bureau of Land Management, Glenwood Springs, CO.
- Sigler, W. F. and R. R. Miller. 1963. Fishes of Utah. Utah State Department of Fish and Game, Salt Lake City.
- Singh, Teja and Neil E. West. 1971. Comparison of some multivariate analyses of perennial Atriplex vegetation in southeastern Utah. Vegetatio 23:5-6(289-313).
- Spackman, S., K. Fayette, and P. Lyon. 1997. Conserving the globally imperiled DeBeque milkvetch (*Astragalus debequaeus* Welsh). Unpublished report prepared for BLM, Grand Junction Resource Area. Colorado Natural Heritage Program, Fort Collins, CO.
- Stevens, Joe. Personal communication. Director of Grand Junction Parks and Recreation.
- Stebbins, R. C. 1985. A Field Guide to Western Reptiles and Amphibians. Second edition. Houghton Mifflin Co., Boston. xiv + 336 pp.
- Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York.
- Tisdale, E. W., M. Hironaka, and M. A. Fosberg. 1969. The Sagebrush Region in Idaho. University of Idaho Agricultural Experiment Station bulletin 512. Moscow, Idaho.
- Tomb, A. S. 1980. Taxonomy of *Lygodesmia* (Asteraceae). Systematic Botany Monographs, Vol. 1, October 1980.
- Tyus, H. M., and C. A. Karp. 1989. Habitat use and streamflow needs of rare and endangered fishes, Yampa River, Colorado. U.S. Fish Wildl. Serv., Biol. Rep. 89(14). 27 pp.
- Tyus, H. M., and C. W. McAda. 1984. Migration, movements and habitat preferences of Colorado squawfish, *Ptychocheilus lucius*, in the Green, White, and Yampa rivers, Colorado and Utah. Southwest. Naturalist 29:289-299.

- USDI Bureau of Land Management, Grand Junction Resource Area. 1992. ACEC Activity Plan and Environmental Assessment. Badger Wash ACEC, Pyramid Rock ACEC, Rough Canon ACEC.
- USDI Bureau of Land Management, Grand Junction District. 1989. Final Wilderness Environmental Impact Statement. Grand Junction, CO.
- USDI Bureau of Land Management, Grand Junction District. 1987. Grand Junction Resource Area Resource Management Plan and Record of Decision. Grand Junction, CO.
- USDI Bureau of Land Management, Grand Junction Resource Area. 1985. Resource Management Plan and Environmental Impact Statement. pp. 123, 124.
- USDA Soil Conservation Service. 1978. Soil Survey of Mesa County Area, Colorado.
- USDA Soil Conservation Service. 1989. Colorado Climate. Temp., Precip., Frost and Growth Data. SCS Ecological Sciences and Snow Survey, Lakewood, CO.
- USDA Soil Conservation Service. PLANTS. Plants of Colorado--Alphabetical Listing.
- USFWS Federal Register. 12 July 1995.
- Weber, William A. 1987. Colorado Flora: Western Slope. Colorado Associated University Press,
- Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins, Eds. 1993. A Utah Flora. Second Edition, Revised. Brigham Young University, Provo, Utah.
- West, and Van Pelt 1987
- Wheye, D. 1992. Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico. Stanford University Press. Stanford, California. 259 pp.
- Woodling, John. 1985. Colorado's Little Fish: A Guide to the Minnows and Other Lesser Known Fishes in the State of Colorado. Colorado Division of Wildlife, Department of Natural Resources, Denver, co. 77 pp.
- Woods, Christopher P. and Clait E. Braun. 1995. Sage Grouse Investigations Glade Park and Pinon Mesa, Mesa County, Colorado. Unpublished Report to the Colorado Division of Wildlife. Fort Collins, CO.
- Young, James A. 1981. Principles of weed control and plant manipulation. In Managing Intermountain Rangelands--Improvement of Range and Wildlife Habitats. U. S. D. A. Forest Service Intermountain Forest and Range Experiment Station, Ogden, UT 84401. Gen Tech Report INT-157.

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Appendix I.

Explanation of the Colorado Natural Heritage Program's element and occurrence ranks

The Colorado Natural Heritage Program (CNHP) is part of an international network of conservation data centers that houses comprehensive information on the rare, threatened, and endangered species and natural communities in the U.S., Canada, and many Latin American countries. The multi-disciplinary team of scientists and information managers gathers information and incorporates it into continually updated databases. By concentrating on site-specific data for each element of natural diversity, CNHP accurately details the status and distribution of each species or community. Each of these significant natural features (species and community types) is an **element of natural diversity**, or simply an **element**. Each element is assigned a rank that indicates its relative imperilment on a five-point scale (1 = extremely rare/imperiled; 5 = abundant/secure (**Table 6**). By using the element ranks and the quality of each occurrence, priorities can be established for the protection of the most sensitive or imperiled sites.

