

***Land Health Assessment
Gunnison Gorge Area, 2001***

SUMMARY

This land health assessment evaluated nearly 110,000 acres of public land, including 95,633 acres located within the Gunnison Gorge National Conservation Area (NCA) planning area. The evaluation resulted in a determination of the acreage meeting the Rangeland Health Standards, the acreage not meeting, and the nature and location of the problems on the landscape. A small amount of the planning area was not evaluated due to inaccessibility, or because it was located on ecological sites which were not commonly occurring in the area. The following table shows the amount of land meeting or not meeting the Standards:

Acres Meeting Standards 1, 3,& 4	Acres Not Meeting Standards 1,3,& 4	Acres Unknown 1,3,& 4
96,082	5,030	8,098
Stream Miles Meeting Standards 2&5	Stream Miles Not Meeting Standards 2&5	Stream Miles Unknown 2&5
79.8	4.4	0.3

In order to make the above determination, the Gunnison Gorge Area was first rated according to each of the five Rangeland Health Standards separately. The following table better indicates the general nature of problems in the assessment area.

Standard	Meeting	Meeting With Problem Areas	Not Meeting	Unknown
Standard 1-Soils (acres)	77,861	23,181	48	8,098
Standard 2-Riparian (miles)	14.8	24.7	0	0.3
Standard 3-Healthy Communities (acres)	47,348	48,734	5,008	8,098
Standard 4-T&E Species (acres)	84,692	26,433	0	0
Standard 5-Water Quality (miles)	74.7	5.0	4.4	0

Major Land Health Problems

Standard 1: Nearly all of the area was meeting this standard. Where there were problems, they were mainly related to heightened erosion risk rather than actual accelerated erosion, except in isolated areas which had active gullies. Erosion risk factors like high bare ground and low plant basal cover were found in many locations across the area.

Standard 2: Riparian areas along about 1/3 of the perennial and intermittent streams were found to meet this standard with no significant hydrologic or vegetation problems. The majority of riparian areas were rated as functioning at risk—meeting Standard 2 with some problems. Most of the problems are minor, and relate to vegetation community changes and minor channel changes resulting mainly from flow alteration from dams or irrigation return flow. The Upper Gunnison River makes up the majority of riparian miles functioning at risk.

Standard 3: The great majority the Gunnison Gorge area meets this standard, or meets the standard with isolated problems. Where problems occurred, they were varied in nature and included lack of perennial grasses, (especially cool season grasses) and forbs, extensive invasions by nonnative species (mainly cheatgrass), scattered noxious weed infestations, low shrub vigor in some areas, and scattered problems with the vegetation age-class diversity, and landscape mosaic.

Standard 4: The majority of the Gunnison Gorge area meets this standard. There are some areas with problems, such as the late seral stage conditions, lack of perennial forbs, and poor shrub vigor(see Standard 3) common to so much of the Gunnison sage grouse range. There are some areas, especially the Mancos shale areas, where there issues that must be evaluated in more detail and addressed in the pending Gunnison Gorge NCA Management Plan, such as the effects of recreation use and off highway vehicles on rare species, plant communities, and endemic wildlife. Problems, such as habitat fragmentation problems for kit fox and alterations of stream flows are beyond the scope of BLM's management authority.

Standard 5: Most of the streams and rivers in the Gunnison Gorge area meet the health standard. Problem areas identified included the Peach Valley drainage resulting from unstable channel and poor watershed conditions, and the Smith Fork for high temperatures and dissolved solids and lack of aquatic life.

Recommendations

- 1) Map gully systems, identify and correct causes where possible.
- 2) Where heightened erosion risk, perennial grass and forb cover, invasive exotic species or cool season grass cover is a problem, manage grazing to reduce dormant season utilization, shorten duration of grazing during plant growth periods, reduce utilization on native riparian plants to sustain their abundance and vigor, and reduce the number of years that spring and fall grazing occur in the same pasture.
- 3) Evaluate road inventory data to identify sources of erosion and take corrective action through road maintenance, or OHV and road management.
- 4) Establish test plots for restoring native communities in degraded swales in the Mancos soils of the western part of the NCA area, expand successful approaches to conservation demonstration areas and larger areas, then manage restored areas to sustain native plant communities.
- 5) Increase herbaceous dominated early and early-mid seral patches to percentages outlined in the UFO Fire Management Plan by using a combination of fire, mechanical, and chemical treatments, followed by seeding of native species. Ensure follow-up management maintains seral stage or natural

disturbance needed for long-term maintenance.

6) Work with Black Canyon National Park to secure occasional “flushing flows” for the Upper Gunnison River below Crystal Dam to reduce sedimentation in the channel and establishment of nonnative vegetation.

7) Control noxious weeds by: completing weed inventory for NCA area, developing and implementing a strategy to control and reduce the amount of noxious weeds in the NCA, and seeding disturbances on the landscape with native species that can compete against exotic species.

8) Expand water quality monitoring to: identify levels of Fecal coliform bacteria in the Smith Fork, Gunnison River, and the North Fork; characterize chemical properties of the water in both the Smith Fork and Iron Creek; more comprehensively evaluate watershed conditions on Mancos shale areas; and to establish a baseline inventory of macroinvertebrate taxa on perennial water systems within the landscape unit.

9) BLM should remain involved with the ongoing, state driven, Selenium - Total Maximum Daily Load process that is ongoing in the Lower Gunnison Basin. Future management efforts to reduce Selenium yields could include implementation of management activities that minimize both surface runoff and soil erosion on public land within the landscape unit, on soils derived from Mancos shale.

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Land Health Assessment Gunnison Gorge Area, 2000

INTRODUCTION

Overview

The Gunnison Gorge Area is based around the Gunnison Gorge National Conservation Area planning area. It extends to the Uncompahgre River to the west, Highway 50 to the south, the GMUG National Forest to the east, and just above the Gunnison River and North Fork of the Gunnison River to the north. The boundary is extended in places to include all portions of grazing allotments that are partially contained within the unit. The unit encompasses about 320,000 acres, and includes the following watersheds: Lower Uncompahgre River, Black Canyon, Crystal /Curecante Creek, Smith Fork/Crawford Reservoir, and portions of Leroux/Cottonwood Creeks, Tongue/Current Creeks, and the Cimarron River. The unit was identified in 1998, prior to the directive to base units on fifth order watershed boundaries. However, it is centered around the Gunnison Gorge Uplift and thereby forms a large cohesive landscape “chunk”. The unit also follows the boundaries of the NCA, and was high priority for assessment because of the need to develop an NCA plan in 2001 and 2002.

The primary problems and issues we are aware of in the area include: alteration of the vegetation community including weed and exotic plant invasions, domination of the landscape by mid and late seral stages, lack of forbs, low levels of cool season grasses, poor quality winter range and numerous big game and agriculture conflicts on adjacent private lands, a vulnerable Gunnison sage grouse population, declining neotropical bird numbers, soil erosion and gully formation, whirling disease in the fishery, salt cedar invasion, road proliferation, water quality, and potential threats to sensitive plants from human activities. Indicators used to assess these problems included plant canopy cover, species composition, vigor, age class, browse class, soil surface cover, as well as systematic observations of channel type, runoff drainages, pedestals, cryptobiotic crusts, plant distribution, community diversity, exotic plants, noxious weeds, vertical structure, grazing impacts, litter retention, fire evidence, stream channel characteristics, riparian vegetation characteristics, channel characteristics, limited water quality samples, remotely sensed landscape patch distribution and arrangement, and sensitive species distribution and trend data.

Land Status

The health assessment unit boundary encompasses a little more than 320,000 acres of which 109,865 acres are public land. These public lands are concentrated in the center of the unit around the Gunnison Gorge and its uplift (Figure 1.1). Numerous noncontiguous small and scattered public land parcels are located around the large block of public land. The public land adjoins the Black Canyon National Park. The majority of public land in this large block falls into the Gunnison Gorge National Conservation Area. A wilderness area is also located within this NCA on public land to the northwest of the park, and running into the park as well. Public land on either side of the Gunnison River south of the Park is managed by the Park Service as part of the Curecante Recreation Area. Private land makes up the majority of the landscape unit, where it nearly surrounds the public land.

All public land in the unit is covered by the Uncompahgre Basin Resource Management Plan. The scattered lands in the western and eastern part of the unit are in Management Unit 16

Figure 1.1 Land ownership.

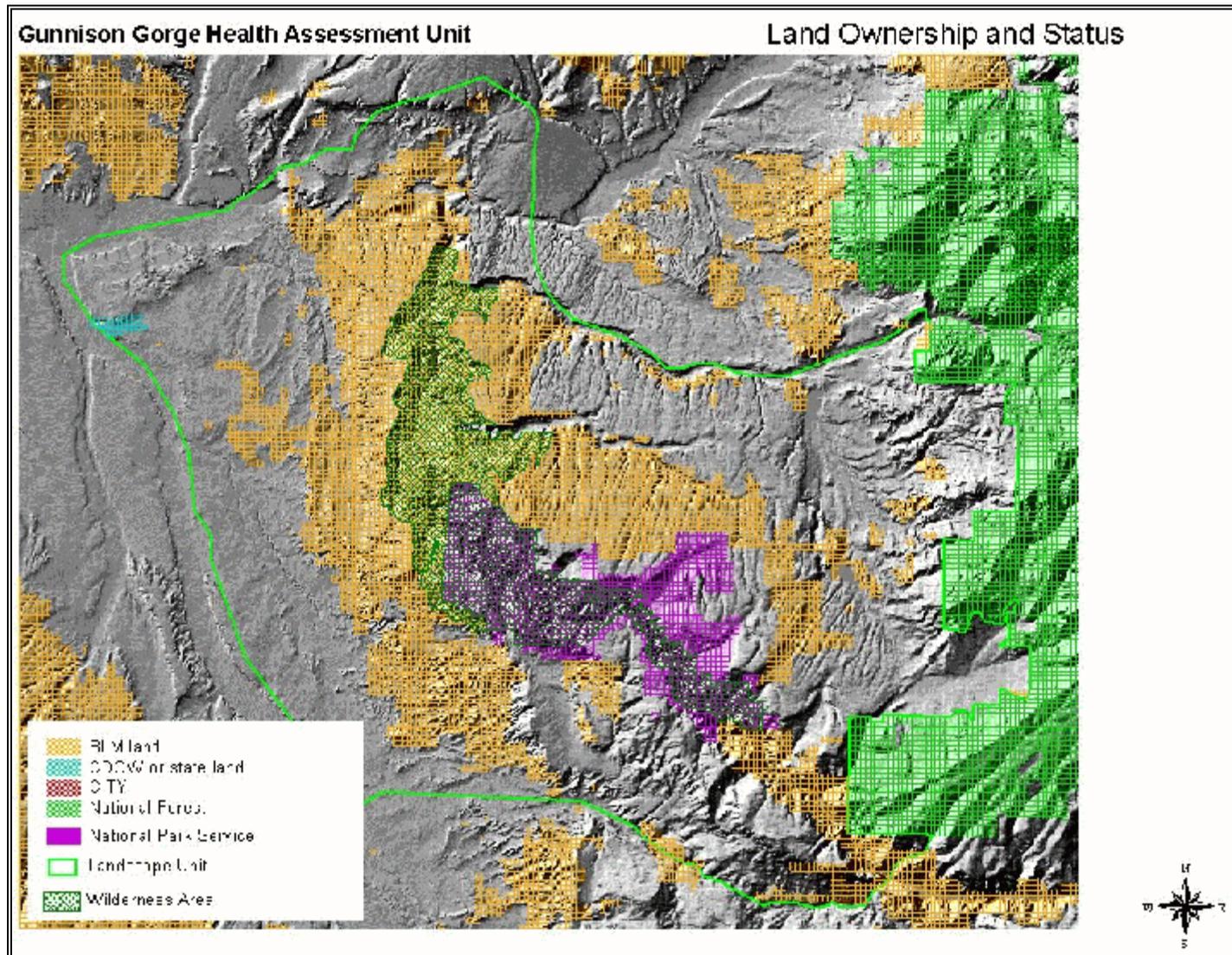
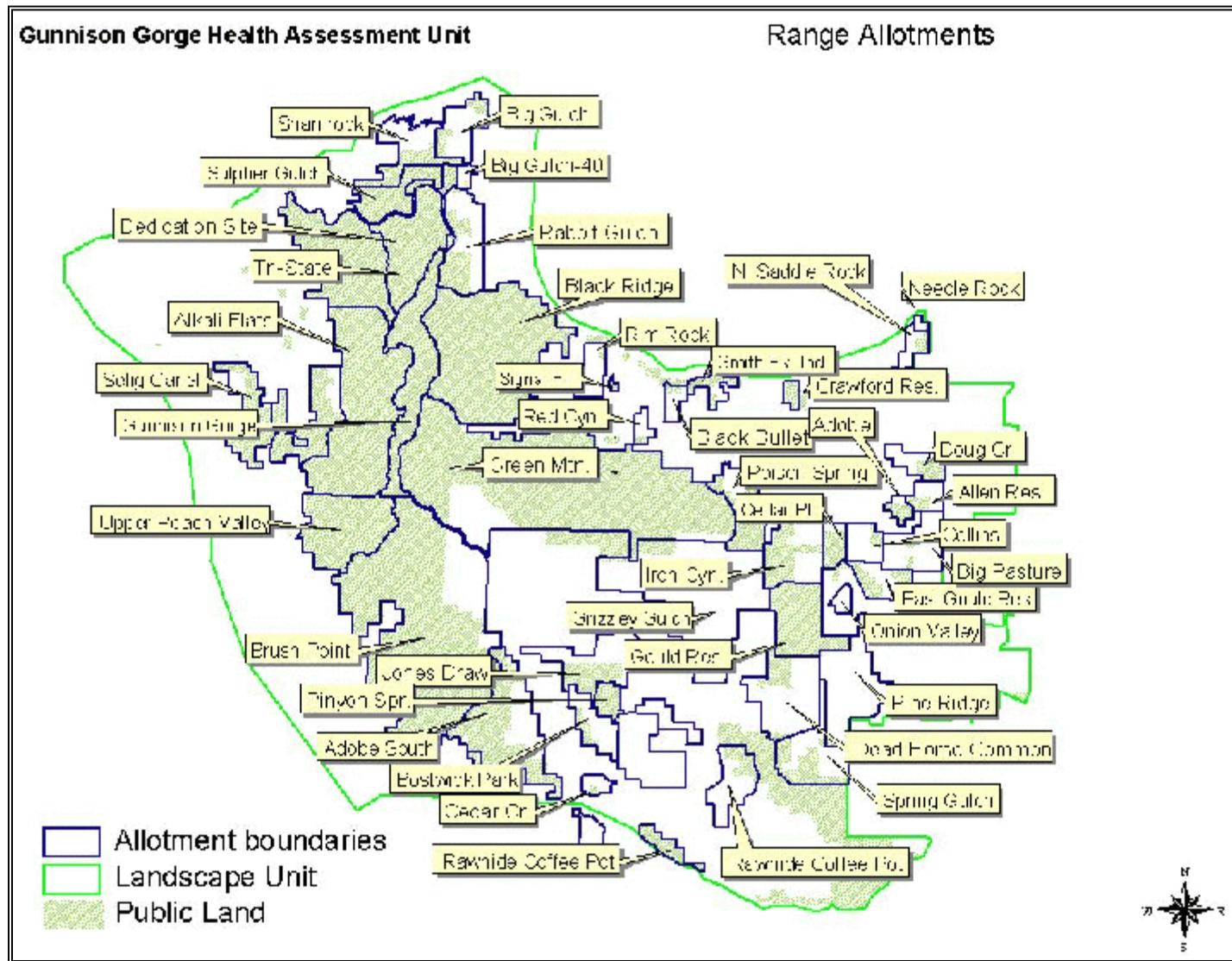


Figure 1.2 Grazing Allotment Boundaries



for lower priority, difficult to manage isolated tracts of public land. The western slope of the uplift, much of the adobe country, and the Black Ridge area fall into unit 4 which is a recreation emphasis area. The Gunnison Gorge is in unit 6 which has a wilderness emphasis. Fruitland Mesa and lands to the south are in the livestock grazing emphasis area. A small area around Jones Draw is in the forestry emphasis unit 3. There are 44 grazing allotments in the unit that contain public land—some of these are almost entirely made up of public land while in others the great majority of land is private (Figure 1.2). Some public land is unallotted, including a large part of the Gunnison Gorge.

Landform and Topography

Elevations range between 5,000 feet in the northwest part of the unit to over 9,000 feet in the southeast part (Figure 1.3). The Gunnison uplift is the dominant landform in the unit. It is deeply cut by the Gunnison River, forming a very steep walled, two-tiered canyon. The Uncompahgre River has cut a similarly deep but much wider valley in the western part of the unit. The Smith Fork, Red Canyon, and the North Fork of the Gunnison are important drainages that define the other notable land forms including Black Ridge, Scenic Mesa and Fruitland Mesa (Figure 1.4). The foothills of the West Elk Mountains lie to the East and create the slopes on this side of the unit, while Bostwick Park is a hanging valley where a quaternary river once flowed.

Geology and Soils

The assessment area is located on the eastern boundary of the Canyon Lands Section of the Colorado Plateau Geomorphic Province. The area is typical of Colorado Plateau geology: gently dipping sedimentary rocks, altitudes exceeding 5,000 feet, the climate is semi-arid to arid, erosion has produced innumerable escarpments and structural benches and relief is the result of the incision of deep canyons below moderately flat terrain.

The geologic structure within the area consists of gently dipping sediments overlying precambrian rocks with some folding and faulting, including the Montrose Syncline, the Gunnison Uplift, and the Cimarron, Ute and Red Rocks fault zones (Figure 1.5). The Gunnison Gorge is an uplift composed of precambrian rock through which the Gunnison River has carved an impressive canyon. The uplift consists of Mesozoic sedimentary beds that have been uplifted and eroded to expose core precambrian rocks. The axis of the Montrose Syncline is west of and parallel to the Gunnison River and the three major fault zones also parallel or are within the Gunnison Gorge canyon walls.

The underlying geologic formations include Quaternary alluvium, Tertiary volcanics, Cretaceous Mancos Shale, Dakota sandstone and Burro Canyon Formations, the Jurassic Morrison, Wanakah and Entrada Formations and the Precambrian Formation. The Paleozoic section is missing because the area was a highland and these sediments were never deposited. The precambrian rocks consist of pegmatites, quartz monzonites, granodiorites, granites and metamorphic rocks. Their origin and composition vary widely.

A regional unconformity separates the precambrian rocks from the Entrada sandstone. The Upper Jurassic Entrada sandstone is a distinctive light colored, buff to tan, cross-stratified well-sorted sandstone. The large scale crossbedding indicates the formation is an eolian or wind deposited beach sand or dunes near the margin of a large sea. The top of the formation is fluvial, indicated by ripple marks. The contact with the Wanakah Formation is sharp but sometimes interfingers due to the fluvial environment.