The primary criterion for ranking elements is the number of occurrences, i.e., the number of known distinct localities or populations, and the total number of individuals at each location. Other considerations include the condition of the occurrences, the number of protected occurrences, population trends, fragility, and threats. However, the emphasis remains on the number of occurrences, such that ranks are an index of known biological imperilment. These ranks are assigned both in terms of the element's rarity and the element's imperilment over its entire range (Global, or G-rank), and within Colorado (State, or S-rank) Table 2 gives a complete definition of global and state ranks. Taken together, these two ranks give an instant picture of the imperilment of the element. Although most species protected under state or federal endangered species laws are critically imperiled, not all imperiled species are listed as Endangered or Threatened. **Natural Heritage imperilment ranks should not be interpreted as legal designations.**

The spot on the landscape that supports a particular population of a species or a specific stand of a given community type is an **element occurrence**. In addition to ranking each element in terms of imperilment, Natural Heritage staff scientists rank each element occurrence, so that protection efforts can be aimed not only at the most imperiled elements, but at the best examples of each. Element occurrences are ranked on a four point scale: A= pristine or undisturbed, B= undisturbed to slightly altered, C= disturbed to highly altered, D= recognizable, but probably unrecoverable. Overall ranks include: 1) **quality** - size, vigor, health of population, degree of connectedness to surrounding natural ecosystems, etc.; 2) **condition** - naturalness of the habitat, abundance of non-native species present, degree of human-induced disturbance, soil compaction, alteration of species composition by grazing, etc. 3) **viability** - the likelihood that the population will survive based on intrinsic biological factors, e.g., whether natural pollinators are in place, 4) **defensibility** - ease or difficulty of protecting the occurrence from external threats, site specific problems, and adjacent land use compatibility.

For example, an 'A' ranked occurrence of a riparian plant association has no, or very few, non-native plant species present, the channel and banks are stable and show no signs of trampling or sloughing, and the soils are not compacted. The association is surrounded by other riparian associations of similar quality, creating a connected, high quality mosaic. The surrounding hill slopes and areas up and down stream are in natural condition and have not been drastically altered (no dams or diversions upstream, no logging or mining up stream of adjacent hill slopes). A 'B' ranked occurrence of a riparian plant association may have all of the above 'A' criteria but is very small in size, or has a higher abundance of non-native plant species present, or may be in an area where surrounding land use fragments the occurrence. A 'C' ranked occurrence is of poor condition, generally with abundant non-native plant species present and/or the area is highly fragmented, or degraded, and/or the area is very small. Again, surrounding land use and condition plays a role in the overall riparian occurrence rank.

The Colorado Natural Heritage Program has mapped over 7,000 element occurrences in Colorado. Information on the location and quality of these element occurrences is entered into the computerized Biological and Conservation Databases (BCD). This computer system, developed by The Nature Conservancy, is utilized by the international network of heritage programs and conservation data centers. All centers utilize the same methodology, allowing a unique, direct comparison of information throughout the area covered.

Table 6. Natural Heritage Global Rarity Ranks

(These ranks should not be interpreted as legal designations.)

Global Rank (G): Based on the range-wide status of a species.

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range).
- G2 Imperiled globally because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Endangered throughout its range).
- G3 Very rare or local throughout its range or found locally in a restricted range (21 to 100 occurrences). (Threatened throughout its range).
- G4 Apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery.
- G5 Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- GX Presumed extinct.
- G#? Indicates uncertainty about an assigned global rank.
- GU Unable to assign rank due to lack of available information.
- GQ Indicates uncertainty about taxonomic status.
- G#T# Trinomial rank (T) is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.

Table 7. Natural Heritage State Rarity Ranks

(These ranks should not be interpreted as legal designations.)

State rank (S): Based on the status of a species in an individual state. S ranks may differ between states based on the relative abundance of a species in each state.

- S1 Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state).
- S2 Imperiled in state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extirpation from the state. Endangered or threatened in state).
- S3 Rare in state (21 to 100 occurrences).
- S3S4 Watchlisted; specific occurrence data are collected and periodically analyzed to determine whether more active tracking is warranted
- S#B Refers to the breeding season imperilment of elements that are not permanent residents.
- S#N Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used.
- SZ Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
- SH Historically known from the state, but not verified for an extended period, usually 15 years; this rank is used primarily when inventory has been attempted recently.
- SX Presumed extirpated from state.
- S#? Indicates uncertainty about an assigned state rank.
- SU Unable to assign rarity rank, often because of low search effort or cryptic nature of the element.
- SA Accidental in the state.
- SR Reported to occur in the state, but unverified.
- S? Unranked; some evidence that species may be imperiled, but awaiting formal rarity ranking.

Appendix II. List of species mentioned in text, by scientific and common names.

<i>Abies lasiocarpa</i>	Subalpine fir
<i>Abronia elliptica</i>	Sand verbena
<i>Accipiter cooperii</i>	Cooper's hawk
<i>Acer negundo</i>	Box elder
<i>Adelpha bredowi</i>	Sister
<i>Adiantum capillus-veneris</i>	Southern maidenhair
<i>Agropyron cristatum</i>	Crested wheatgrass
<i>Agrostis alba</i>	Red top
Alder, thinleaf	<i>Alnus incana ssp. tenuifolia</i>
Alfalfa	<i>Medicago officinalis</i>
Alkali sacaton	<i>Sporobolus aeroides</i>
<i>Allium macropetalum</i>	Large flower wild onion
<i>Allium nevadense</i>	Nevada onion
<i>Alnus incana</i>	Thinleaf alder
<i>Amelanchier utahensis</i>	Serviceberry
<i>Ammospermophilus leucurus pennipes</i>	White-tailed antelope squirrel
<i>Amphispiza bilineata</i>	Black throated sparrow
<i>Amsonia jonesii</i>	Jones blue-star
<i>Aquilegia micrantha</i>	Mancos columbine
<i>Arctostaphylos patula</i>	Greenleaf manzanita
<i>Ardea herodias</i>	Great blue heron
<i>Artemisia cana</i>	Silver sagebrush
<i>Artemisia nova</i>	Black sagebrush
<i>Artemisia spinescens</i>	Bud sage
<i>Artemisia tridentata ssp. tridentata</i>	Big sagebrush
<i>Artemisia tridentata ssp. vaseyana</i>	Mountain big sagebrush
<i>Asclepias speciosus</i>	Common milkweed
Aspen	<i>Populus tremuloides</i>
<i>Astragalus debequaeus</i>	DeBeque milkvetch
<i>Astragalus eastwoodiae</i>	Eastwood's milkvetch
<i>Astragalus flavus</i>	Yellow milkvetch
<i>Astragalus linifolius</i>	Grand Junction milkvetch
<i>Astragalus musiniensis</i>	Ferron milkvetch
<i>Astragalus naturitensis</i>	Naturita milkvetch
<i>Astragalus piscator</i>	Fisher Towers milkvetch
<i>Astragalus rafaensis</i>	San Rafael milkvetch
<i>Astragalus wetherillii</i>	Wetherill milkvetch
<i>Athene cucularia</i>	Burrowing owl
<i>Atriplex canescens</i>	Four-wing saltbush
<i>Atriplex confertifolia</i>	shadscale
<i>Atriplex corrugata</i>	Mat saltbush
<i>Atriplex gardneri</i>	Gardner saltbush
<i>Atriplex grayi (Grayia spinosa)</i>	Spiny hopsage
Bahia	<i>Platyschkuhria integrifolia</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Baltic rush	<i>Juncus balticus</i>
Bendire's thrasher	<i>Toxostoma bendirei</i>
<i>Berberis fremontii</i>	Fremont barberry
<i>Betula occidentalis</i>	Western river birch
Big sagebrush	<i>Artemisia tridentata ssp. tridentata</i>