Figure 1.3 Elevation of unit from Digital Elevation Model data

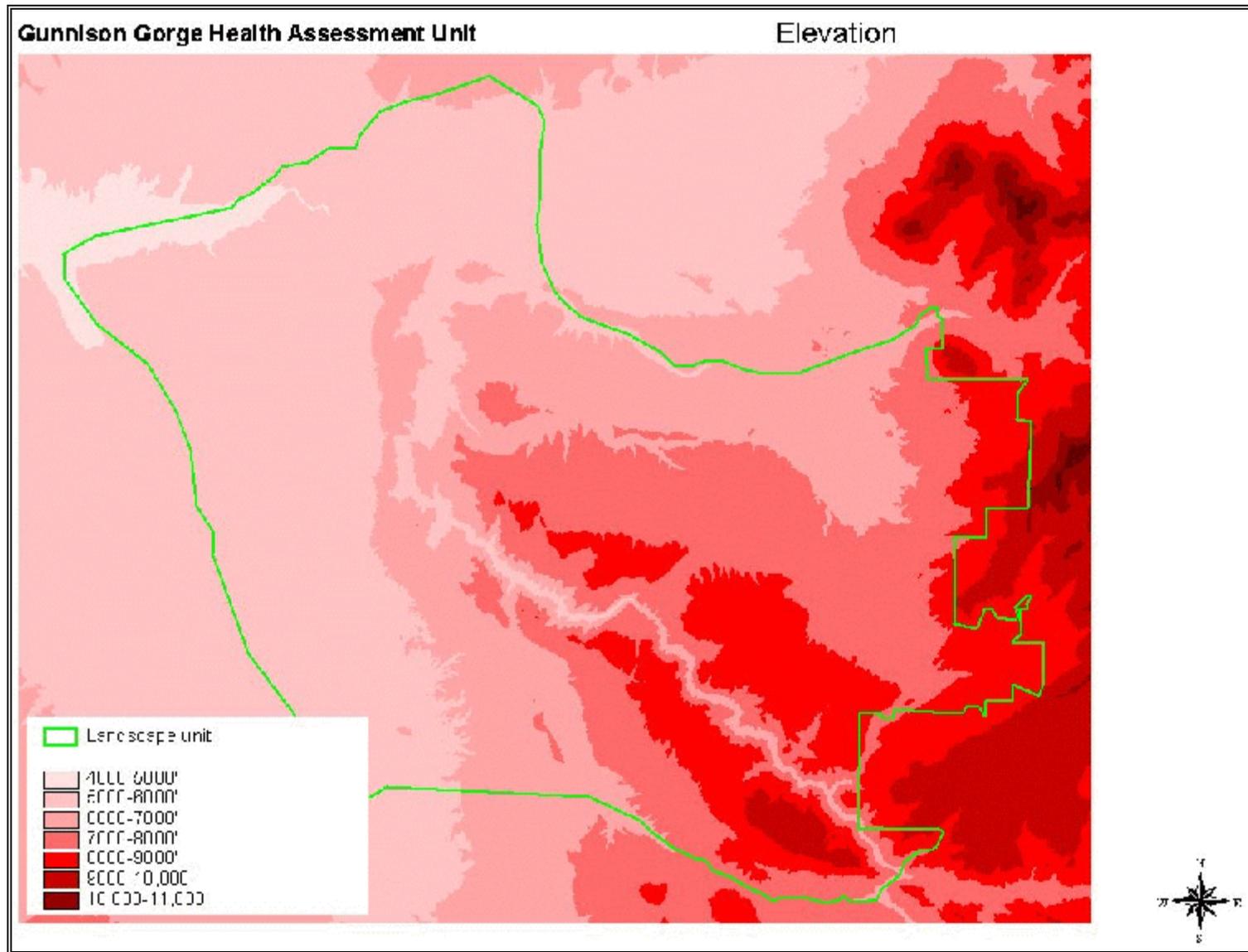


Figure 1.4 Landforms and slopes from Digital Elevation Model data

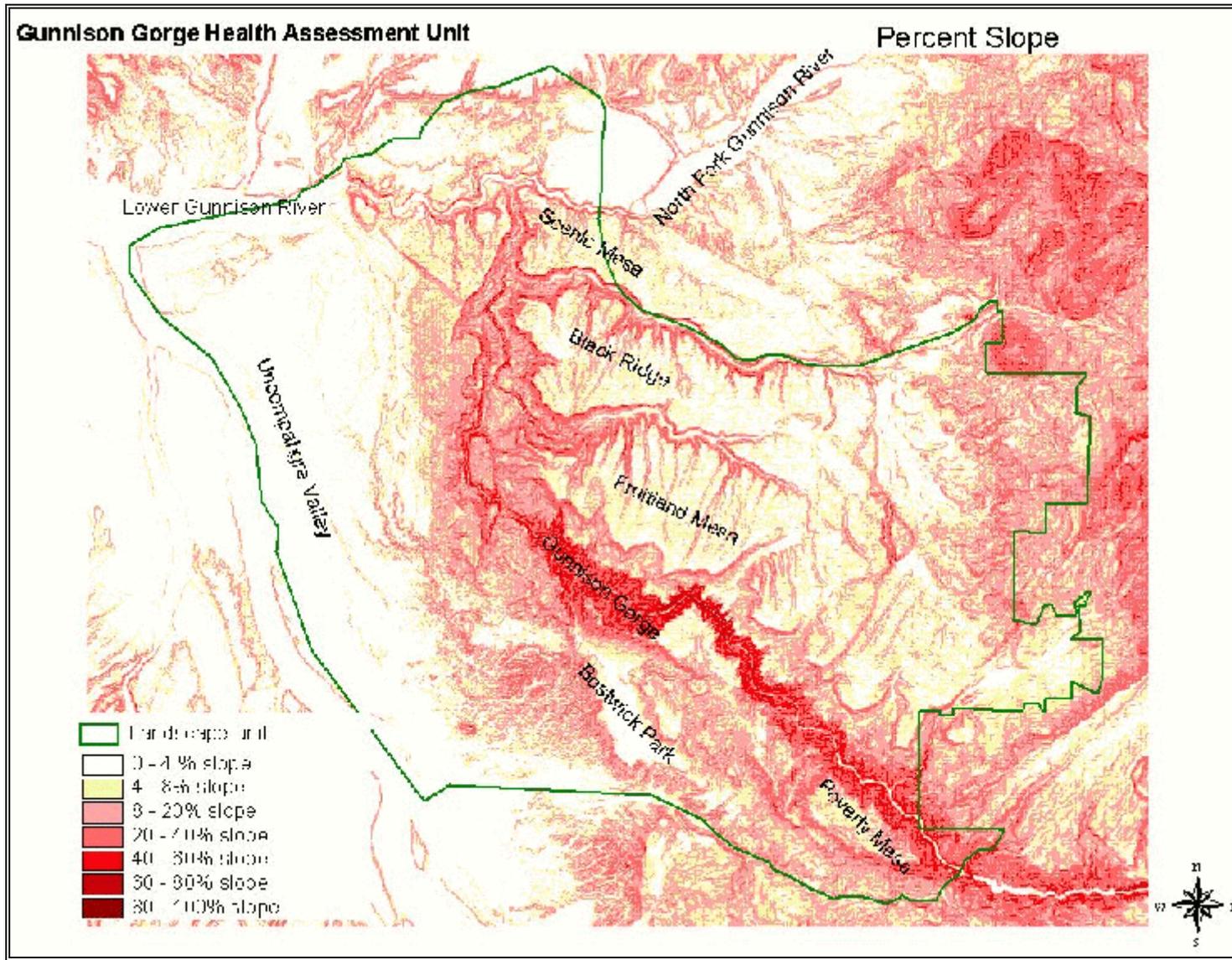
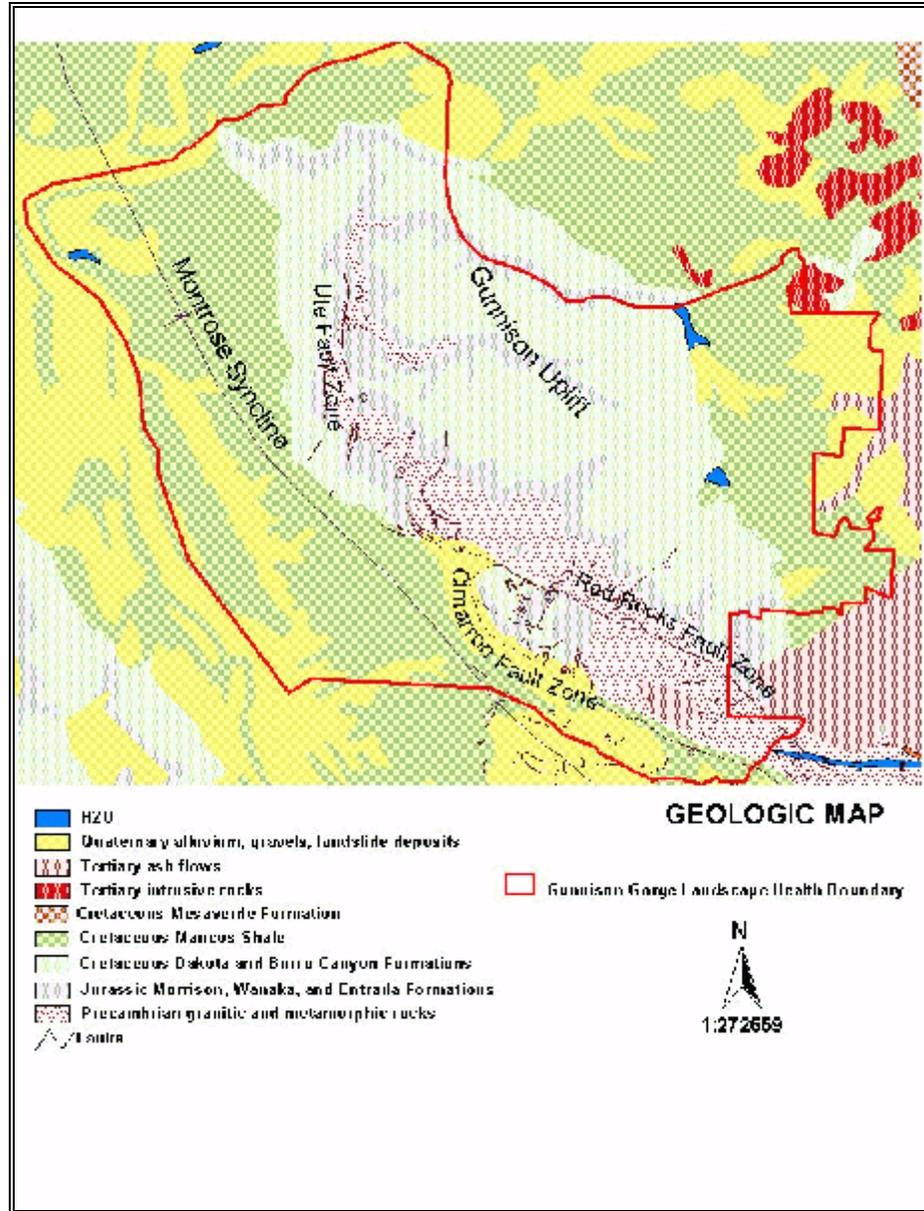


Figure 1.5 Geology of area



The Wanakah Formation is also Upper Jurassic in age. Three members are recognized in the area. The formation consists of crossbedded sandstones, gypsiferous mudstones and a gray limestone. Deposition ranges from a type of broad tidal flat, subject to periodic inundation and desiccation, stream deposition in a broad flat plain and a shallow marginal sea. The contact with the overlying Morrison Formation is sharp.

The Morrison Formation is comprised of two members in ascending order: the Salt Wash member and the Brushy Basin shale member.

The Salt Wash member is a thick complex of interbedded lenticular sandstones, siltstones and mudstones which crop out above the Wanakah Formation. It is light brown to light orange in color. Ripple marks, current lineations, rill marks and cut-and-fill structures indicate fluvial origin. The formation was deposited by aggrading braided streams on a large alluvial plain or fan, it may also represent channel deposition.

The contact between the Brushy Basin member and the Salt Wash member is gradational. The Brushy Basin Member consists predominately of varicolored bentonitic shale and mudstone, with beds and lenses of conglomerate, sandstone and a few thin layers of limestone. The shale and mudstone are thin-bedded and range in color from white to pastel tints of red, blue, and green. These sediments were deposited on an alluvial plain in fluvial and lacustrine environments.

The Cretaceous Burro Canyon Formation is a massive, thick-bedded cross-stratified sandstone and conglomerate. It is a white to gray sandstone, mudstone and conglomerate with irregular, lenticular bedding. It is lenticular and composed of channel fill indicating fluvial origin. The lower contact is not distinct; it interfingers with the Brushy Basin Shale. The upper contact is an erosional surface of regional extent. It has been combined with the Dakota Sandstone on the geologic map.

There is a disconformity between the Burro Canyon and Dakota sandstone with no clear contact. The Cretaceous Dakota sandstone is primarily a gray, yellow and buff flaggy sandstone with some discontinuous lenses of conglomerates, carbonaceous shale and coal. Deposition is partly continental and partly littoral. It is of fluvial origin with the carbonaceous shale and coal restricted to lagoons along the edge of a marine embayment. The contact with the overlying Mancos Shale is conformable and appears to be gradational.

The Mancos Shale is a dark gray to black, fossiliferous silty clay shale with bentonitic beds and limestone concretions. The shale is of offshore marine origin and can be 4,000 to 5,000 feet thick. Based on abandoned oil and gas holes, the Mancos shale is less than 2,000 feet thick in the report area.

The Tertiary volcanic deposits consist of ash flows and intrusive rocks. The ash flow tuffs are from sources in the San Juan Mountains and the intrusive rocks occur in the form of laccoliths and stocks such as Needle Rock on the eastern side of the report area.

The Quaternary alluvium consists of poorly sorted gravel, basalt cobbles, sand, and silt deposits that have been recently worked in the existing drainages.

Historically, the interest in mining within the report area includes: bentonite in the Smith Mountain area, precious metals along the Ute and Duncan trails, placer gold in the gravels of the Gunnison River, platinum or gold in the Mancos Shale, uranium and vanadium in the Morrison Formation, and small coal mines utilized for domestic coal in the Dakota sandstone.

Soils on public lands in the unit are varied, a result of the diverse geologic formations. They are described in detail in the Paonia Soil Survey (SCS , 1981), with the exception of about 12,000 acres which were not mapped. The dominant soil map units are listed in the table below. The majority of soils

in the unit have relatively low potential for plant production.

Soil Map Unit	Name	BLM Acreage in Unit	Characteristics
75	Torriorthents-Rock outcrop, sandstone, complex	18,916	Steep, variable soils and sandstone rock on mountainsides
11	Badland	11,875	Nearly barren outcrops of silty, calcareous and gypsiferous shale
47	Kech-Rock outcrop complex, 10-40% slopes	9,678	Moderately steep, shallow loam with sandstone outcrops
49	Lazear-Rock outcrop complex, 3-30% slopes	9,503	Sloping shallow gravelly loam with sandstone outcrops
12	Beenom-Absorokee loams	6,828	Sloping shallow and moderately deep loams
1	Absarokee loam	5,522	Moderately deep loam
46	Kech-Progresso loams, 3-15% slopes	4,689	Sloping shallow to moderately deep loams
67	Rock Outcrop	3,594	Bare exposures of bedrock
62	Progresso Loam, 6-12% slopes	2,640	Sloping, moderately deep, well drained soil overlying sandstone

Climate

The assessment area is primarily semi-arid, although precipitation is variable. Annual precipitation in the nearby town of Montrose (just outside the southwestern corner of the unit has averaged 8.8" over the last 47 years, while precipitation in Cimarron (outside the southeast corner) has averaged 13.2" over the same time period. Precipitation in Montrose has varied from 5.4" at its driest to 15.2" at its wettest. It is fairly evenly distributed across the months of the year with February the driest averaging 0.47" and August the wettest averaging 1.16". Precipitation is nearly evenly divided between cold and warm months with October through March precipitation averaging 4.2" and April through September precipitation averaging 5.4".

Temperatures in Montrose typically range from 13.7 °F lows in January to 88.2° highs in July. Cimarron, which is located above 7,200', is cooler with January lows of -0.2° and July highs of 85°.

The Gunnison Gorge Landscape unit is subject to frontal, convectional, and monsoonal storm patterns. Soil moisture in spring is generally consistent and abundant, drying out in late May and June, and then subject to localized short-term recharge from thunderstorm activity in late July through September. The storms bring with them lightening activity which generates many fire starts in dry years.

Vegetation

At least five distinct vegetation types occur in the landscape unit, and are tied to soil type as well as elevation and precipitation (Figure 1.6). The adobe badlands to the west and north of the unit support a salt-desert shrub community typified by mat saltbush (*Atriplex corrugata*), Gardner saltbush (*Atriplex gardneri*), winterfat (*Krascheninnikovia lanata*), bottlebrush squirreltail (*Elymus elymoides*), Salina wildrye (*Elymus salinus*), and cottonthorn horsebrush (*Tetradymia spinosa*). A semidesert grassland occurs slightly higher on the uplift on sandstone-derived soils. Dominant species in this community include galleta grass (*Hilaria jamesii*), shadscale (*Atriplex confertifolia*), needleandthread grass (*Stipa comata*), and occasional Utah greasebush (*Forsellesia meionandra*) and hopsage (*Grayia spinosa*).

This community grades into pinyon-juniper woodland on shallower soils and big sagebrush on the deeper soils. The pinyon-juniper woodland is dominated by Colorado pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with an understory of green Mormon tea (*Ephedra viridis*), yucca (*Yucca harrimanii*), rock goldenrod (*Petrorhiza pumila*) and muttongrass (*Poa fendleriana*) on more mesic sites. The sagebrush community contains Basin big sage (*Artemisia tridentata tridentata*) or black sage (*Artemisia nova*), western wheatgrass (*Pascopyrum smithii*), Sandberg bluegrass (*Poa secunda*), and frequently cheatgrass (*Bromus tectorum*). At higher elevations, particularly on Fruitland Mesa and nearby mesas the sagebrush community grades into a mountain big sagebrush (*Artemisia tridentata vaseyana*) type that contains Utah serviceberry (*Amelanchier utahensis*) together with a productive understory of muttongrass and junegrass (*Koeleria macrantha*), and numerous forbs. Slightly higher in elevation, the mountain big sage declines in abundance and is replaced by Gambel oak (*Quercus gambelii*), Utah serviceberry, squawapple (*Peraphyllum ramosissimum*), birch leaf mountain mahogany (*Cercocarpus montanus*), and elk sedge (*Carex geyeri*).

Pockets of aspen can be found on mesic sites at the highest elevations in the unit, while the drainages with intermittent or perennial water contain riparian vegetation. Riparian vegetation is most prevalent along the Gunnison River where sandbar willow (*Salix exigua*), reed canarygrass (*Phalaris arundinacea*), and box elder (*Acer negundo*) are prominent members of the community. Narrowleaf cottonwood (*Populus angustifolia*) and Rio Grande cottonwood (*Populus deltoides* ssp. *Wislizenii*) form occasional small groves along parts of the Lower Gunnison and smaller streams.

Colorado Natural Heritage Program Potential Conservation Areas (PCA): The Colorado Natural Heritage Program has identified a number of sites within the analysis area that contain high quality plant communities, or assemblages of rare plants, and animals that they feel warrant protection and management. Each PCA was ranked for its biodiversity values, protection urgency, and management urgency. Figure 1.7 shows all eighteen PCA's displayed on a map of the assessment area. The following table shows the important resource values in each of the PCA's. The plant communities are considered to be high quality examples which have few if any non-native plant species present.

PCA Name	Resource Values	Biodiversity Rank
Uncompahgre Badlands Macrosite (not mapped)	<p>Communities: Mat saltbrush/galleta</p> <p>Plants: Clay loving wild buckwheat, Montrose bladderpod, Montrose penstemon, Delta lomatium, long-flowered cat's eye, Rocky Mountain thistle</p> <p>Animals: Northern Harrier, Northern leopard frog</p>	B2
Sulphur Mine	<p>Plants: Uinta Basin hookless cactus, Delta lomatium</p>	B3
Lawhead Gulch	<p>Communities: Cattail marsh, Greasewood/ seablight</p> <p>Plants: Clay loving wild buckwheat</p> <p>Animals: Northern leopard frog</p>	B2
North Fork	<p>Communities: Narrowleaf cottonwood/skunkbrush, Fremont's cottonwood riparian forest</p> <p>Animals: Northern leopard frog, great basin spadefoot</p>	B3
Ute Trail	<p>Plants: Wetherill's milkvetch, large-flowered breadroot*</p>	B3
B50 Rd.	<p>Plants: Clay loving wild buckwheat</p>	B2
Peach Valley	<p>Communities: Shadscale/galleta</p> <p>Plants: Clay loving buckwheat, long-flowered cat's eye, Montrose penstemon</p>	B2
Gunnison Gorge S. Rim	<p>Plants: Montrose bladderpod, Wetherill's milkvetch, long flowered cat's eye, large-flowered breadroot*</p>	B2
Landfill Rd.-Bostwick Rd.	<p>Communities: Shadscale/Salina wildrye</p> <p>Plants: Montrose bladderpod, Delta lomatium, Montrose penstemon</p>	B2
Bostwick Park	<p>Plants: Montrose bladderpod, Wetherill's milkvetch</p>	B3
Fairview (includes the Fairview RNA)	<p>Plants: Montrose penstemon, clay loving wild buckwheat</p>	B3

Cedar Creek	Plants: clay loving wild buckwheat, Delta lomatium, Montrose penstemon	B2
Cerro Summit	Animals: Gunnison sage grouse	B2
Cimarron	Plants: Rocky Mountain thistle, Delta lomatium, Black Canyon gilia	B2
Crystal Ck.	Communities: Montane Riparian Forest, Aspen Forest, Lower Montane Forest	B3
Red Canyon South	Animals: Gunnison sage grouse	B2
Doug Creek	Plants: Rocky Mountain thistle	B2
Smith Fork at Crawford	Communities: Narrowleaf cottonwood riparian forest, narrowleaf cattail marsh Animals: Great blue heron	B5

*watchlist species for CNHP

Biodiversity ranking: B2- Very High Significance

B3- High Significance

B4-Moderate Significance

B5- General Significance

In addition to the communities and plant resources identified by CNHP, there is an isolated, excellent condition, example of a Great Basin wild-rye community located on the river terrace at the upstream end of Ute Park. The office staff is unaware of any other occurrences of this community within the Gunnison Gorge or within the Field Office area, and increased recreation use in the area could result in degradation of this site.

Figure 1.6 Vegetation types from Landsat Imagery

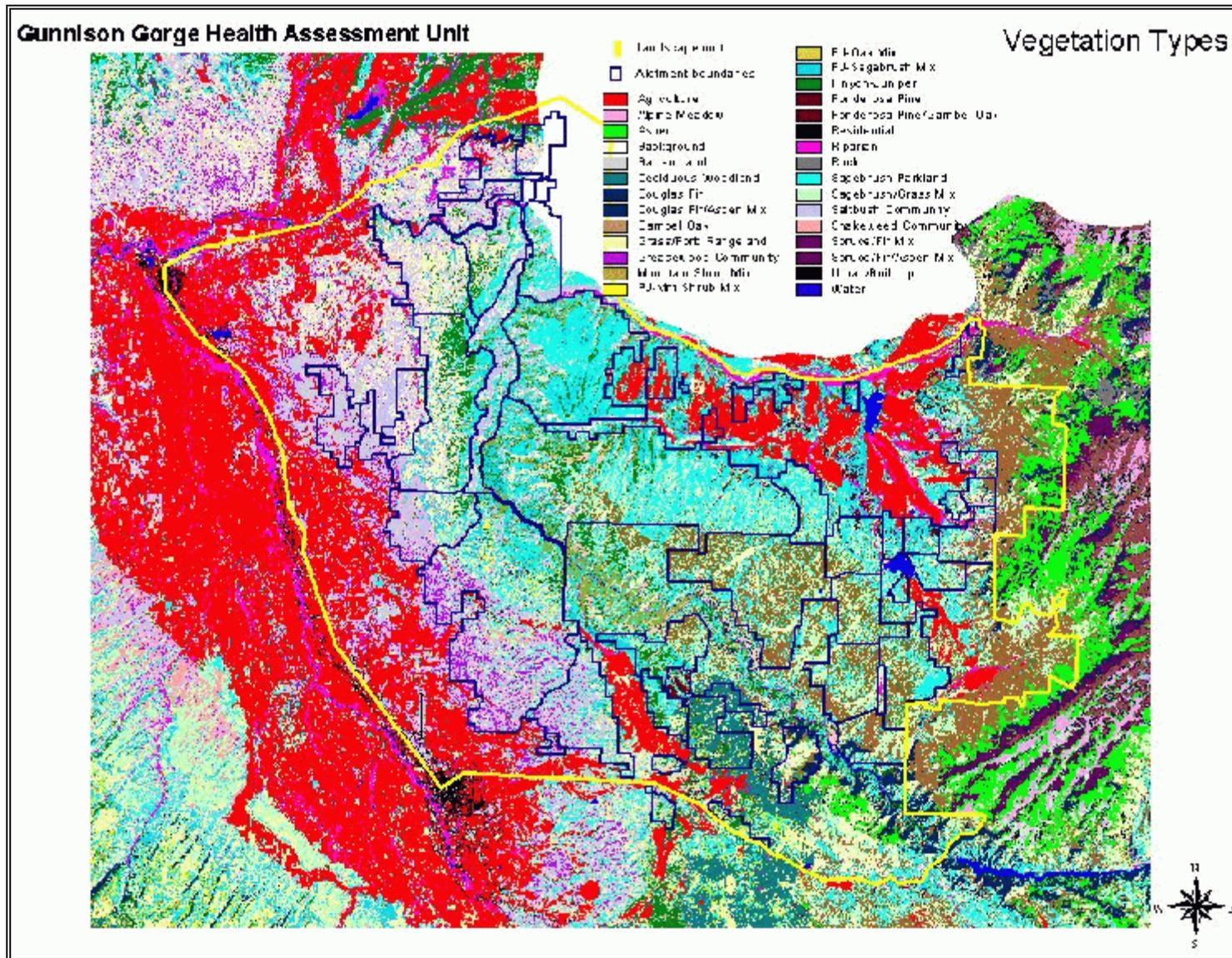
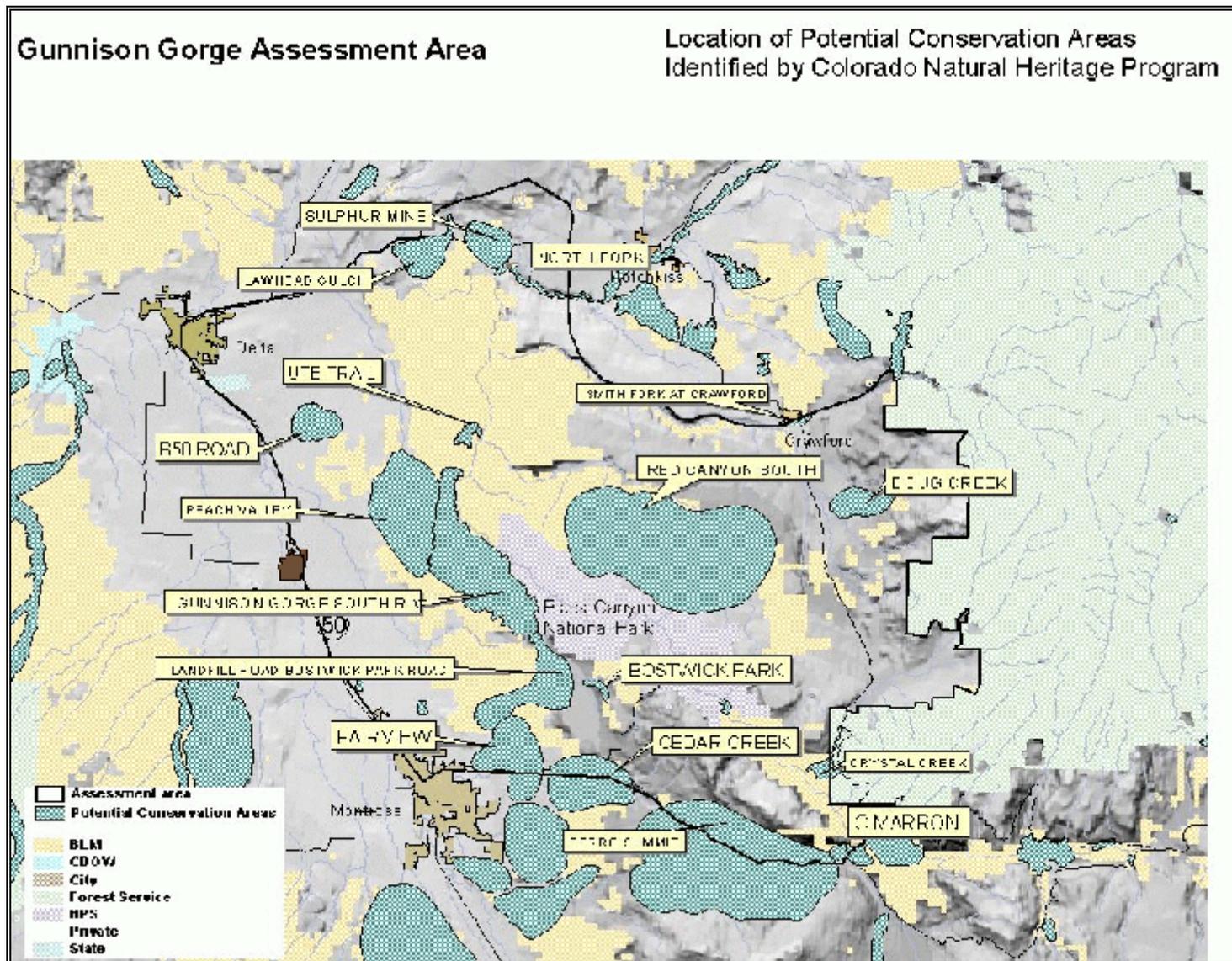


Figure 1.7 Potential Conservation Areas for Rare Plants, Animals, and Plant Communities



Wildlife

The Gunnison Gorge Area supports an undetermined variety of upland, riparian, and aquatic wildlife species. Table W1 below lists the most common or noted terrestrial wildlife species, or groups of species, their occurrence, and the basic habitat types in which they are found. Some species are year-long residents, while others are migrant. A variety of small mammal, bird, and herptile species are scattered throughout the unit where their specific habitats are present. Habitat variety is great, and is created by diversity in topography, slope, aspect, vegetation, soils, and climate. The description of the existing vegetation in the Vegetation section of this report provides a good description of most wildlife habitats that occur in the management area.

Table W1. Gunnison Gorge Area list of most common or noted terrestrial wildlife species, groups of species, their occurrence, and basic habitat types in which they are found.

Species (Common Name)	Habitat Type	Occurrence
Mule deer	Pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland.	Common, Yearlong, mostly during winter
Elk	Pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland.	Common, mostly during winter.
Cougar	All types, mostly along rim-rock areas.	Common, yearlong
Bobcat	All types	Uncommon, yearlong
Coyote	All types	Common, yearlong
Ringtail Cat	Rocky, Bluffy areas in Gorge	Uncommon, yearlong
Cottontail rabbit	All types	Common, yearlong
Porcupine	Pinyon-juniper, riparian	Common, yearlong
Prairie dog (whitetailed)	Sagebrush, desert shrub	Common, yearlong
Raptor; Eagles, Hawks, Falcons.	All types	Common, yearlong
Blue grouse	Oak/Serviceberry	Common, yearlong
Gunnison sage grouse	Sagebrush	Common, yearlong
Chukar	Salt desert "Adobes", foothills-east side	Uncommon, yearlong
Neo-tropical birds	All types	Common, warm season
Small mammals	All types	Common, yearlong
Amphibians-herps	All types	Common yearlong

Riparian habitat is present along the perennial streams listed in the above sections, and is

extremely important for a number of wildlife species, especially small birds, mammals, reptiles, and raptors. The status of most of these species is unknown.

Mule deer and elk use the area yearlong, but primarily as winter range (see Desired Landscape Objectives map). Most deer and elk use occurs east of the West rim of the Gunnison Gorge. Some winter use by elk occurs at the lower elevations west of the West rim. Summer range is located mostly at higher elevations east of the Gorge in the oak/serviceberry vegetation type. Winter range is located at lower elevations in the sagebrush and pinyon-juniper vegetation. All the area is classified by the Colorado Division of Wildlife as winter range for both deer and elk, and much of the area is classified as severe winter range with winter concentration areas. Winter concentration areas are shown in Figure W1. Most of the wintering mule deer and elk come from the higher elevation summer ranges to the east, the West Elk Mountains. During most winters there is a high degree of overlap in mule deer and elk use on winter ranges, however, the extent of competition is unknown.

Winter range quantity and quality is fairly good in this area, although, on some of the winter concentration areas winter habitat conditions are declining. The exact location of problem areas are unknown at this time.

The long-term (15-20yr) mule deer population trend is stable or down slightly, while elk are increasing slightly. Figure W1 shows deer and elk population trends respectively, 1980-2000. Mule deer numbers are up slightly since 1995, while elk numbers are down since 1991, reflecting more restrictive hunting regulations for mule deer and more liberal hunting regulations for elk. The area provides abundant mule deer fawning habitat at the higher elevations in the oak/serviceberry vegetation, while only a relatively few elk calve in this area. Most elk calving areas are off the area to the east in the West Elk Mountains. The number of elk using this area year long is steadily increasing, and is occurring mostly in areas adjacent to the Gorge. Data shown in Figure W1 is CDOW data for deer data analysis units 40 and 39 which excludes a small portion of GMU 53 from the figures. Elk data is for data analysis units 52 and 35, which include all the area within the analysis area.

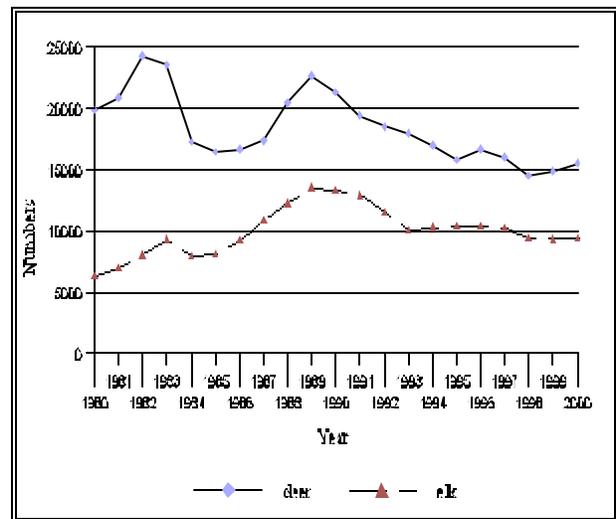


Figure W1. Mule deer and elk population trends, 1980-2000.

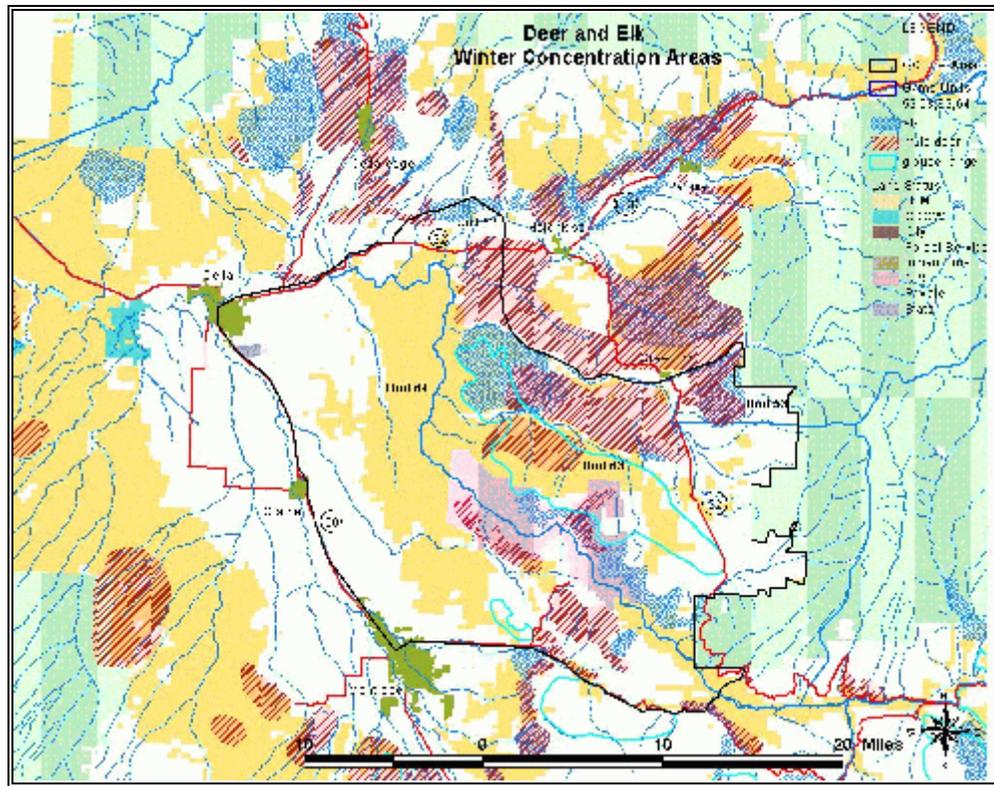


Figure W2. Mule deer and elk winter concentration areas.

A small population of Rocky Mountain Bighorn sheep, introduced in the early 80's, use the Gunnison Gorge and the lower ends of the Smith Fork and Red Canyon. Their numbers appear to be stable at best or declining, and CDOW at this time does not seem interested in active management of this herd. Prior to, and after the introduction of this herd, there were feral goats, and exotic mouflon sheep in the Red Canyon area which had escaped from captivity. The mouflons in particular may have caused some genetic pollution in the bighorn herd. Don Masden, with CDOW, (personal communication, 2001) feels that the agency efforts in the late 80's and early 90's to eliminate those exoctic species were successful.

Merriam turkeys are present and use the larger canyon bottoms at lower elevations as winter range and the pinyon-juniper, oak/serviceberry areas at higher elevations for breeding, nesting, and brood rearing. Turkey numbers are slowly increasing since being transplanted into the area during the mid 80's.

Ringtail Cats are known to occur in the Gunnison Gorge, but there is no data on the status of the population.

Large predators, such as coyotes, cougars, and black bears use the area regularly as parts of their larger overall ranges. Of the predators, coyotes are the most numerous and wide spread. Black bear primarily use the major drainage's with well developed riparian vegetation, and the higher elevation oak/serviceberry areas, especially during spring and late summer, and fall for feeding. Cougars probably use most all this area at some time or another while hunting, or raising young. The number of

cougars present is probably very low, limited mostly to the ones who have established their territories, or parts of their territories in this area. There appears to be suitable denning habitat in the bluffy areas along the major canyon rims. While the exact status of these predators are undetermined, they are all believed to be doing well.

Aquatic wildlife species and their habitats are limited to perennial streams and their associated riparian vegetation (see Standard 2 for locations of perennial streams and more information on functional condition). The Gunnison River is designated as a Gold Medal fishery by CDOW because of its excellent trout population, rainbow trout, brown trout, and a few cutthroat may be found. The cold water fishery in the Gorge is an artifact of the dams installed upstream for the Currecanti project. Releases from the dams have resulted in cold water conditions, smaller peak flows, and more consistent low flow conditions. Basically the cold water fishery that used to exist upstream of the National Park has been reset downstream as a result of the flow, water quality, and water temperature conditions resulting from the dams. Negotiations are underway between the Bureau of Reclamation, U.S. Fish and Wildlife Service, National Park Service, water users and BLM regarding the management of flows below the dams. The Fish and Wildlife Service would like to see a hydrograph that more closely resembles pre-dam conditions, at least periodically, as a tool to help maintain endangered fish habitat in the lower Gunnison and Colorado River. Other issues that could impact the fishery and other aquatic resources in the Gorge include projects like the proposed AB Lateral Hydropower project, which may reduce flows in the Gorge throughout the year, but especially during the winter months. Long term maintenance of the channel dynamics under these reduced flows may become a problem. Currently the rainbow trout population is declining dramatically as a result of an infestation of whirling disease. There has been very little natural recruitment since 1993 and 1994, and CDOW estimates that the population will crash catastrophically within two years. Currently the population is being maintained by annual stocking of fingerlings old enough to resist whirling disease. Some brook, rainbow, brown, and cutthroat trout also may be found in small numbers in other perennial streams. Native fish species, Bluehead Sucker, speckled dace, sculpin, and Flannelmouth sucker, etc., are known to be present in the Gunnison Rivers and some sections of other streams. Some frogs, toads, and water snakes are known to be present, but their status is unknown. It is assumed that cutthroat trout that may be present are hybrids rather than native Colorado River Cutthroat.

Most public land riparian systems are in fair condition, but flow alterations for irrigation and other uses, along with the invasions of salt cedar, yellow toadflax, and Russian knapweed have degraded the usability of some areas for native wildlife, especially non-game birds. Within the Gunnison Gorge, tamarisk has a firm foothold on the riparian benches from Ute Park to the confluence with the North Fork. BLM has been working on eradication of this woody species. It is important to note that prior to construction of the Currecanti project there was probably little in the way of a stable riparian community within the Gorge. The large differences between spring flows and late season and winter flows resulted in a riparian system that lacked the stability we see today. The majority of the grass species present on the riparian system of the Gorge are introduced species, but those grasses are probably having little impact on the riparian dependent wildlife of the area.