Bitterbrush	<i>Purshia tridentata</i>
Black neck garter snake	<i>Thamnophis cyrtopsis</i>
Black sagebrush	<i>Artemisia nova</i>
Black throated sparrow	<i>Amphispiza bilineata</i>
Blackbrush	<i>Coleogyne ramosissima</i>
Blue spruce	<i>Picea pungens</i>
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>
Botta's pocket gopher	<i>Thomomys bottae howelli</i>
Bottlebrush squirreltail	<i>Elymus elymoides</i>
Box elder	<i>Acer negundo</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Breadroot, large flowered	<i>Pediomelum megalanthum</i>
Breadroot, Paradox	<i>Pediomelum aromaticum</i>
<i>Bromus carinatus</i>	California brome
<i>Bromus tectorum</i>	Cheatgrass
Broom snakeweed	<i>Gutierrezia sarothrae</i>
Buckwheat, Julie's	<i>Eriogonum bicolor</i>
Bud sage	<i>Artemisia spinescens</i>
<i>Bufo punctatus</i>	Red spotted toad
Bulbous bluegrass	<i>Poa bulbosa</i>
Bull thistle	<i>Cirsium vulgare</i>
Burrowing owl	<i>Athene cunicularia</i>
Cactus, fishhook	<i>Sclerocactus parviflorus</i>
Cactus, Uinta Basin hookless	<i>Sclerocactus glaucus</i>
California brome	<i>Bromus carinatus</i>
<i>Campanula parryi</i>	Parry's bellflower
Canada thistle	<i>Cirsium arvense</i>
Canyon bog orchid	<i>Platanthera sparsiflora</i>
Canyon tree frog	<i>Hyla arenicolor</i>
Canyonlands lomatium	<i>Lomatium latilobum</i>
<i>Cardaria draba</i>	White top
<i>Carex geyeri</i>	Elk sedge
<i>Carex lanuginosa</i>	Woolly sedge
<i>Carex utriculata</i>	Northwest Territory sedge
<i>Casmerodius alba</i>	Great egret
<i>Castilleja sp.</i>	Indian paintbrush
Cattail	<i>Typha latifolia</i>
<i>Centaurium exaltum</i>	Great Basin centaury
<i>Centaurium repens</i>	Russian knapweed
<i>Centrocercus minimus gunnisonii</i>	Gunnison sage grouse
<i>Cercocarpus ledifolius</i>	Curl-leaf mountain mahogany
<i>Cercocarpus montanus</i>	Mountain mahogany
Cheatgrass	<i>Bromus tectorum</i>
Chokecherry	<i>Prunus virginiana</i> var. <i>melanocarpa</i>
<i>Chrysothamnus viscidiflorus</i>	Low rabbitbrush
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium perplexans</i>	Rocky Mountain thistle
<i>Cirsium vulgare</i>	Bull thistle
Cliffrose	<i>Purshia stansburiana</i>
<i>Coleogyne ramosissima</i>	Blackbrush
Colorado squawfish	<i>Ptychocheilus lucius</i>
<i>Coluber constrictor mormon</i>	Western yellowbelly racer
Common milkweed	<i>Asclepias speciosus</i>
Common reed	<i>Phragmites australis</i>
Cooper's hawk	<i>Accipiter cooperii</i>

Corn snake	<i>Elaphe guttata</i>
<i>Cornus sericea</i>	Red-osier dogwood
<i>Cowania mexicana</i>	Cliffrose
Coyote willow	<i>Salix exigua</i>
Crested wheatgrass	<i>Agropyron cristatum</i>
<i>Cryptantha elata</i>	Tall cryptanth
<i>Cryptantha flava</i>	Yellow cat's-eye
<i>Cryptantha longiflora</i>	Long-flower cat's-eye
<i>Cryptantha osterhoutii</i>	Osterhout cryptanth
Curl-leaf mountain mahogany	<i>Cercocarpus ledifolius</i>
Dandelion	<i>Taraxacum officinale</i>
DeBeque milkvetch	<i>Astragalus debequaeus</i>
DeBeque phacelia	<i>Phacelia submutica</i>
Desert woodrat	<i>Neotoma lepida</i>
<i>Dipodomys ordii sanrafaeli</i>	Ord's kangaroo rat
Dolores skeleton-plant	<i>Lygodesmia doloresensis</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Dwarf purslane	<i>Portulaca halimoides</i>
Eastwood's desert parsley	<i>Lomatium eastwoodiae</i>
Eastwood's milkvetch	<i>Astragalus eastwoodiae</i>
Eastwood's monkeyflower	<i>Mimulus eastwoodiae</i>
Egret, great	<i>Casmerodius alba</i>
Egret, snowy	<i>Egretta thula</i>
<i>Egretta thula</i>	Snowy egret
<i>Elaphe guttata</i>	Corn snake
<i>Eleagnus angustifolia</i>	Russian olive
<i>Eleocharis acicularia</i>	Needle spike rush
<i>Eleocharis palustris</i>	Common spike rush
Elk sedge	<i>Carex geeyeri</i>
<i>Elymus elymoides</i>	Bottlebrush squirreltail
<i>Elymus salina</i>	Salina wildrye
Engelmann's spruce	<i>Picea engelmannii</i>
<i>Ephedra torreyana</i>	Mormon tea
<i>Ephedra viridis</i>	Mormon tea
<i>Epipactis gigantea</i>	Giant helleborine orchid
<i>Equisetum arvense</i>	Horsetails
<i>Eriogonum bicolor</i>	Julie's buckwheat
<i>Eriogonum contortum</i>	Grand buckwheat
<i>Eriogonum leptocladon</i>	Sand buckwheat
<i>Eriogonum lonchophyllum</i>	Spearleaf buckwheat
<i>Eriogonum palmerianum</i>	Palmer buckwheat
<i>Eupatorium maculatum</i>	Joe Pye weed
<i>Falco peregrinus anatum</i>	Peregrine falcon
Ferron milkvetch	<i>Astragalus musiniensis</i>
Field mint	<i>Mentha arvensis</i>
Fisher Towers milkvetch	<i>Astragalus piscator</i>
<i>Forestiera pubescens</i>	New Mexican privet
<i>Forsellesia meionandra</i>	Spiny greasebush
Four-wing saltbush	<i>Atriplex canescens</i>
Fremont barberry	<i>Berberis fremontii</i>
Galleta	<i>Hilaria jamesii</i>
Gambel's oak	<i>Quercus gambelii</i>
<i>Gambelia wislizenii</i>	Longnose leopard lizard
Gardner saltbush	<i>Atriplex gardneri</i>
Giant helleborine orchid	<i>Epipactis gigantea</i>