The limited amount of ponded open water within the analysis area limits its potential for waterfowl production. There are small numbers of waterfowl, including mergansers, Canada geese, mallards, green wing teal, etc. that nest along the Gunnison River and tributary areas where there is

suitable nesting substrate and reliable water. Concentrations of waterfowl during the fall migration have been estimated as high as ten thousand birds in the lower end of the Gunnison Gorge, upstream of the Smith Fork confluence. This area may serve as a refuge from hunters during the later portion of the waterfowl season. Potential winter flow reductions as a result of the proposed AB Lateral Hydropower Project may increase ice formation in the lower section of the Gorge and further impact the area's suitability for wintering waterfowl use. No recent counts of waterfowl have been conducted in that area, but smaller concentrations were evident through the 1980's.

Whitetail Prairie Dogs are found in the Peach Valley area, the adobe hills north of the Gunnison River, and in the lower elevation areas south of Hotchkiss. Potentially they may occur anywhere there is open grassland, grass/sagebrush or salt desert shrub areas. BLM mapped some of the prairie dog colonies in the Peach Valley area in 1978-79, but there has been no follow-up mapping.

Threatened , Endangered Species and Special Status Species:

Within the LHA area there are several species listed as threatened or endangered, as well as species proposed for listing under the Endangered Species Act, as amended. A list of those federally listed species considered is located in the Field Office' 6840 file. Based on the inventory data maintained by the Uncompahgre Field Office, and inventory data available from the Colorado Natural Heritage Program, the special status species shown in the table below are found or potentially found within the analysis area. Additional species such as the Canada lynx and the boreal toad can be found within the area managed by the Field Office, but habitats for these species are not found within the analysis area.

Threatened Endangered and Special Status Species			
Common Name	Scientific Name	Status ¹	Occurrence
Black-footed Ferret	<i>Mustela nigripes</i>	FE, SE	Not known to occur, but prairie dog host is present in the analysis area.
Bald Eagle	<i>Haliaeetus leucocephalus</i>	FT, ST	Winter concentration in the Gunnison Gorge
Southwestern Willow Flycatcher	<i>Epidonax traillii extimus</i>	FE, SE	Suitable habitat may be present within the planning area, no nesting documented on public land.
Whooping Crane	<i>Grus americana</i>	FEx, SE	Overflies the area during Migration. May stop at Crawford Reservoir, Gould Reservoir and Hart's Basin
Sandhill Crane	<i>Grus canadensis</i>	SC	Overflies the area during migration. May stop at Crawford Reservoir, Gould Reservoir, and Hart's Basin
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	FE, ST	Occupied and critical habitat downstream of analysis area in Gunnison R.

Razorback Sucker	<i>Xyrauchen taxanus</i>	FE, SE	Occupied and critical habitat downstream of analysis area in Gunnison R.
Bonytail Chub	<i>Gila elegans</i>	FE, SE	Occupied and critical habitat downstream of analysis area in Colorado R.
Humpback Chub	<i>Gila cypha</i>	FE, ST	Occupied and critical habitat downstream of analysis area in Colorado R.
Gunnison Sage Grouse	<i>Centrocercus minimus</i>	FC, BLMS	Populations on Fruitland Mesa and Black Ridge sagebrush/grass areas. Former leks in Bostwick Park.
River Otter	<i>Lutra canadensis</i>	SE	Population in Gunnison R.
Kit Fox	<i>Vulpes macrotis</i>	SE	Remnant Population in Peach Valley and near the Montrose Landfill
Spotted Bat	<i>Euderma maculatum</i>	BLMS	Inner Gunnison Gorge and Black Canyon
Big Free-tailed Bat	<i>Nyctinomops macrotis</i>	BLMS	Inner Gunnison Gorge and Black Canyon
Western Burrowing Owl	<i>Athene cunicularia</i>	ST	Present in prairie dog colonies, known to breed in the area.
Peregrine Falcon	<i>Falco peregrinus anatum</i>	SC	Known to nest in the Black Canyon National Park and on Needle Rock RNA. Recently removed from the federal endangered species list.
Ferruginous Hawk	<i>Buteo regalis</i>	BLMS, SC	Present during migration, no nesting in the planning area.
Curlew, Long-billed	<i>Numenius americanus</i>	BLMS, SC	Present during migration
White-faced Ibis	<i>Plegadis chihi</i>	BLMS	Present during migration, may nest in the Crawford Reservoir area.
Flannelmouth Sucker	<i>Catostomas latipinnis</i>	BLMS	Known to be present in the Gunnison Gorge, the second most common native fish in the river(CDOW 2001)
Roundtail Chub	<i>Gila robusta</i>	BLMS, SC	May be present in the N. Fork and Smith Fork, or other tributary streams.
Midget Faded Rattlesnake	<i>Crotalus viridis concolor</i>	BLMS	Present in PJ, rocky areas, greasewood/sage and sagebrush/rabbitbrush
Northern Leopard Frog	<i>Rana pipiens</i>	BLMS	Ponds and irrigation canals

Clay Loving Wild Buckwheat	<i>Eriogonum pelinophilum</i>	FE	Known from Mancos shale areas in Peach Valley and near Austin. Critical habitat on private land near Lawhead Gulch.
Uinta Basin Hookless Cactus	<i>Sclerocactus glaucus</i>	FT	Scattered individuals in the Peach Valley area, and north of the Gunnison Forks area.
Delta Lomatium	<i>Lomatium concinnum</i>	BLMS	Mancos shale hills
Montrose Bladderpod	<i>Lesquerella vicinna</i>	BLMS	Salt desert shrub grading up into the pinon juniper communities
Rocky Mountain Thistle	<i>Cirsium perplexans</i>	BLMS	Disturbed sites, including Mancos shale
Montrose Penstemon	<i>Penstemon retrorsus</i>	CNHP	Mancos shale habitats
Long flowered cats eye	<i>Cryptantha longiflora</i>	CNHP	Found in Peach Valley
Black Canyon Gilia	<i>Gilia penstemonoides</i>	BLMS	Precambrian rock crevices in the Black Canyon. Not documented on public land at this time.
Giant Helleborine Orchid	<i>Epipactis gigantea</i>	BLMS	Riparian areas, wetlands and seeps, not currently documented in the analysis area.
Wetherill milkvetch	<i>Astragalus wetherillii</i>	CNHP	steep slopes, canyon benches and talus slopes on sandy clay soil in pj, sage and mahogany communities

1 Status is as follows: FE.= Federally Endangered; FT.= Federally Threatened; FEx. = Experimental Non-essential Population; FP.= Federal Proposed for listing; FC. = Federal Candidate for listing; SE. = Colorado Endangered; ST. = Colorado Threatened; BLMS = BLM Sensitive Species; CNHP = Species considered sensitive or rare by the Colorado Natural Heritage Program.

Sources: Natural Heritage Biological Survey of Delta County, 1998

The Uncompahgre River Basin, A Natural Heritage Assessment, 1999

Bald Eagle Inventories, BLM, 1980

BLM Rare Plant inventories, Various Years

Federal Register: December 28, 2000 (Volume 65, Number 250)

Colorado Natural Heritage Program, Spatial Data for the Uncompahgre Field Office

Colorado Division of Wildlife, bat inventory Data

Colorado Division of Wildlife, Breeding Bird Atlas

CDO Web Site

There are no designated critical habitats on public land within the analysis area. Critical habitat for the clay-loving wild buckwheat is located on private land in the Lawhead Gulch area. Critical habitat for Colorado pikeminnow and razorback sucker are located outside the analysis area within the one hundred year floodplain on the lower Gunnison River. Management within the analysis area could impact critical habitat for the fish by depleting the amount of surface water that reaches critical habitats in the lower Gunnison River and Colorado River.

The field work for the assessment did not include a specific mission to identify new locations of

rare plants or animals. Notes of any conflicts between rare species habitat and other uses of public land, and new locations of clay loving wild buckwheat and Uinta Basin hookless cactus were found in Peach Valley.

From early December through early April, wintering bald eagles concentrate within the Gunnison Gorge for night roosting. Day foraging and roosting activities may take place anywhere within the analysis area, but tend to be concentrated around the North Fork and the Gunnison main stem downstream of the confluence with the North Fork. Helicopter and ground surveys, conducted by BLM in the early 1980's, did not locate specific communal roost sites within the Gorge. Night roosts in the Gorge are scattered along the cliffs and rock ledges above the river, with no apparent loyalty to any site. This is atypical of other night roost situations in western Colorado, which commonly involve large conifers or cottonwood trees. In 1980 a maximum of thirty five adult and immature birds were counted in the Gorge including the National Park. Counts conducted up through 1988 (CDOW) varied slightly from year to year, but did not change drastically. At the national level populations have recovered well enough since it was listed as Endangered in 1973, that in July of 1999, the USFWS proposed to remove the bald eagle from the threatened list (Federal Register, July 1999). CDOW data indicates that there are potentially two bald eagle nest sites on private land within the Uncompahgre River valley, but when BLM biologist, Jim Ferguson checked the sites for activity during the spring and summer of 2000, they were inactive. Both sites are in cottonwood trees in agricultural areas. There are no known nest sites on public land in the analysis area.

No black-footed ferrets have been documented in the area, but there have been reported sightings and survey work conducted by the USFWS and CDOW. USFWS surveys were conducted from aircraft during the winter and CDOW surveys were night spotlight surveys in the Hotchkiss area. It is unlikely that there are black-footed ferrets in this area at this time. The latest report of a ferret sighting was received in 2001, but the sighting was at mid-day and therefore not likely to be a black-footed ferret. Some previous ferret sightings turned out to be European ferrets that had escaped or been abandoned by owners.

Burrowing owls are known to occur in some of these prairie dog colonies. BLM data indicates that sightings are infrequent, and there is no data on the condition or trend of this species population in the area, but range wide the population has declined.

Currently BLM inventory efforts have not identified any sites within the analysis area as suitable habitat for southwestern willow flycatchers. Although nesting pairs of flycatchers are known to exist at the Escalante State Wildlife Area near Delta, there is no data to indicate that there are any nesting pairs within the analysis area. Currently there is a proposal to revamp the known range of this species by moving the northern boundary of its distribution southward close to the New Mexico border. It is possible that by 2002 this species will no longer be a management factor for this office.

There are 8 individuals of the experimental whooping crane population from Gray's Lake that still migrate through the area in the company of sandhill cranes (USFWS, 2001). Whooping cranes have been documented as stopping over at Fruitgrowers, Crawford, and Gould Reservoirs. There is no documentation of whooping crane use of any of the public lands within the analysis area, so public land management decisions are felt to have little or no impact on this species.

A small population of 200-300 Gunnison sage grouse are present in this area and use the extensive sagebrush area east from Green Mt. (Figure W3). Gunnison sage grouse were recently classified “Candidate” under the ESA. In 1995, to address rising concerns about the long term status of the Gunnison sage grouse in the Crawford area the Colorado Division of Wildlife, the Bureau of Land Management, Fish and Wildlife Service, local landowners, and interested individuals and groups formed the “Crawford sage grouse partnership” to address declining trends of sage grouse numbers. In 1998 the Partnership completed a Conservation Plan which outlines a framework that will guide a coordinated management effort to improve sage grouse habitat and reverse the long term downward trend. Sage grouse numbers appear to have increased slightly since 1994 (Figure W4). Currently the primary sage grouse use area is along C-77 road west of Poison Spring Gulch to Green Mountain, and between the Black Canyon of the Gunnison River on the south and Red Canyon on the north. Elevation of this area ranges between 6560 - 8200 feet. All known, active leks are on BLM land within this area, spaced fairly evenly for about 7 miles west from the Black Canyon Road. All leks are located 1/4 mile of the road on the north side. Most of the sage grouse activity, strutting, breeding, nesting, and wintering occurs within the first four miles of this area west of the Black Canyon road. This strip is the largest contiguous sagebrush dominated site within the Crawford area. Vegetation in this strip blends from sagebrush in the middle along C-77 road to invading pinyon and juniper on the north edge at lower elevations near Red Canyon, and to mountain shrubs on the south edge at higher elevations toward the Black Canyon.

Figure W4. Gunnison grouse population trend

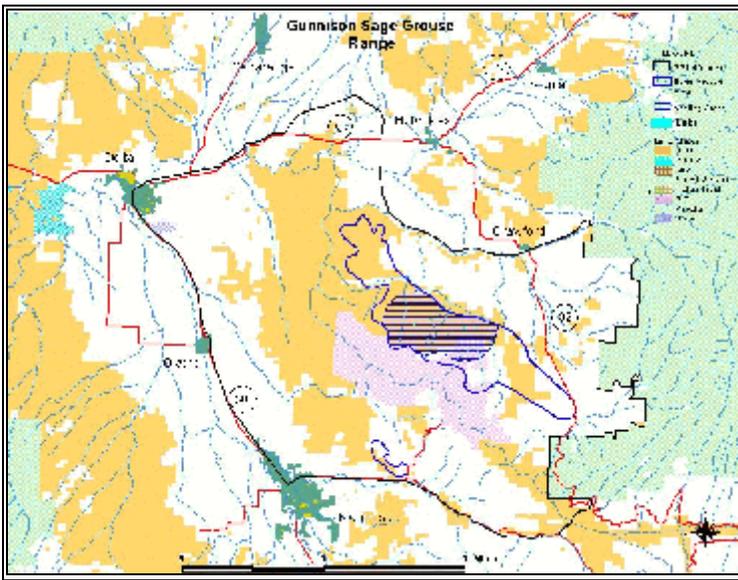
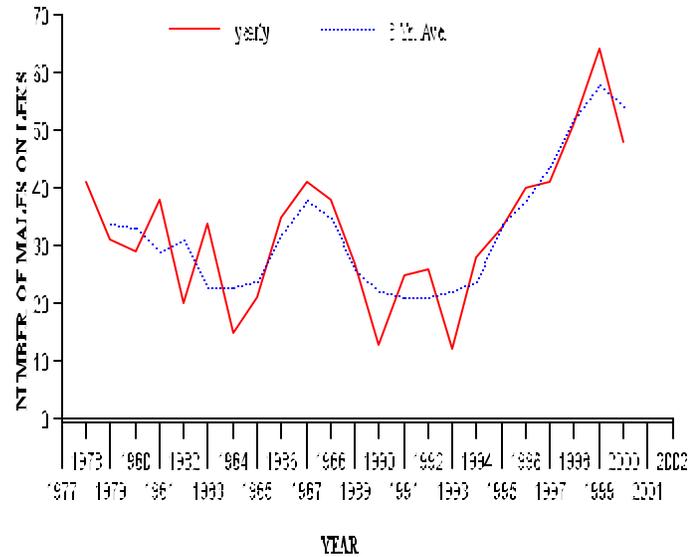


Figure W3. Crawford Area Gunnison Sage Grouse Range

Gunnison River on the south and Red Canyon on the north. Elevation of this area ranges between 6560 - 8200 feet. All known, active leks are on BLM land within this area, spaced fairly evenly for about 7 miles west from the Black Canyon Road. All leks are located 1/4 mile of the road on the north side. Most of the sage grouse activity, strutting, breeding, nesting, and wintering occurs within the first four miles of this area west of the Black Canyon road. This strip is the largest contiguous sagebrush dominated site within the Crawford area. Vegetation in this strip blends from sagebrush in the middle along C-77 road to invading pinyon and juniper on the north edge at lower elevations near Red Canyon, and to mountain shrubs on the south edge at higher elevations toward the Black Canyon.

juniper on the north edge at lower elevations near Red Canyon, and to mountain shrubs on the south edge at higher elevations toward the Black Canyon.

Sage grouse use is also known to occur outside this area, as far east as Hwy. 92 south of Gould Reservoir to the southeast, and on Black Ridge to the northwest. Also, sage grouse sightings have been reported recently in other locations within the Crawford and North Fork Valley, and in Bostwick Park, however, there is no evidence of long-term occupation.

Inventory efforts by the U.S. Fish and Wildlife Service (1995) have not documented any endangered fish populations in the Gunnison River above the Hartland Diversion, upstream of Delta. The analysis area does not provide habitat for the pikeminnow, the razorback sucker, bonytail chub, or humpback chub. A population of razorback suckers and colorado pikeminnows is present in the lower Gunnison River and could be affected by management decisions in the analysis area, especially if water depletions are involved. CDOW fish data (Nehring, 2001) indicates that there are flannelmouth suckers in the Gunnison Gorge. Survey data in 2000 indicated that the density of this species was only about 0.08 individuals per acre or 0.2 lbs per acre.

There is little data on the condition of the river otter populations within the Gunnison Gorge. The otters were reintroduced here in 1977 and are believed to be doing well. Occasional reports from recreation users and evidence of otter use on the stream banks are documented. It is doubtful that any BLM activities or management are having any effect on this species.

The local kit fox population is believed to be part of the larger population that extends down the Gunnison River valley to the Grand Junction area and on into the deserts of eastern Utah. CDOW has completed extensive field inventory work in the analysis area trying to locate and study the local kit fox population. Few animals were found, and the general trend of the population seems to be static at best. Tom Beck, researcher for CDOW, stated during the winter of 2000 that we are probably dealing with a remnant population here that is slowly dying out. He reasons that kit fox are not adept at traversing highways, rivers, subdivisions, and active farm lands, which means that the individuals in Peach Valley and near the Montrose landfill are most likely isolated from the remainder of the population to the north.

CDOW inventory work identified the spotted bat and big free-tailed bat as being present in the Black Canyon/Gunnison Gorge area. No population health data is available at this time. Burrowing owls are found infrequently within the prairie dog colonies in this area. Sightings are far fewer than would be expected considering the available habitat, and populations of this species are believed to be declining throughout its range (CDOW, 2001). The species is vulnerable to human disturbance, avian and mammalian predation, and dogs.

Ferruginous hawks, long-billed curlews, and white-faced ibis are known to occur in the area during migration, but there is no evidence that any of these species nest in the area or over winter here. Midget faded rattlesnakes and northern leopard frogs are present, but no data is available on population health or trends.

The analysis area provides habitat for five species of rare plant, several of which are closely tied to the Mancos Shale soils (Figure 1.9). The clay loving wild buckwheat is largely confined to areas within Peach Valley and areas east of Montrose, including the Fairview Research Natural Area. The Peach Valley road and at least one other small two track road bisect known occurrences of this species. In each case the impacts from the roads are old, and no current impacts to this species from off road vehicle travel were documented during the data collection portion of this analysis. BLM inventories have not identified grazing or trampling impacts to this species from livestock management on public land. A recent comprehensive evaluation of this species status on public land has not been

completed, but BLM is unaware of any losses of occupied habitat on public land. Information received from James Reveal (personal communication, 2000) indicates that development on private lands in the valley has resulted in the extermination of several occurrences of this plant, and Peggy Lyon (2001) has indicated that the populations on private land at the type locality and critical habitat have also been damaged by the landowner's activities. The type locality has recently been placed under conservation easement that focuses on preserving this species' habitat. These trends make the active preservation of the public land sites especially important.

The Uinta Basin hookless cactus in this area are part of the larger Gunnison River metapopulation. This area seems to be on the eastern fringe of the Gunnison River population range, and there does not appear to be potential for large numbers of individuals. In the peach valley area individual plants found are confined to locations where there is a gravel pediment overlying the Mancos shale. BLM inventories have identified few real impacts to this species from other activities on public land, including livestock grazing and off highway vehicle use.

The Montrose bladderpod was first described as a new species in 1997. Subsequent inventory work by the Colorado Natural Heritage Program has found many new population sites in more habitats than originally anticipated. CNHP field work has expanded the range to include portions of the lower Gunnison River and Upper Gunnison River drainage, well outside the boundary of this analysis area. This plant may prove to be tolerant of a wide range of habitat substrates, and be in little danger of significant impacts from human activities.

The Delta lomatium, and Montrose penstemon are Mancos shale endemics which are obligate to that geologic type. Although Rocky Mountain thistle is found on Mancos shale in this area, it is not restricted to that substrate throughout its range. The lomatium and penstemon are confined to habitats in the Uncompahgre, and North Fork river basins. As more areas are inventoried, more occurrences of these species are found. Even though the overall range of the plants is quite small, indications are that the populations are secure. The Rocky Mountain thistle is found in Ouray, Montrose, Delta, and Mesa counties. In some locations it may be subject to spraying by well meaning individuals who assume that the only good thistle is a dead thistle. Most of the recently found population sites on public land are located in the adobes in locations where there is little potential for noxious weed spraying programs to impact them. The plant should be secure on public land.

Wetherill milkvetch is found within the Gunnison Gorge in small numbers and the Black Canyon gilia is known from the precambrian rock cliffs inside the Black Canyon National Park. There is some potential for the gilia to occur on public land downstream of the Park, but the vertical rock habitats provide a barrier to data collection. The cliffs also protect the plants from most human impacts. The giant helleborine and long-flowered cat's eye are distributed over a fairly wide range. The giant helleborine may have been more common in riparian areas prior to the introduction of livestock into the western ecosystems. This plant is rarely found in those locations today, and there are no documented sites within the analysis area.

During the summer of 2001 BLM has contracted with the Colorado Natural Heritage Program to evaluate the interaction of off road vehicle use and rare plant populations in the Mancos shale areas at the southern end of the analysis area, between Flat top and Falcon Road. The results of the work are not yet available, but new occurrences of *Lomatium concinnum*, *Penstemon retrorsus*, and *Cirsium perplexans* have been documented in the area. Tentative information indicates that there are some impacts to these species from off road vehicle use, but early reports indicate that use levels have

not yet hit the point where they are eliminating local populations. There may be some areas where these plants have been completely eliminated by vehicle use, but there is no historic data to verify this.

Watersheds, Drainages, and Water Quality

The Gunnison Gorge Landscape Unit is entirely within the Gunnison River Basin (Hydrologic Unit Code (HUC), 2nd field: 1402), a major tributary in the Upper Colorado River Basin (Figure 1.10). Table 1 shows the HUC , watershed subdivisions for the landscape unit to the 5th field watershed.

Table 1. Watershed Subdivisions (Hydrologic Unit Codes) for the Gunnison Gorge Landscape Unit, to 5th Field.

Region	Subregion	Accounting Unit	4 th Field Watersheds	5 th Field Watersheds
14 Upper Colorado	02 Gunnison	00	14020006 Uncompahgre Drainage	1402000607 Lower Uncompahgre
				1402000640 Spring Creek/Happy Canyon
			14020005 Lower Gunnison Drainage	1402000513 Tongue/Currant Creeks
			14020002 Upper-Gunnison Drainage	1402000205 Smith Fork/Crawford Res.
				1402000210 Black Canyon
				1402000207 Blue Mesa Res./Upper Gunnison
				1402000281 Cimarron
				1402000253 Crystal Creek
14020004 North Fork Gunnison	1402000458 Leroux/Cottonwood Creeks			

At the 4th field watershed level, the drainage configuration with the landscape unit is somewhat discontinuous. The two 5th field watersheds in the Uncompahgre drainage (HUC 14020006), generally drain to the west/northwest, into the Uncompahgre River. The Uncompahgre River drains to the Gunnison River downstream of the landscape unit boundary. The three remaining 4th field HUC's (14020005, 14020002, and 14020004) all have direct hydrologic connection to the Gunnison River within the landscape unit boundary.

Within the landscape unit there are approximately 43 miles of perennial streams and rivers. The major perennial stream systems include: the Gunnison River, occurring within the Blue Mesa/Upper Gunnison, Black Canyon, and Tongue Creek/Currant Creek 5th field watersheds, Cimarron Creek,

occurring within the Cimarron Creek 5th field watershed, Muddy Creek, Iron Creek and the Smith Fork, occurring within the Smith Fork/Crawford Reservoir 5th field watershed, and the North Fork of the Gunnison River occurring within the Tongue/Currant Creeks and Leroux/Cottonwood Creeks 5th field watersheds.

The perennial streams in the landscape unit experience high flows from both snowmelt and rainfall events. The snowmelt runoff is generated in the high elevation, headwaters of the Upper Gunnison and North Fork Drainages and can result in elevated river flow for weeks or months in the spring and early summer. Short duration flood flows commonly occur from high intensity precipitation events associated with monsoonal air flow patterns in late summer. Typically, these summer floods are localized, and more significant on low order drainages in portions of the landscape unit where watershed cover is minimal. However, summer floods can carry large sediment loads to the bigger rivers like the Gunnison, resulting in changes to river morphology and present a disturbance to the aquatic biology. Additionally, the North Fork, Smith Fork, and Gunnison River Flows are regulated by upstream reservoirs. The most significant regulation of river flow in regard to potential effects to flow-dependent resource values is the Gunnison River, downstream of the Aspinall Unit. Several changes to the historic, natural flow regime in the Gunnison River, within the landscape unit, are reflected in the river channel morphology (see Standard 2 Results Section), riparian plant community, and flow-dependent recreational opportunities. A trans-basin diversion from the Gunnison River in the upstream reaches of the landscape unit, for irrigation in the Uncompahgre Valley, results in a significant water depletion to the downstream reaches. The Aspinall Unit, consists of a series of 3 storage reservoirs (Crystal, Morrow Point ,and Blue Mesa) upstream of the landscape unit on the Gunnison River. Since their operation began in the 1960's, downstream peak flows have been diminished and low periods augmented.

Ongoing water flow issues in the Gunnison that have the capacity to change flows from the present regime, include a Federal Reserved Water Right quantification recently filed by the National Park Service, for the Black Canyon National Park, that would return flows in this portion of the Gunnison River to a more natural hydrograph (high spring peak flows, and low base flows in late summer, fall, winter and early spring). The US Fish and Wildlife Service, having responsibility for managing Threatened and Endangered fish species in the lower Gunnison River are also attempting to secure a more natural flow regime in the Gunnison River. Conversely, a private venture in the planning stage, the AB Lateral Project, proposes to extend the present irrigation diversion from the Gunnison River to the Uncompahgre Valley, year long for hydroelectric power generation. This proposal would reduce flows in the Gunnison River during the irrigation off-season.

Exclusive of the perennial stream systems discussed above, the remaining drainages in the landscape unit primarily consist of low order, intermittent or ephemeral drainages. Most of these drainages flow only in response to precipitation events, with the highest flood flows occurring from late summer thunderstorm events. The landscape unit's soils are largely medium to fine textured, being derived from sedimentary sandstones and shales. Consequently, intense precipitation events have the capacity to erode surface soils, especially on the steeper slopes and where vegetation cover is less than at potential.

Drainages formed in soils derived from the marine-deposited Mancos shale, most common in the western portions of the landscape unit, are especially vulnerable to high rates of soil erosion and salinity yields. Water quality in the North Fork, Uncompahgre and Lower Gunnison Rivers is affected

by salinity and sediment from areas dominated by Mancos shale. An inventory of a Mancos shale dominated area, within the landscape unit, in the 1980's showed, a significant variation in soil surface salinity. Depositional environments such as valley fill deposits showed low salinity concentrations, while salinity was significantly higher on steep, erosional environments. The highest salinity concentrations were found on steep slopes with little watershed cover, primarily on southern aspects (table 2).

Table 2. Statistical Summary of Inventory Data, Elephant Skin Wash, an Area Dominated by Mancos Shale Derived Soils

Average Values					
Aspect Erosional Sites	Ground Slope %	Soil Salinity as EC, mmhos/cm	Watershed Cover %	Basal Cover %	Sample Number
North	52	3.6	49	12	9
East	58	4.5	33	7	8
South	72	12.2	2	0	20
West	51	5.5	35	9	11
Depositional Sites	5	1.5	51	6	19

All of the stream and river reaches within the landscape unit, have stream classifications and water quality standards, established and enforced by the Colorado State, Water Quality Control Division (Colorado Department of Health). Table 3 lists stream designations and classifications by 5th field watershed.

Along with the stream designations and classifications listed in table 3, are numeric and narrative standards (see, Colorado Water Quality Control Commission). For example, the Recreation 1 classification limits Fecal Coliform to 200 colonies/100 ml, while Recreation 2 has a limit of 2,000 colonies/100 ml. The “Use Protected” designation is for waters of the state that do not warrant special protection provided by the outstanding waters designation or the antidegradation review process. Basically, the “Use Protection” designation allows for some water quality degradation, as long as the use classifications are protected (see, Colorado Water Quality Control Commission).

In addition to the state’s water quality designations, classifications and numeric standards, all surface waters of the State are subject to the Basic Standards (Colorado Water Quality Control Commission), which in part read: state surface waters shall be free from substances attributable to human-caused point or nonpoint source discharge in amounts, concentrations or combinations that:

1. Can settle to form bottom deposits detrimental to the beneficial uses (e.g. silt and mud)
2. Are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life.
3. Produce a predominance of aquatic life.

Table 3. Stream Classifications and Designations for the Gunnison Gorge Landscape Unit

4th Field Watersheds	Stream Segment	Stream Designation	Stream Classifications
14020006 Uncompahgre Drainage	All tributaries to the Uncompahgre River	Use Protected	Aquatic Life Warm 2 Recreation 2 Agriculture
14020005 Lower Gunnison Drainage	All tributaries to the Gunnison River	Use Protected	Aquatic Life Warm 2 Recreation 2 Agriculture
	Gunnison River		Aquatic Life Cold 1 Recreation 1 Water Supply Agriculture
14020002 Upper-Gunnison Drainage	Gunnison River from Crystal Reservoir to downstream boundary of 14020002		Aquatic Life Cold 1 Recreation 1 Water Supply Agriculture
	Smith Fork		Aquatic Life Cold 1 Recreation 1 Agriculture
	Tributaries other than Smith Fork and North Fork	Use Protected	Aquatic Life Warm 2 Recreation 2 Agriculture
	Blue Mesa , Morrow Point and Crystal Reservoirs and the Gunnison River that interconnects them		Aquatic Life Cold 1 Recreation 1 Water Supply Agriculture
	Cimarron River and other tributaries to the Gunnison River	Use Protected	Aquatic Life Cold 2 Recreation2 Agriculture
14020004 North Fork Gunnison	North Fork of the Gunnison		Aquatic Life Cold 1 Recreation 1 Water Supply Agriculture

	Tributaries to the North Fork	Use protected	Aquatic Life Warm 2 Recreation 2 Water Supply Agriculture
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None of the stream or river segments within the landscape unit are on the state’s 303(d) list for impaired water quality or the Colorado 1998 Monitoring and Evaluation List for suspected impairment. However, Colorado’s Unified Watershed Assessment, 12/98, ranked 14020006, 14020005, and 1402004, 4th field watersheds as Category 1, “Watersheds in Need of Restoration. Only portions of these watersheds are within the boundary of the landscape unit. Although, less than optimal watershed conditions on portions of the landscape unit may be factor for the Category 1 rankings, lands outside of the landscape unit have also contributed to the lack of meeting clean water and other natural resource goals, (table 4). The Upper Gunnison Basin Hydrologic Unit, 1402002 was ranked a category 3, “Watersheds Meeting Goals, Included Those Needing Action to Sustain Water Quality”. The purpose for the Unified Watershed Assessment is to improve Colorado’s eligibility for nonpoint source grant funds, and other funding mechanisms related to the Clean Water Action Plan.

Table 4. Colorado’s Unified Watershed Assessment Rankings

Watershed	Category Ranking*	Category Ranking for BLM Portion of Watersheds	Rationale for Ranking
14020002 Upper Gunnison	3	2	-50% federally managed - Colorado River cut throat in headwaters (outside of landscape unit)
14020004 North Fork	1	not ranked	- 50% federally managed - Temporary modification of Selenium. water quality standard, several segments on 303(d) (outside of landscape unit) - Information received from local watershed organizations indicates restoration needs (outside of landscape unit).
14020005 Lower Gunnison	1	4	- Mainstem, downstream of landscape unit, is medium priority on the 303(d) list. - BLM is major land manager - Newly occupied by native fish due to fish ladder at Redlands (downstream of landscape unit) -EQIP project area. - Lower Gunnison Salinity Control Unit

14020006 Uncompahgre	1	not ranked	- Portions of mainstem a high priority on the 303(d) list (portions of landscape unit drain into mainstem). - EQIP project area. - Lower Gunnison Salinity Control Unit
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* Unified Watershed Assessment Ranking are defined as:

Category 1: Watersheds in Need of Restoration

Category 2: Watersheds Meeting Goals, Including Those Needing Action to Sustain Water Quality

Category 3: Watersheds with Pristine/Sensitive Aquatic System Conditions on Lands Administered by Federal, State, or Tribal Governments.

Category 4: Watersheds with Insufficient Data to Make an Assessment.

Much of the area underlain by Mancos shale within the landscape area has been reviewed for salinity reduction management to be in compliance with the Colorado River Basin Salinity Control Act of 1974, and amendments in 1985. In August of 1983, a Watershed Activity Plan (EA # CO-030-U84-27) was prepared for an ephemeral/Mancos shale dominated drainage, Elephant Skin Wash. The water quality objectives of the plan were to reduce sediment and salt yields from diffuse sources within the drainage by use of structural methods. Two of 4 proposed sites were developed with a series of channel diversions and ponding dikes, that remain functional. Monitoring subsequent to project development concluded that structural control for salinity management in this type of environment is not cost effective.

Selenium concentrations in reaches of the Lower Uncompahgre and Gunnison Rivers are, at times, elevated above the Colorado State Water Quality Standard of 5 ppb. The elevated levels of Selenium arise from a variety of nonpoint sources associated with both human-caused and natural processes, and all sources appear to be associated with the Mancos shale. In the mid 1990's, a group of private, local, state and federal interests formed the Gunnison Basin Selenium Task Force. The goal of the group was to initiate the state's Total Maximum Daily Load (TMDL) process and find ways to reduce Selenium within the affected river reaches. Initial soil analyses of Mancos shale derived soils on public land within the landscape unit show Selenium levels to be approximately 34 times levels found on similar soils under cultivation.

METHODS

The land health assessment was conducted on public lands in the Gunnison Gorge Unit during July and August of 2000. The following procedure was used:

- 1). The area was first broken apart into around 100 different polygons. Polygons were based on soil mapping units and allotment boundaries. Polygons ranged from 9 to 9,200 acres in size.
- 2). The team ranged between 6-8 people. At the beginning of each week, the entire team worked together collecting data, in order to gain consistency. Afterwards data was collected primarily by interdisciplinary teams of three people.
- 3). Each polygon was visited in the field, and land health assessment forms were used to describe the plant community characteristics, and various soil and community health attributes. Polygons were evaluated at between 2 and 9 sites spread across the polygon, based on the size of the polygon. The sites were predetermined on maps, and not subjectively chosen in the field. Data collection occurred in the field, and preliminary evaluations of each polygon against Standards 1 and 3 were made within 1-3 days of the site visit by the team. Nearly every point was mapped by a GPS unit in the field. A photo of

each stop point was taken.

4). Riparian data from the riparian PFC assessment that took place in 1994-1997, and supplemented in 2000 was used to address Standard 2, together with some Greenline transect data. Standard 5 was evaluated based on the PFC data, the data from the Rapid Assessment, and Colorado's stream water quality designations. Only streams with intermittent or perennial flow were considered capable of supporting significant riparian vegetation, and thus only these were assessed for Standard 2.

5). Data from the forms was entered into DBASE (several modules: speciera, grpcvrra, healthra, headerra), and polygons and stop points from the maps were entered into ARC. The databases were then linked to the polygons and to the stop points to provide a system that allows maps to be made based on any of the data attributes collected. Mean values for each site type (unique combination of soil type, slope and aspect) were calculated as a means to assess the indicators for each site.

6). A final polygon determination for Standards 1 and 3 was made by the ID team using mean scores for each attribute at each of the sites. The ID team judged each polygon as to whether it was meeting the standard (no evident problems at any site in the polygon), not meeting the standard (problems at one half or the majority of sites in the polygon), or meeting with problem areas (problems at less than half of the stops in polygon), based on a preponderance of evidence. The "meeting with problem areas" category has been used in past land health assessments, and denotes polygons which on balance meet a health standard, but have some indicators or locations within them that the ID team would like to see tracked and managed for improvement. Problems were defined as a score of 1 or 2 for the following health indicators: runoff drainages, pedestals, plant distribution, community diversity, exotic plants, noxious weeds, or litter retention; or for scores of less than average for the site type for soil cover or plant cover or vigor attributes. Reasons for the rankings were documented. Riparian Functioning at Risk ratings were directly translated into "meeting with problems", as they had been in past land health assessments.

7). Polygon rating (meeting, not meeting, meeting with problems (Functioning At Risk)) was then entered into the ARC polygon map attribute table which also contained attribute fields to document reasons for the rating, and to list causes. Causes for polygons not meeting or FAR for any standard were discussed by an ID team with reference to grazing dates, actual use, and by evaluating the type of problem.

8). Numerous maps were created showing the locations of different types of problems across the assessment area, based on the data collected at sample points.

9). Large scale health issues were assessed by using the Landsat vegetation map and the desired landscape map that has been developed the fire planning process, in addition to wildlife population data.

10). Standard 4 was rated based on existing location data of special status species and Colorado BLM's listed species of concern together with habitat needs data and the data from the Rapid Assessment.

RESULTS

Standard 1:

Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic process. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

*Indicators used to assess this standard include: rills and **pedestals**, active **gullies**, appropriate **groundcover** and plant canopy cover, **litter accumulation**, **litter movement**, appropriate soil organic material, plant species diversity and vigorous, desirable plants.**

** bold text identifies the indicators which were most important for this assessment*

Acreage Figures

Meeting Standard 1		Not Meeting Standard 1	Unknown	Water
Meeting	Meeting with problems			
77,861 acres	23,181 acres	48 acres	8,098 acres	677 acres

See figure 2.1 for locations of problem polygons.

Specific Problems

Active Soil Erosion-Pedestals and Gullies

Soil erosion is a concern because it reflects loss of site productivity and potential that usually cannot be regained for centuries or more. Gullies along with other downcutting or widening channels, and the formation of pedestals on the soil surface were two primary indicators used to evaluate active soil erosion. Gullying is most extensive on the eastern part of the unit, where gullies or downcut channels were found at eight sites (Fig. 2.2). This problem area spans several allotments and occurs on public lands that are interspersed with private lands. Two smaller areas with apparent erosion problems were observed along the adobes where a scattering of pedestal problems and gullies occurred among sites without elevated erosion.

Active Soil Erosion-Runoff Drainages

Runoff drainages or rills occur where water fails to infiltrate into the soil and instead runs off the site as overland flow. Water running over the soil surface is often an important source of soil erosion, carrying off soil particles as it goes. An additional concern is that water, by not entering into the soil, is unavailable for plant growth. This results in even lower productivity in an area that is already constrained by a dry climate. Very few areas with high levels of runoff drainages were found in the assessment area (Fig. 2.3).

Figure 2.1 Standard 1 polygon ratings

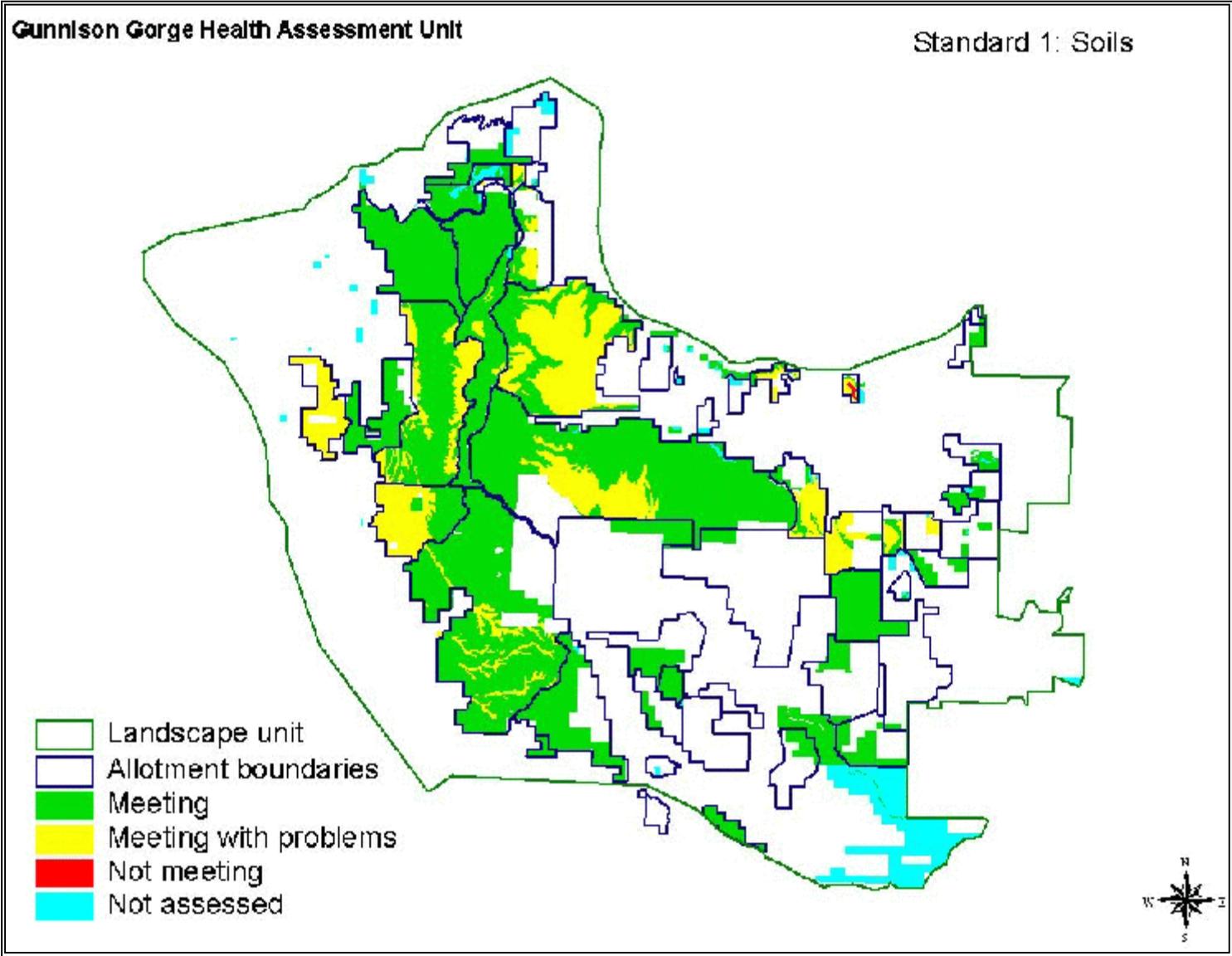


Figure 2.2 Soil loss problems: map shows all sites with channels ranked as Rosgen type G channels as gullies. Pedestal problems are sites with scores of 2 or lower on the Rangela Health Assessment data sheet. Blue circles show areas in the landscape with problem areas.