<i>Gila robusta</i>	Roundtail chub
<i>Gilia stenothyrsa</i>	Narrow stemmed gilia
Grand buckwheat	<i>Eriogonum contortum</i>
Grand Junction milkvetch	<i>Astragalus linifolius</i>
Gray vireo	<i>Vireo vicinior</i>
Greasewood	<i>Sarcobatus vermiculatus</i>
Great Basin centaury	<i>Centaurium exaltum</i>
Great Basin silverspot	<i>Speyeria nokomis</i>
Great Basin spadefoot toad	<i>Scaphiopus intermontanus</i>
Great blue heron	<i>Ardea herodias</i>
Great egret	<i>Casmerodius alba</i>
Greenleaf manzanita	<i>Arctostaphylos patula</i>
<i>Grindelia squarrosa</i>	Gumweed
Groundsel	<i>Senecio sp.</i>
Gumweed	<i>Grindelia squarrosa</i>
Gunnison sage grouse	<i>Centrocercus minimus gunnisonii</i>
<i>Gutierrezia sarothrae</i>	Snakeweed
Hairy golden aster	<i>Heterotheca villosa</i>
<i>Haliaeetus leucocephalus</i>	Bald eagle
Halogeton	<i>Halogeton glomeratus</i>
<i>Halogeton glomeratus</i>	Halogeton
Hardstem bulrush	<i>Scirpus acutus</i>
<i>Heterotheca villosa</i>	Hairy golden aster
<i>Heuchera rubescens</i>	Red alum-root
<i>Hilaria jamesii</i>	Galleta
<i>Hippochaete hyemalis</i>	Scouring rush
Horned buttercup	<i>Ranunculus testiculatus</i>
Horsetails	<i>Equisetum arvense</i>
<i>Hyla arenicolor</i>	Canyon tree frog
<i>Icterus parisorum</i>	Scott's oriole
Indian paintbrush	Castilleja sp.
Indian rice grass	<i>Oryzopsis hymenoides</i>
Joe Pye weed	<i>Eupatorium maculatum</i>
Jones blue-star	<i>Amsonia jonesii</i>
Julie's buckwheat	<i>Eriogonum bicolor</i>
<i>Juncus balticus</i>	Baltic rush
<i>Juncus longistylus</i>	Longstyle rush
June grass	<i>Koeleria macrantha</i>
<i>Juniperus osteosperma</i>	Utah juniper
<i>Juniperus scopulorum</i>	Rocky Mountain juniper
Kentucky bluegrass	<i>Poa pratensis</i>
Kit fox	<i>Vulpes macrotis</i>
<i>Koeleria macrantha</i>	June grass
<i>Krascheninnikovia lanata</i>	Winterfat
Lamb's tongue groundsel	<i>Senecio integerrimus</i>
<i>Lampropeltis triangulum</i>	Utah milk snake
<i>Lanius ludoviciana</i>	Loggerhead shrike
Large flowered breadroot	<i>Pedimelum megalanthum</i>
<i>Lepidium sp.</i>	Peppergrass
<i>Lesquerella parviflora</i>	Piceance bladderpod
<i>Linaria vulgaris</i>	Toadflax
Livemore fiddlehead	<i>Nama dichotomum</i>
Lodgepole pine	<i>Pinus contorta</i>
Loggerhead shrike	<i>Lanius ludoviciana</i>
<i>Lomatium eastwoodiae</i>	Eastwood's desert parsley