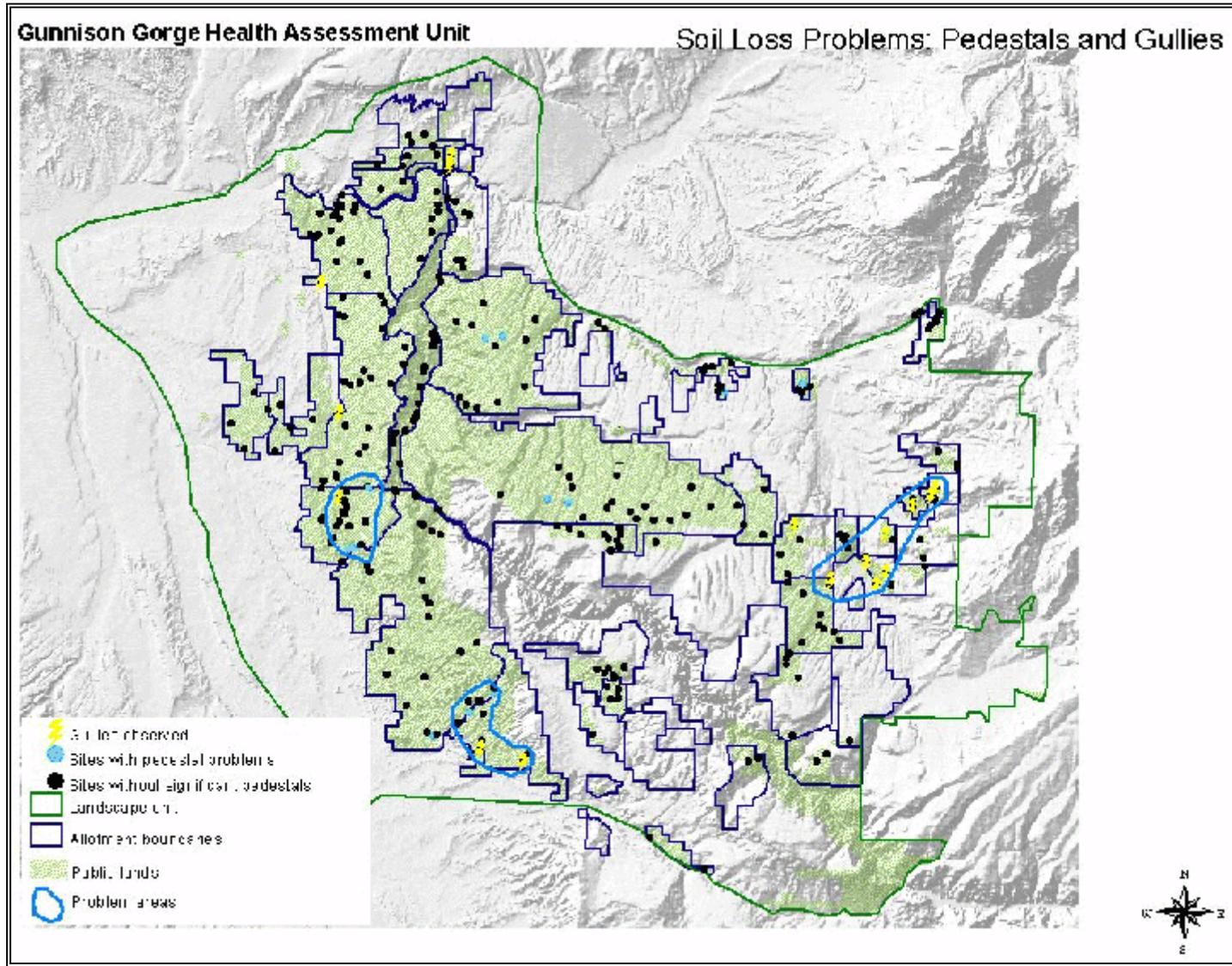
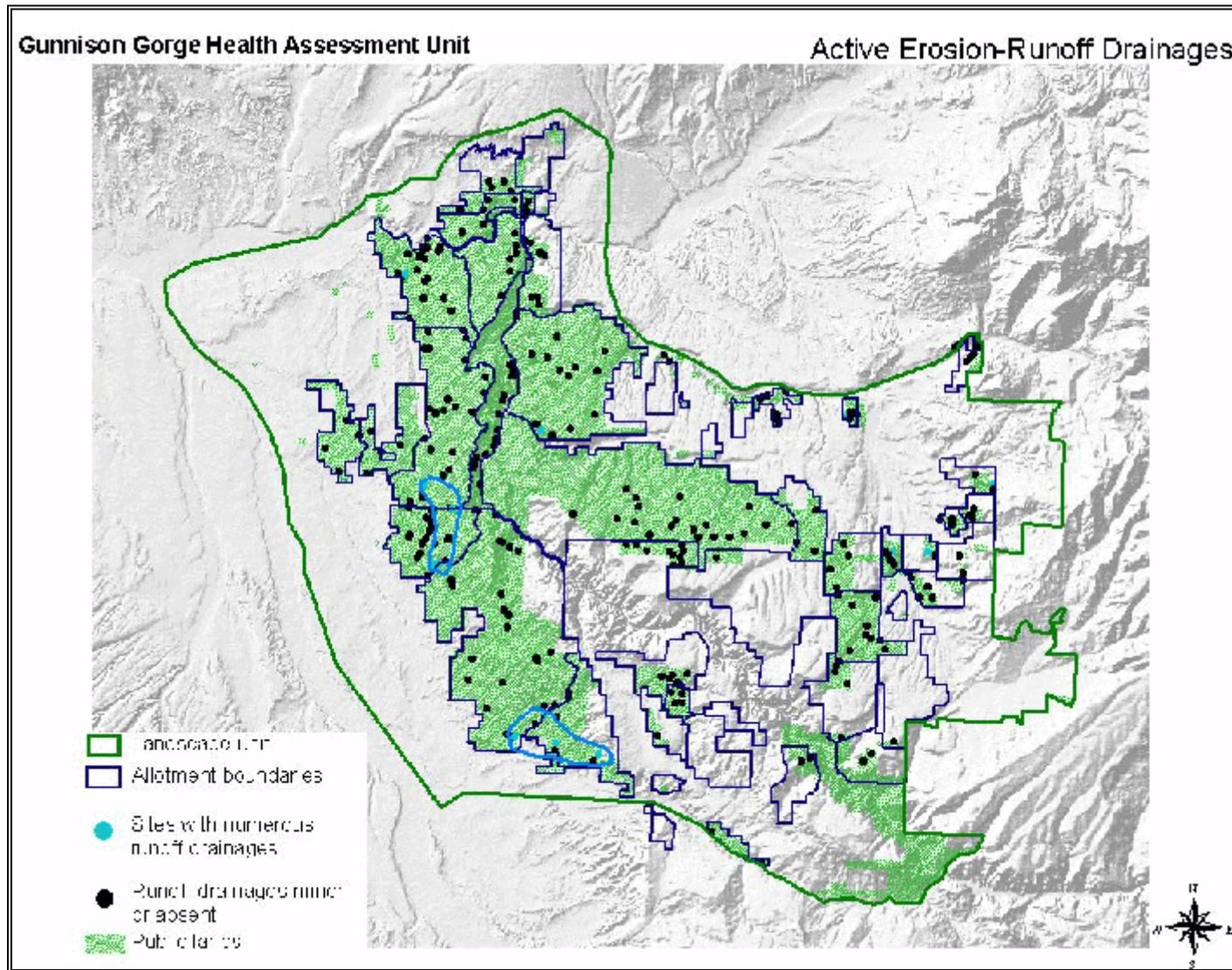


Figure 2.3 Runoff drainages: sites with runoff drainage scores of 1 or 2 on the Rangeland Health Indicator sheet are considered problem sites. Scores of 3,4, and 5 are not shown as problem sites. Blue circles show problem areas in the landscape unit.



Elevated Bare Soil Levels

Bare soil is unprotected from the erosive forces of water and wind, and therefore is vulnerable to erosion. The percent cover of bare soil was an important indicator used to evaluate soil erosion hazard. Higher than average bare soil for the site type was observed at many sites scattered throughout the unit (Fig. 2.4). Concentrations of such sites were observed in seven areas: around Selig Canal, Brush Point, parts of Green Mountain and Poison Spring, Black Ridge, Sulpher Gulch, and the eastern end of the unit.

High Soil Erosion Hazard

High erosion hazard ratings indicate areas that are especially vulnerable to soil erosion. Erosion hazard combines soil texture with amount of bare soil and slope to create an index of vulnerability. Few sites had high risk for soil erosion across the unit (Fig. 2.5). Weak concentrations of high risk sites were found in four areas: the eastern part of the unit, the adobe hills northeast of Montrose, the upper Peach Valley area, and moderate erosion risk around Selig Canal.

Low Perennial Plant Basal Cover

Perennial plant basal cover is one of the best sources of soil protection since it protects the soil surface from wind and water erosion, and binds soil particles together with roots. The percent of ground covered by the basal parts of plants was used as another important indicator of the level of soil protection. In addition to elevating the risk of soil erosion, low basal cover is a concern because the site is producing less vegetation or a different type of vegetation than it is capable of. Most types of sites (soils, slopes, and aspects) in the Gunnison Gorge Unit should be able to produce at least 5% plant basal cover. Many areas in the unit were heavily impacted by historic livestock grazing and other activities in the past. Because of this the average basal cover for most site types is skewed lower than what is desirable given the site potential. Therefore, a minimum cover of 5% used as one indicator to show areas with problems producing soil-protecting vegetation. Concentrations of such areas (Fig. 2.6) were found around Brush Point, Upper Peach Valley, the slopes on either side of the Gorge and within the Gorge, and slopes above the confluence of the North Fork and the Gunnison Rivers.

Perennial Plant Basal Cover Lower Than Average For Ecological Site

Perennial plant basal cover values that are lower than average for the ecological site indicate that the plant community is not as vigorous, or producing the level of soil-protecting ground cover that it is capable of producing. Concentrations of points with low basal cover relative to average values for the site type (Fig. 2.7) were found around Brush Point, the slopes above Upper Peach Valley, across the central part of the Gunnison Gorge from rim to rim, the Dedication Site, and parts of Green Mountain and Poison Spring.

Figure 2.4 Sites vulnerable to soil erosion because of high levels of bare soil: High Bare Ground = sites with 5% or higher bare ground*; Average Bare Ground = sites within 5% of the average bare ground*; Low Bare Ground = sites with less than 5% bare ground*. **Blue polygons** show problem areas in the landscape unit.

*All sites are ranked against the average bare ground for the type being evaluated.

percent compared against the average of site evaluation

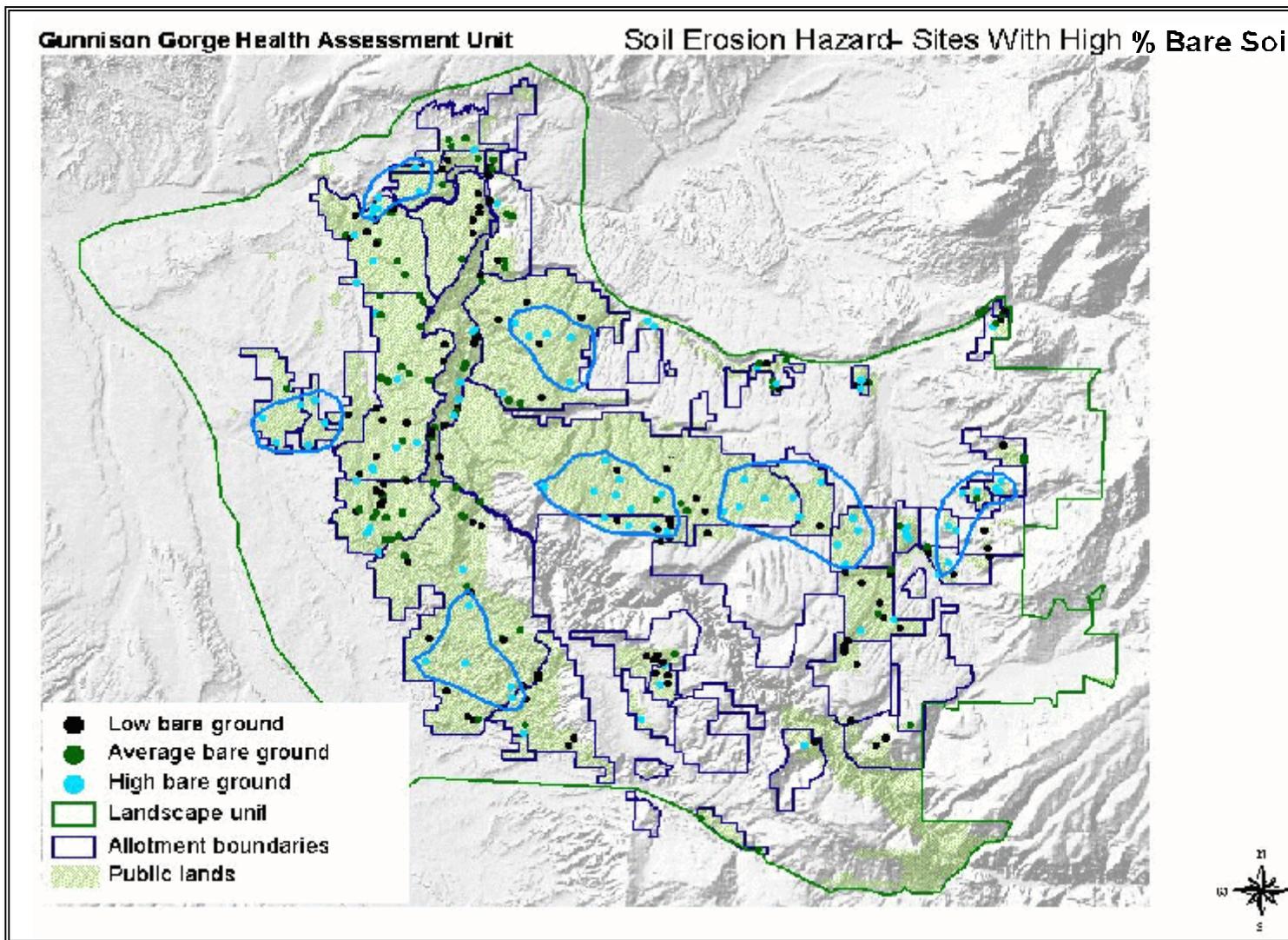


Figure 2.5 Sites with high erosion hazard: soil k factor > 0.2, bare soil > 50%, and slopes > 8% at highest risk, slopes between 4 and 8% at moderate risk. Blue circles show problem areas in landscape unit.

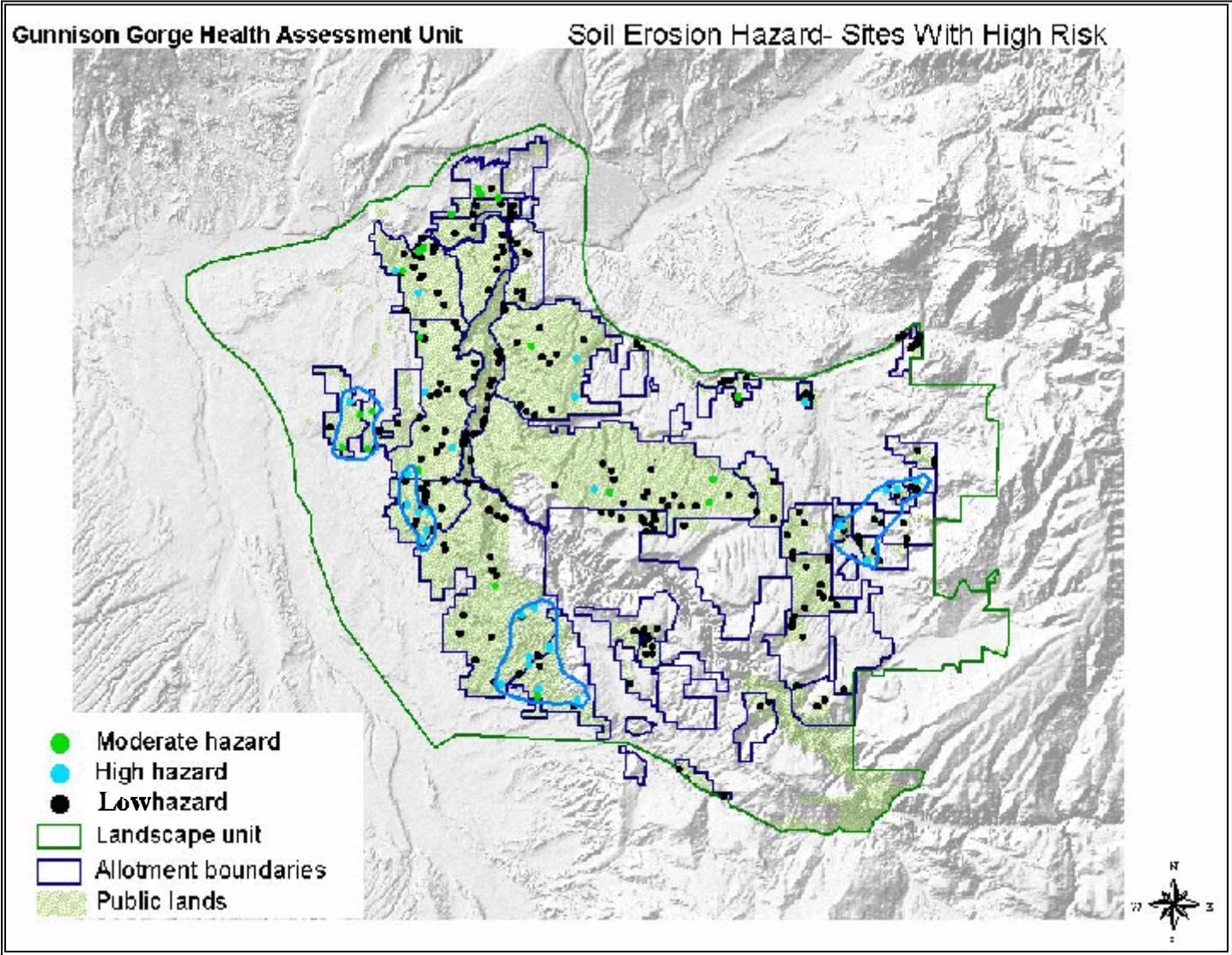


Figure 2.6 Sites with low basal cover (<5%). This does not take site potential into account. Blue circles show problem areas in the landscape

unit.