<i>Lomatium latilobum</i>	Canyonlands lomatium
Long-flower cat's-eye	<i>Cryptantha longiflora</i>
Longleaf phlox	<i>Phlox longifolia</i>
Longnose leopard lizard	<i>Gambelia wislizenii</i>
Longstyle rush	<i>Juncus longistylus</i>
Lupine	<i>Lupinus sp.</i>
<i>Lupinus sp.</i>	Lupine
<i>Lygodesmia doloresensis</i>	Dolores skeleton-plant
<i>Lygodesmia grandiflora</i>	large-flowered skeletonweed
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Maianthemum stellatum</i>	Starry solomonseal
Mancos columbine	<i>Aquilegia micrantha</i>
Manzanita	<i>Arctostaphylos patula</i>
Mat saltbush	<i>Atriplex corrugata</i>
<i>Medicago officinalis</i>	Alfalfa
<i>Melilotus officinalis</i>	Sweet clover
<i>Mentha arvensis</i>	Field mint
Mesa dropseed	<i>Sporobolus flexuosus</i>
<i>Mimulus eastwoodiae</i>	Eastwood's monkey flower
Mormon tea	<i>Ephedra viridis</i> or <i>E. torreyana</i>
Mountain big sagebrush	<i>Artemisia tridentata ssp. vaseyana</i>
Mountain lover	<i>Paxistima myrsinites</i>
<i>Muhlenbergia depauperata</i>	Sixweeks muhly
Muttongrass	<i>Poa fendleriana</i>
<i>Myotis yumanensis</i>	Yuma myotis
<i>Nama dichotomum</i>	Livemore fiddlehead
Narrowleaf cottonwood	<i>Populus angustifolia</i>
Naturita milkvetch	<i>Astragalus naturitensis</i>
Needle and thread	<i>Stipa comata</i>
Needle spike rush	<i>Eleocharis acicularia</i>
<i>Neotoma lepida</i>	Desert woodrat
Nevada onion	<i>Allium nevadense</i>
New Mexican privet	<i>Forestiera pubescens</i>
Nokomis fritillary	<i>Speyeria nokomis</i>
Northern leopard frog	<i>Rana pipiens</i>
Northwest Territory sedge	<i>Carex utriculata</i>
Oak, Gambel's	<i>Quercus gambelii</i>
Onion, large flower, wild	<i>Allium macropetalum</i>
<i>Onopordum acanthium</i>	Scotch thistle
<i>Opuntia polyacantha</i>	Prickly pear cactus
Ord's kangaroo rat	<i>Dipodomys ordii sanrafaeli</i>
<i>Oryzopsis hymenoides</i>	Indian rice grass
Osterhout cryptanth	<i>Cryptantha osterhoutii</i>
Palmer buckwheat	<i>Eriogonum palmerianum</i>
Paper flower	<i>Psilostrophe bakeri</i>
Paradox breadroot	<i>Pediomelum aromaticum</i>
Parry's bellflower	<i>Campanula parryi</i>
<i>Pascopyrum smithii</i>	Western wheatgrass
<i>Paxistima myrsinites</i>	Mountain lover
<i>Pediomelum aromaticum</i>	Paradox breadroot
<i>Pediomelum megalanthum</i>	Large flowered breadroot
<i>Penstemon utahensis</i>	Utah penstemon
Peppergrass	<i>Lepidium sp.</i>
<i>Peraphyllum ramosissimum</i>	Squaw apple
Peregrine falcon	<i>Falco peregrinus anatum</i>