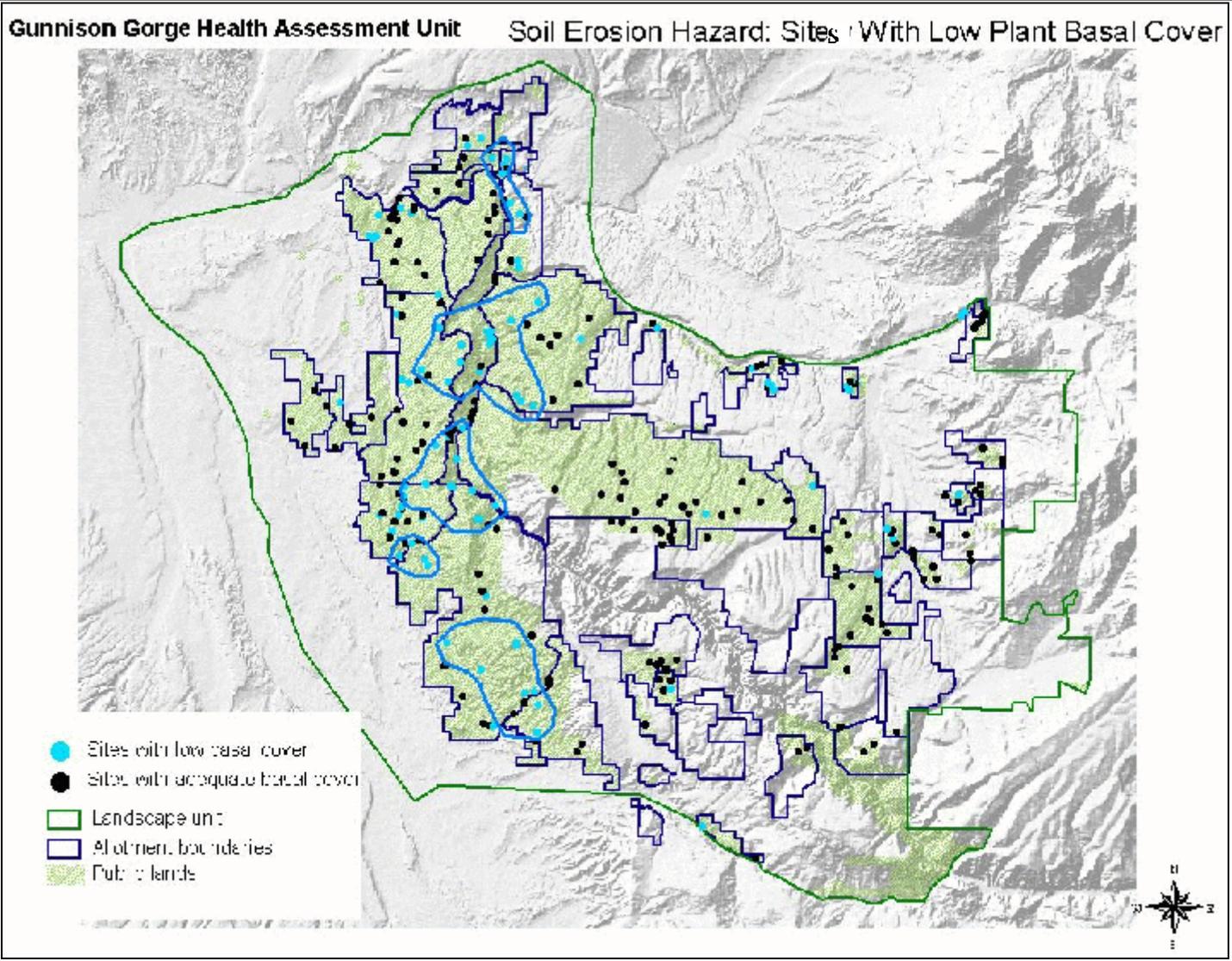


Figure 2.7
 Sites with plant basal cover significantly below potential for site type. Circles show problem areas in landscape unit.

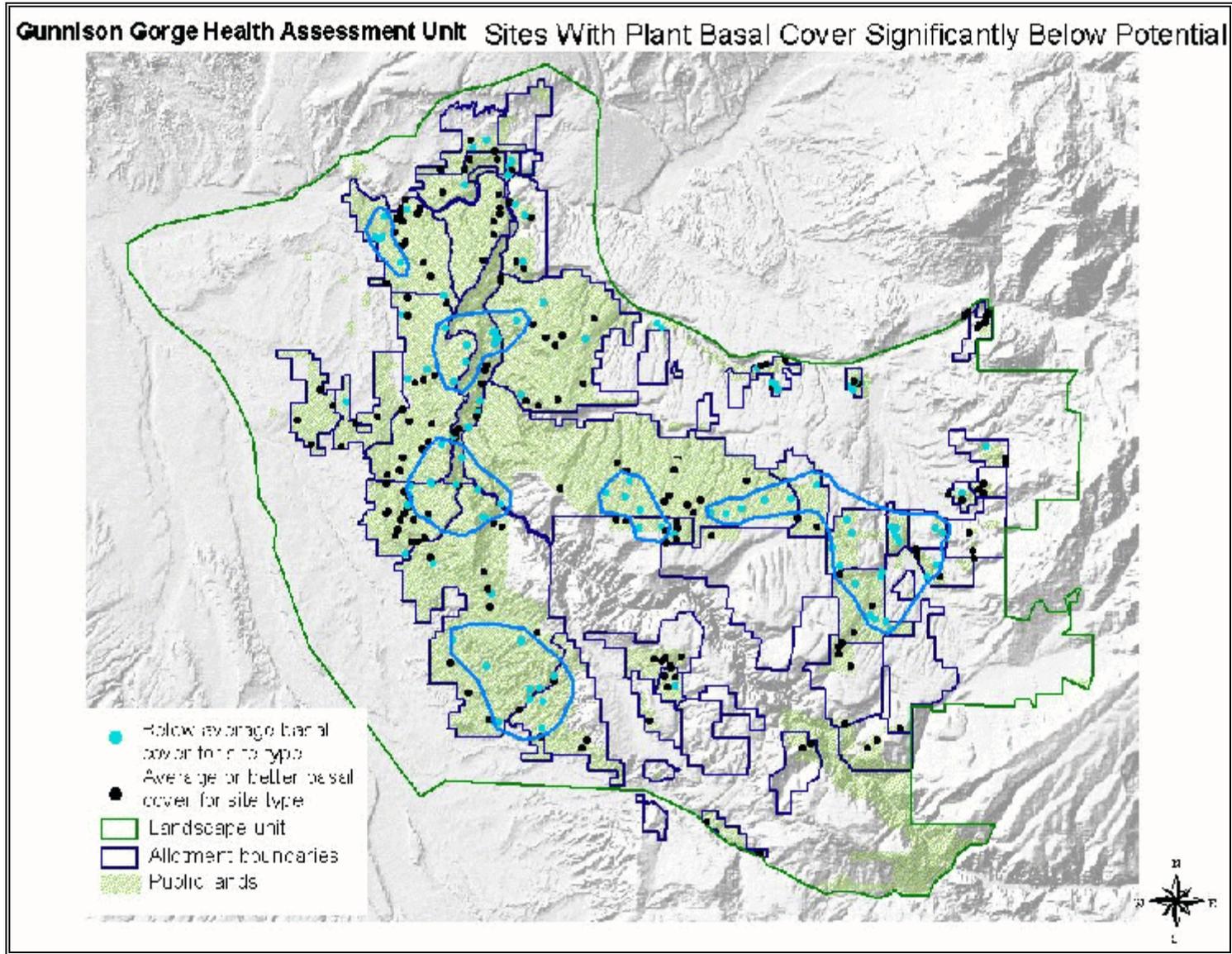


Figure 2.7
 with less basal cover than age for site type. Blue circles show problem areas in landscape unit.

Standard 2: *Riparian systems associated with both running and standing water, function properly and have the ability to recover from major disturbance such as fire, severe grazing, or 100 year floods. Riparian vegetation captures sediment, and provides forage, habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water slowly.*

Indicators used to assess this standard include: native or desirable vegetation dominant, vigorous vegetation, diversity of vegetation age classes, vertical and compositional structure, vegetation that has root systems capable of withstanding high stream flows, species that indicate maintenance of riparian moisture, stream in balance with water and sediment supplied from watershed, indications of high water tables, point bars colonized by vegetation in range of age classes, active floodplain, floodplain vegetation available to capture sediment and dissipate flood energies, appropriate channel meander patterns, woody debris a part of stream morphology where appropriate.

Mileage Figures

Meeting Standard 2		Not Meeting Standard 2	Unknown
Meeting	Meeting with problems		
14.8 miles	24.7 miles	0 miles	0.3 miles

See figure 3.1 for locations of problem streams.

Specific Problems

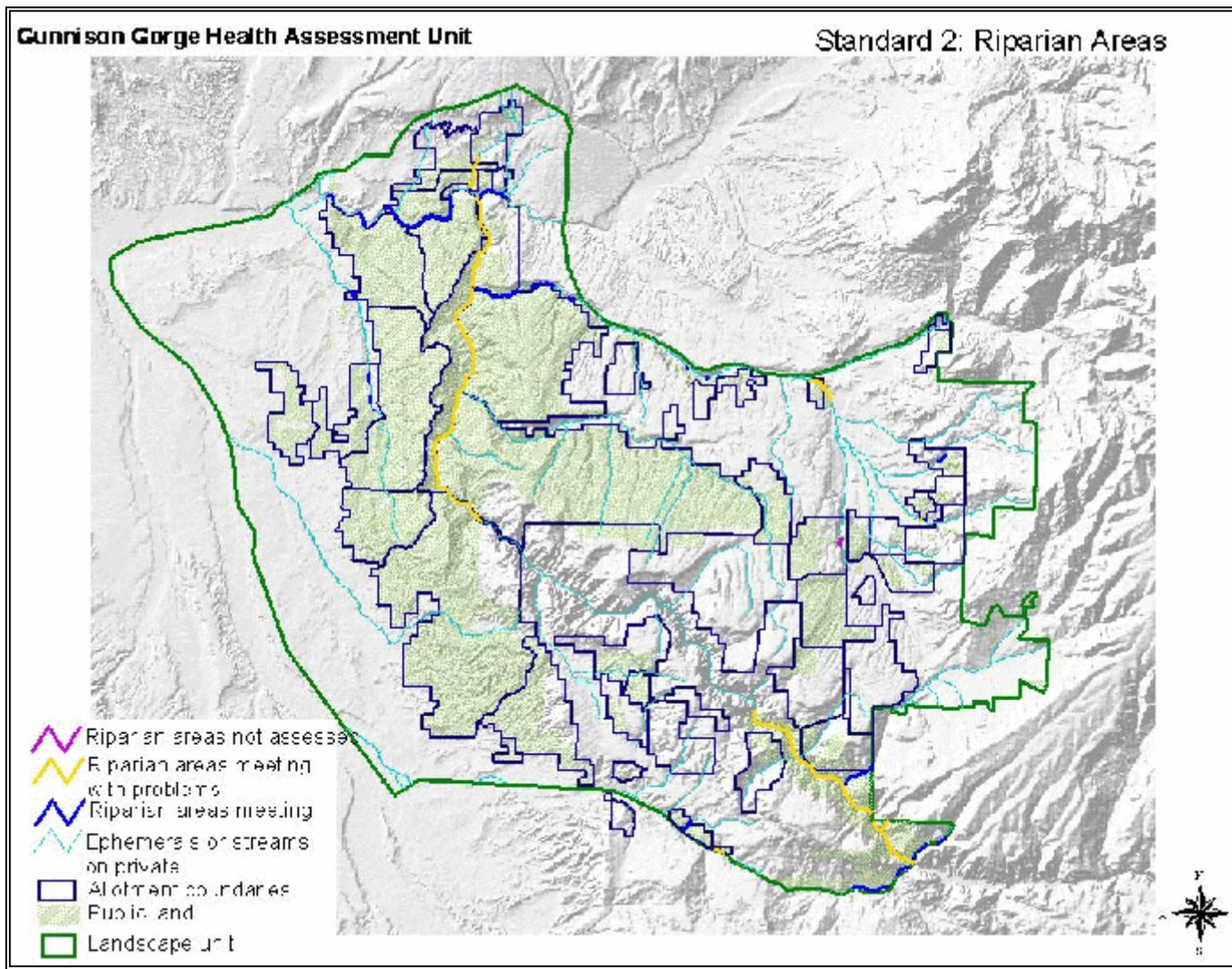
There were no riparian areas on public land in the landscape unit that did not meet Standard 2. Many of the riparian miles fully met the standard, having no evident problems with hydrology, vegetation, or excessive erosion and deposition from either stream channel or watershed problems. The majority of riparian miles (24.7) were rated as “functioning at risk”, which is customarily translated into “meeting Standard 2 with problem areas”. The stream reaches having problems are described here in more detail.

Upper Gunnison River 21.7 miles. The problems identified were an imbalance between sediment delivery and stream energy, and extensive stands of nonnative species in the riparian area. The main sediment problems are not readily visible, but have been detailed by a USGS study which shows steadily accumulating deposits of boulders at the mouths of the tributary canyons (Elliot et al, 1997). The alteration of flow regime by the three upstream dams has reduced peak flows and diminished the ability of the river to move the boulder and other sediment deposits downstream.

Riparian greenline transects have documented the dominance of reed canarygrass (*Phalaris arundinaceae*), which is considered alien in the Intermountain West (Merigliana and Lesica; Weber, 2001), and presence of the nonnative saltcedar along the river downstream of the National Park. Reed canarygrass is a dominant species in the riparian zone in all of the sixteen riparian areas that were randomly sampled. Apparently there once were native populations of this grass in Colorado, but present stands are thought to be hybrids of the native species and agronomic cultivars. The grass is rhizomatous and typically forms thick, nearly monoculture stands at the river’s edge. Saltcedar which is a greater

concern, was present on three of the sixteen randomly selected areas, and increases in the downstream direction.

Figure 3.1 Standard 2 Polygon ratings: Riparian areas along perennial or intermittent streams. Streams rated as Properly Functioning Condition (PFC) are considered to meet Standard 2, those rated Functioning at Risk (FAR) are considered to meet Standard 2 with problems, and those rated as Nonfunctional (NF) are considered not to meet Standard 2.



Sulpher Gulch 1.3 miles. Problems identified were signs that sage and greasewood (upland woody species) were present in some areas of the riparian zone, and that in addition to this most of the streambank vegetation consisted of grasses, not riparian vegetation. The flow in this stream is regulated, and is mainly irrigation return flow that probably varies between ephemeral and intermittent. Given the flow regime, it is unlikely that more wetland-associated species will be able to establish and persist.

Muddy Creek 1.1 miles. Hydrologic problems identified were lack of relatively frequent floodplain inundation, channel incision in some spots, and lack of lateral stream movement in a system that should have more active meandering. Beaver dams and boulders seemed to be preventing additional downcutting in most of the area. There was also a water quality issue, with iron staining on the rocks, and strange water color below the Crawford Reservoir (see the write-up for Standard 5 for more information). The presence of old beaver dams, but lack of current beaver activity was also a concern, particularly if the beaver dams blow out, lowering the water table. This was rated as functioning at risk based on the flow regulations imposed by the dam, and the water quality issue. It was unclear whether the water quality had driven out the beaver and whether or not it was affecting the vegetation.

Long Gulch 0.4 miles. This reach was rated as functioning at risk based on a conservative call. It is very steep and inaccessible, and was viewed through a spotting scope. The intermittent and highly variable stages of streamflow were cited as the main reasons for the rating. The riparian vegetation appears to be limited in extent, but is probably reaching potential given the flow characteristics.

Cedar Creek 0.2 miles. This reach had some vegetation problems with only some parts of the riparian zone having plants adapted to wetland characteristics, or with root systems capable of protecting the streambanks during high flows, or adequate in density to protect the banks. Most of the vegetation was made up of upland species. However, rockiness and sinuosity of the channel appeared to be protecting it from significant channel erosion.

Standard 3: *Healthy productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and habitats potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes.*

Indicators used to assess this standard include: native plant and animal communities distributed adequately to assure sustainability, age class diversity to sustain recruitment and mortality fluctuations, adequate habitat connectivity, photo synthetic activity throughout growing season, resilience to human activities, appropriate plant litter accumulations, and landscapes composed of a variety of successional stages.

Acreage Figures

Meeting Standard 3		Not Meeting Standard 3	Unknown	Water
Meeting	Meeting with problems			
47,348 acres	48,734 acres	5,008 acres	8,098 acres	677 acres

See figure 4.1 for locations of problem polygons.

Specific Problems

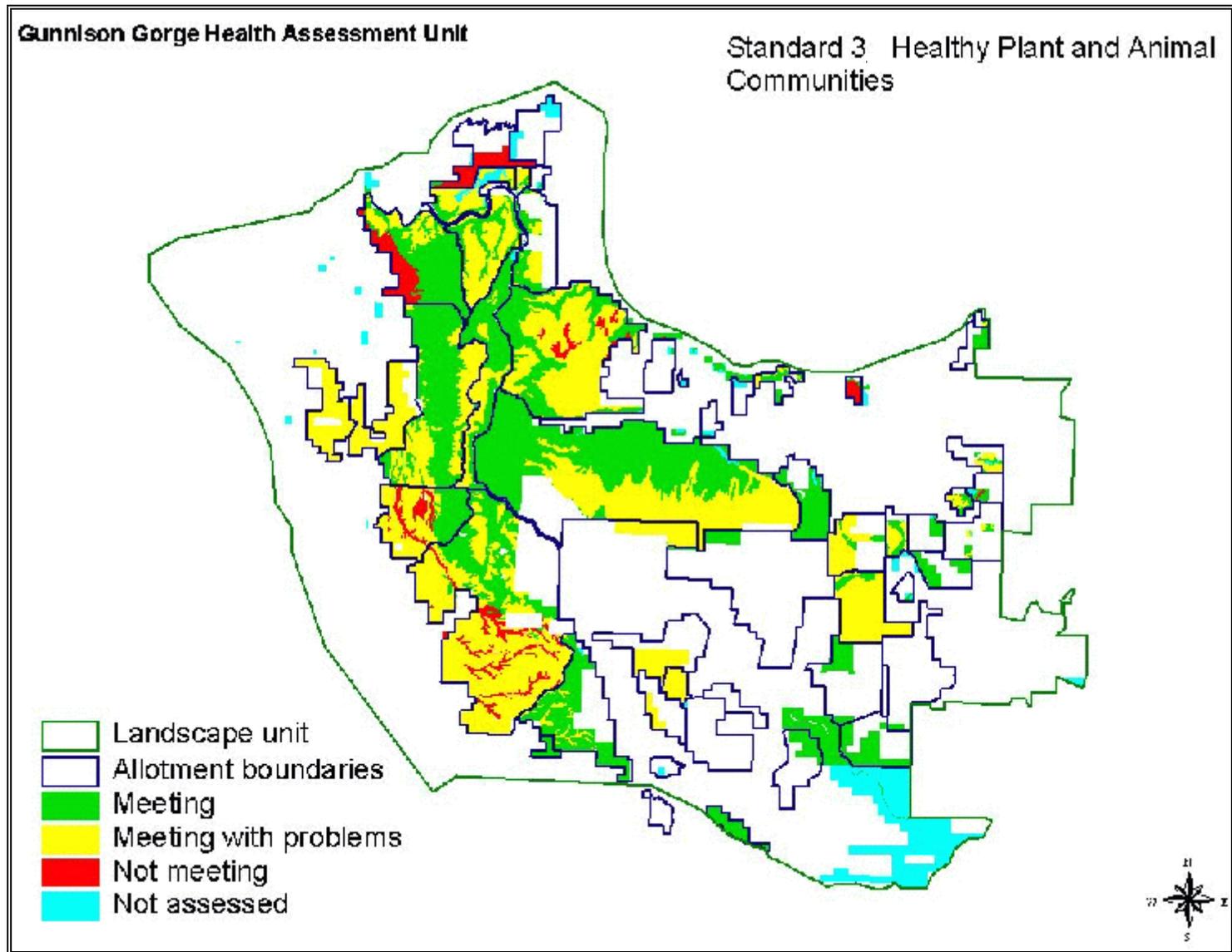
Perennial Grass Cover

Perennial grass is an important if not dominant plant type in most of the plant communities occurring in the unit. It is also one of the plant community components most reduced by historic and present day uses, especially grazing. Percent canopy cover of perennial grass relative to the average found for the site type was used as one indicator of plant community health and also as an indicator of wildlife habitat quality. Figure 4.2 shows concentrations of sites with lower than average perennial grass cover were found in the vicinity of Selig Canal, Brush Point, eastern Green Mountain, the eastern part of the unit, Crawford Reservoir, parts of Black Ridge, and the Tri-State parcel.