Phacelia submutica	DeBeque phacelia
<i>Phlox longifolia</i>	Longleaf phlox
<i>Phragmites australis</i>	Common reed
<i>Physaria acutifolia</i>	Twin bladderpod
<i>Picea engelmannii</i>	Engelmann's spruce
<i>Picea pungens</i>	Blue spruce
Piceance bladderpod	<i>Lesquerella parviflora</i>
<i>Pinus contorta</i>	Lodgepole pine
<i>Pinus edulis</i>	Pinyon pine
<i>Pinus ponderosa</i>	Ponderosa pine
pinyon pine	<i>Pinus edulis</i>
<i>Platanthera sparsiflora</i>	Canyon bog orchid
<i>Platyschkuhria integrifolia</i>	Bahia
<i>Plecotus townsendii pallescens</i>	Townsend's big-eared bat
<i>Poa bulbosa</i>	Bulbous bluegrass
<i>Poa fendleriana</i>	Muttongrass
<i>Poa pratensis</i>	Kentucky bluegrass
Poison aster	<i>Xylorhiza venusta</i>
Ponderosa pine	<i>Pinus ponderosa</i>
<i>Populus angustifolia</i>	Narrowleaf cottonwood
<i>Populus deltoides ssp. wislizenii</i>	Plains cottonwood
<i>Populus tremuloides</i>	Aspen
<i>Portulaca halimoides</i>	Dwarf purslane
Prickly pear cactus	<i>Opuntia polyacantha</i>
Princes plume	<i>Stanleya pinnata</i>
<i>Prunus virginiana</i>	Chokecherry
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass
<i>Pseudotsuga menziesii</i>	Douglas fir
<i>Psilostrophe bakeri</i>	Paper flower
<i>Ptychocheilus lucius</i>	Colorado squawfish
Purple loosestrife	<i>Lythrum salicaria</i>
<i>Purshia stansburiana</i>	Cliffrose
<i>Purshia tridentata</i>	Bitterbrush
<i>Quaking aspen</i>	<i>Populus tremuloides</i>
<i>Quercus gambelii</i>	Gambel's oak
Rabbitbrush	Chrysothamnus sp.
Rabbitbrush, low	<i>Chrysothamnus viscidiflorus</i>
<i>Rana pipiens</i>	Northern leopard frog
<i>Ranunculus testiculatus</i>	Horned buttercup
Razorback sucker	<i>Xyrauchen texanus</i>
Red alum-root	<i>Heuchera rubescens</i>
Red spotted toad	<i>Bufo punctatus</i>
Red top	<i>Agrostis alba</i>
Red-osier dogwood	<i>Cornus stolonifera</i> (Swida sericea)
<i>Rhus trilobata</i>	Skunk bush
River birch	<i>Betula occidentalis</i>
Rocky Mountain juniper	<i>Juniperus scopulorum</i>
Rocky Mountain thistle	<i>Cirsium perplexans</i>
Rocky Mountain willow	<i>Salix monticola</i>
<i>Rosa woodsii</i>	Woods' rose
Rose, wild	<i>Rosa woodsii</i>
Roundtail chub	<i>Gila robusta</i>
Russian knapweed	<i>Centaureum repens</i>
Russian olive	<i>Eleagnus angustifolia</i>
Russian thistle	<i>Salsola australis</i>

Sage grouse, Gunnison	<i>Centrocercus minimus gunnisonii</i>
Salina wildrye	<i>Elymus salina</i>
<i>Salix exigua</i>	Coyote willow
<i>Salix monticola</i>	Rocky Mountain willow
Salsify	<i>Tragopogon dubius</i>
<i>Salsola australis</i>	Russian thistle
San Rafael milkvetch	<i>Astragalus rafaensis</i>
Sand buckwheat	<i>Eriogonum leptocladon</i>
Sand verbena	<i>Abronia elliptica</i>
<i>Sarcobatus vermiculatus</i>	Greasewood
<i>Scaphiopus intermontanus</i>	Great Basin spadefoot toad
Scarlet globemallow	<i>Sphaeralcea coccinea</i>
<i>Scirpus acutus</i>	Hardstem bulrush
<i>Sclerocactus glaucus</i>	Uinta Basin hookless cactus
<i>Sclerocactus parviflorus</i>	Small-flower fishhook cactus
Scotch thistle	<i>Onopordum acanthium</i>
Scott's oriole	<i>Icterus parisorum</i>
Scouring rush	<i>Hippochaete hyemalis</i>
Sea-blight	<i>Suaeda torreyana</i>
<i>Senecio integerrimus</i>	Lamb's tongue groundsel
<i>Senecio sp.</i>	Groundsel
Serviceberry	<i>Amelanchier utahensis</i>
Shadscale	<i>Atriplex confertifolia</i>
Silver sagebrush	<i>Artemisia cana</i>
Sister	<i>Adelpha bredowi</i>
<i>Sisymbrium altissimum</i>	Tumble mustard
Sixweeks muhly	<i>Muhlenbergia depauperata</i>
Skeletonweed, Dolores	<i>Lygodesmia doloresensis</i>
Skeletonweed, large-flowered	<i>Lygodesmia grandiflora</i>
Skunk bush	<i>Rhus trilobata</i>
Small-flower fishhook cactus	<i>Sclerocactus parviflorus</i>
Snakeweed	<i>Gutierrezia sarothrae</i>
Snowberry	<i>Symphoricarpos oreophilus</i>
Snowy egret	<i>Egretta thula</i>
Southern maidenhair	<i>Adiantum capillus-veneris</i>
Southwestern blackhead snake	<i>Tantilla hobartsmithii</i>
Spanish bayonet	<i>Yucca harrimaniae</i>
Spearleaf buckwheat	<i>Eriogonum lonchophyllum</i>
<i>Speyeria nokomis</i>	Great Basin silverspot
<i>Sphaeralcea coccinea</i>	Scarlet globemallow
Spike rush, common	<i>Eleocharis palustris</i>
Spiny greasebush	<i>Forsellesia meionandra</i>
Spiny hopsage	<i>Atriplex grayi (Grayia spinosa)</i>
Spiny horsebrush	<i>Tetradymia spinosa</i>
<i>Sporobolus aeroides</i>	Alkali sacaton
<i>Sporobolus flexuosus</i>	Mesa dropseed
Squaw apple	<i>Peraphyllum ramosissimum</i>
<i>Stanleya albescens</i>	White princes plume
<i>Stanleya pinnata</i>	Princes plume
<i>Stipa comata</i>	Needle and thread
<i>Suaeda torreyana</i>	Sea-blight
Subalpine fir	<i>Abies lasiocarpa</i>
Sun-loving meadowrue	<i>Thalictrum heliophilum</i>
Sweet clover	<i>Melilotus officinalis</i> or <i>M. alba</i>
<i>Symphoricarpos oreophilus</i>	Snowberry

<i>Tadarida brasiliensis</i>	Brazilian free-tailed bat
Tall cryptanth	<i>Cryptantha elata</i>
Tamarisk	<i>Tamarix ramosissima</i>
<i>Tamarix ramosissima</i>	Tamarisk
<i>Tantilla hobartsmithii</i>	Southwestern blackhead snake
<i>Taraxacum officinale</i>	Dandelion
<i>Tetradymia spinosa</i>	Spiny horsebrush
<i>Thalictrum heliophilum</i>	Sun-loving meadowrue
<i>Thamnophis cyrtopsis</i>	Black neck garter snake
Thinleaf alder	<i>Alnus incana</i>
<i>Thomomys bottae howelli</i>	Botta's pocket gopher
Toadflax	<i>Linaria vulgaris</i>
Townsend's big-eared bat	<i>Plecotus townsendii</i>
Townsend's Easter daisy	<i>Townsendia strigosa</i>
<i>Townsendia strigosa</i>	Townsend's Easter daisy
<i>Toxostoma bendirei</i>	Bendire's thrasher
<i>Tragopogon dubius</i>	Salsify
Tumble mustard	<i>Sisymbrium altissimum</i>
Twin bladderpod	<i>Physaria acutifolia</i>
<i>Typha latifolia</i>	Cattail
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>
Utah juniper	<i>Juniperus osteosperma</i>
Utah milk snake	<i>Lampropeltis triangulum</i>
Utah penstemon	<i>Penstemon utahensis</i>
<i>Viola nephrophylla</i>	Butterfly violet
Violet, butterfly	<i>Viola nephrophylla</i>
<i>Vireo vicinior</i>	Gray vireo
<i>Vulpes macrotis</i>	Kit fox
Western river birch	<i>Betula occidentalis</i>
Western wheatgrass	<i>Pascopyrum smithii</i>
Western yellowbelly racer	<i>Coluber constrictor mormon</i>
Wetherill milkvetch	<i>Astragalus wetherillii</i>
White princes plume	<i>Stanleya albescens</i>
White tailed antelope squirrel	<i>Ammospermophilus leucurus pennipes</i>
White top	<i>Cardaria draba</i>
Wild rose	<i>Rosa woodsii</i>
Winterfat	<i>Krascheninnikovia lanata</i>
Woody aster	<i>Xylorhiza venusta</i>
Wooly sedge	<i>Carex lanuginosa</i>
<i>Xylorhiza venusta</i>	Poison aster
<i>Xyrauchen texanus</i>	Razorback sucker
Yellow cats-eye	<i>Cryptantha flava</i>
Yellow milkvetch	<i>Astragalus flavus</i>
Yucca	<i>Yucca harrimaniae</i>
<i>Yucca harrimaniae</i>	Yucca
Yuma myotis	<i>Myotis yumanensis</i>