Cool Season Grass Cover

Cool season perennial grasses are those which are actively growing in the spring and fall months, and are generally dormant during the heat of the summer. On the majority of public lands in the Uncompahgre Resource Area, the cool season grasses have historically been the most diminished because the fall and spring seasons of grazing use coincide with their vulnerable, actively growing period. When cool season species are reduced in a plant community, the community loses productivity because spring and fall resources (sunlight and moisture) are not being fully used. The percent canopy cover of cool season perennial grass was used as an indicator of plant community health and wildlife habitat quality. Relatively few areas with cool season grass problems were found (Fig. 4.3). Minor concentrations of low cool season grasses occurred in Spring Gulch, central Green Mountain, central Alkali Flats and part of the Dedication Site. The larger problem appears to be sites with low total perennial grass cover, particularly across much of the adobe hill country east of Montrose and Olathe.

Figure
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Figure 4.2 Perennial grass cover is assessed relative to site type. Here lower than average cover is at least 10% less than the average value for the site. Blue circles show problem areas in landscape unit.

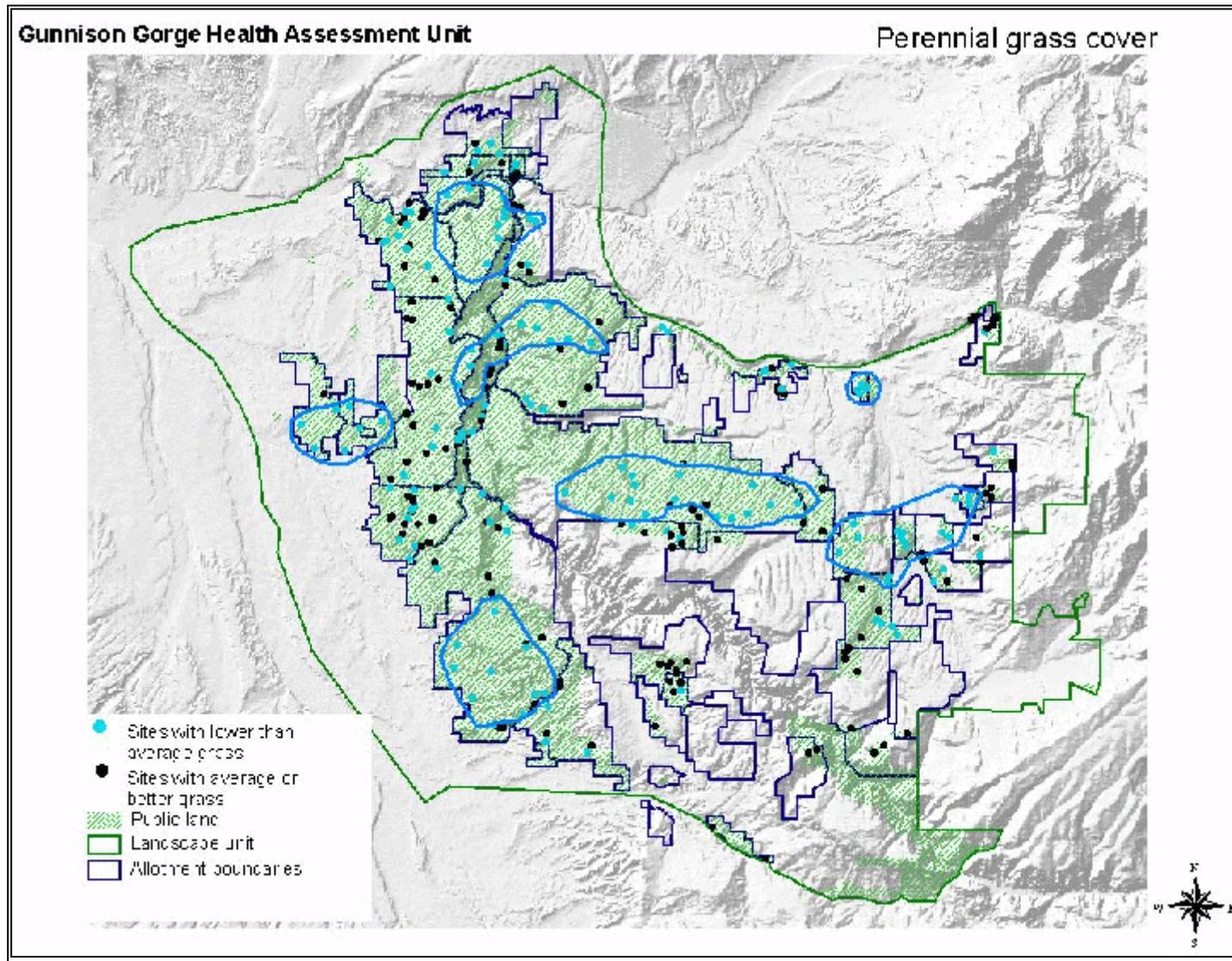
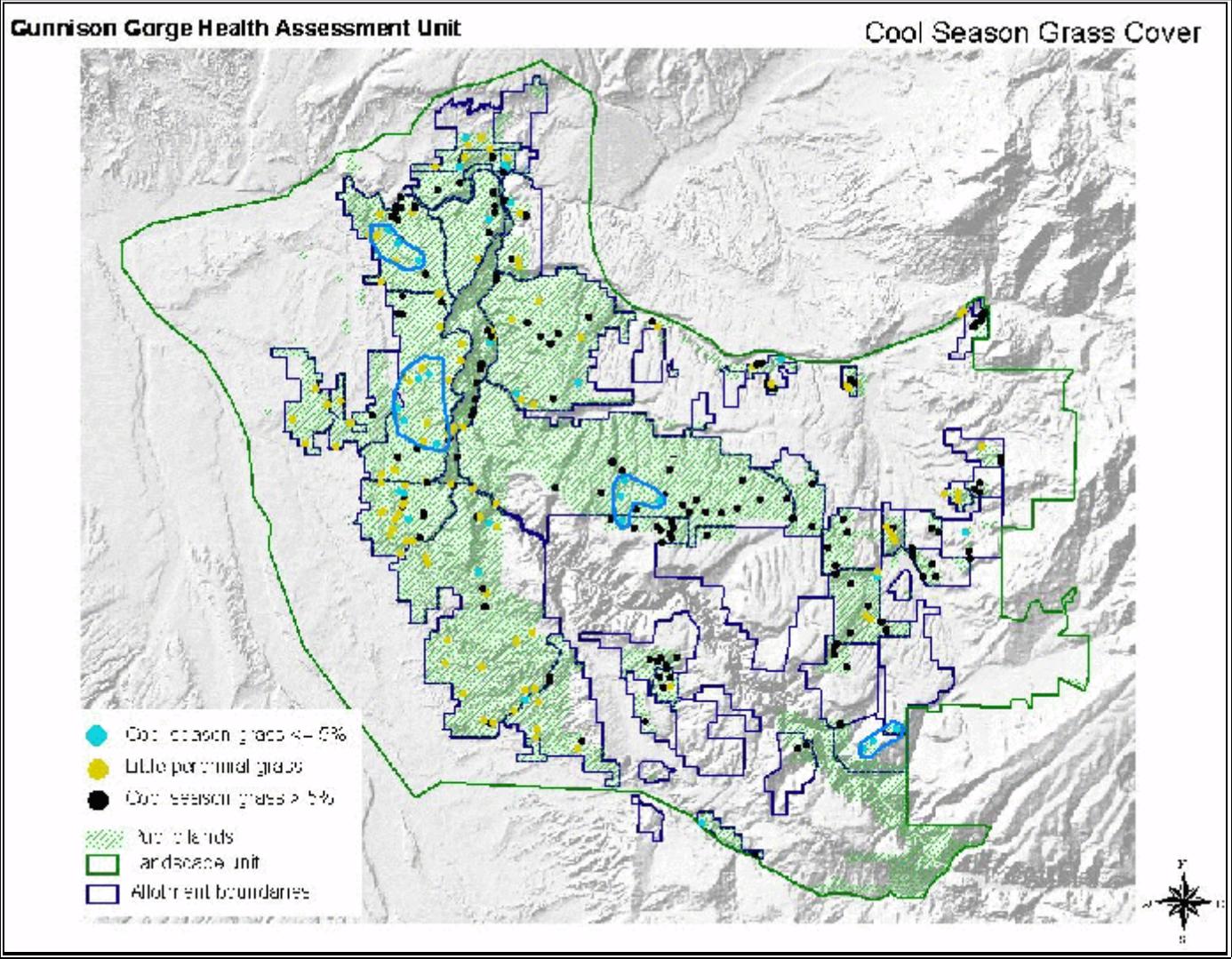


Figure 4.3 Sites with Perennial cool season grass cover, with low cool season cover shown in blue at 5% or less canopy cover. Sites with little grass (total canopy cover 5% or less) are shown in yellow, and not considered in analysis. Blue circles show problem areas in landscape unit.



Perennial Forb Cover

Perennial forbs are a source of diversity and although typically not a dominant plant type, fill many important niches in a plant community. Like the cool season perennial grasses, perennial forbs are one of the native plant types that has been most impacted by historic grazing. Percent perennial forb canopy cover relative to average values for the site type is used as an indicator of plant community health and wildlife habitat quality. Figure 4.4 shows concentrations of sites with low forb cover were found in the northern part of Brush Point, throughout Alkali Flats, in Black Ridge, across Shamrock, Sulpher Gulch, Iron Canyon, Gould Reservoir and Crawford Reservoir.

Pinyon-Juniper Invasion

Pinyon and juniper trees are native species which live for centuries and have been common in the area for millennia. However, there is considerable evidence that pinyon-juniper woodlands are now becoming more dense than they were in the past and are expanding into other plant communities. As this occurs, herbaceous and shrub species decline in dominance at the site level, and the landscape loses diversity at the larger scale. Pinyon and juniper invasion (as evidenced by young age classes of trees dominating a site) is used as an indicator of plant community health and wildlife habitat quality. Very few sites are dominated by either young pinyon or juniper and concentrations of such occurrences were even fewer (Fig. 4.5). Two small problem areas were identified: in the central part of Green Mountain and around Poison Spring.

Exotic Plant Cover

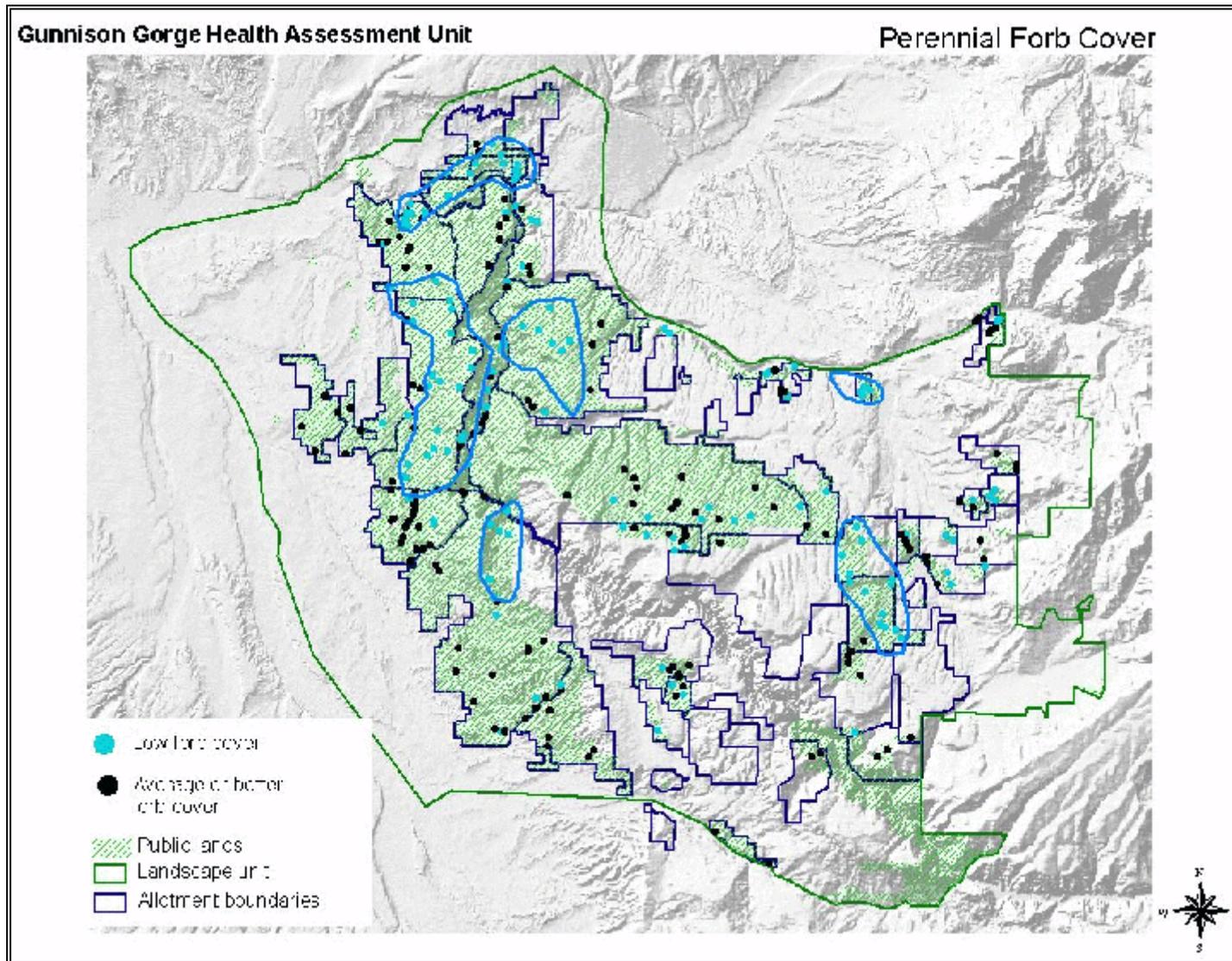
Exotic plants are those species which were not present in the region prior to European settlement of the area, and were brought in from other countries or regions. Therefore, they have not co-evolved with the plants and animals that are native to the area. In some cases, this provides the exotic plants with a competitive advantage allowing them to push out native species. In other cases, the exotics are weedy species associated with disturbance of the native plant community or soil. Prevalence of exotic plant species was used as an indicator of plant community health and wildlife habitat quality. Exotics, primarily cheatgrass, alyssium, Kentucky bluegrass, and crested wheatgrass, are present in the native plant communities at about one half of the sites visited (Fig. 4.6). There are comparatively few places where exotics dominate the plant community. Concentrations of sites where exotics are present or dominant are located across Brush Point, parts of Upper Peach Valley and Alkali Flats, parts of Black Ridge, the Dedication Site and Shamrock, and much of the Smith Fork, Gould Reservoir, Allen Reservoir and Jones Draw.

Noxious Weed Infestations

Noxious weeds are those exotic species which are formally designated by the state as damaging to economic or ecologic values. Noxious weeds that are known to occur in this region include: Russian knapweed, spotted knapweed, diffuse knapweed, Canada thistle, musk thistle, leafy spurge, yellow starthistle, field bindweed, whitetop, yellow toadflax and saltcedar. Roads as well as the LHA survey points were screened for the noxious weed species (Fig. 4.7). Russian knapweed was the most widespread weed, occurring on roads flanking the adobe hills on the west side of the unit, and on roads on Fruitland Mesa and Black Ridge. Canada thistle was found along some of the roads at higher elevations on the east end of Fruitland Mesa. Musk thistle was found along Fruitland Mesa road and at

Gould Reservoir. Saltcedar occurs along much of the Lower Gunnison River in the north of the unit, and at the confluence, together with Russian knapweed.

Figure 4.4 Perennial forb canopy with low equaling 10% than the forb for the type. Blue circles problem landscape



4.4
 1 forb cover cover at least lower average cover site Blue show areas in the unit.

Figure 4.5 Pinyon-juniper invasion: young age classes of either pinyon or juniper were the dominant age class of these species on the site. Blue circles show problem areas in landscape unit.

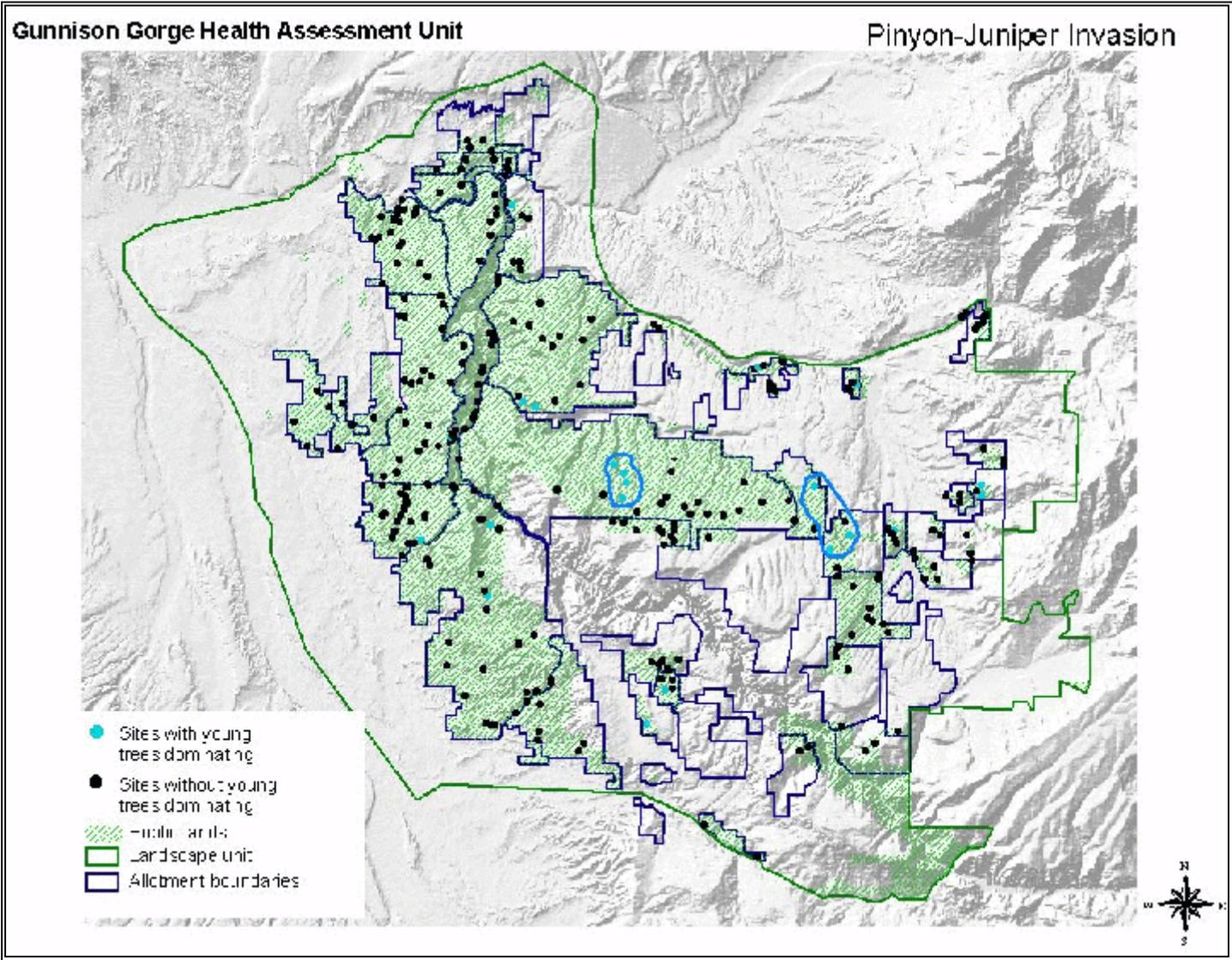


Figure 4.6 Exotic plants: health sheet scores of 4 or 5 = minor or absent, scores of 3 = present, scores of 1,2 = dominant. Blue circles show problem areas in landscape unit.

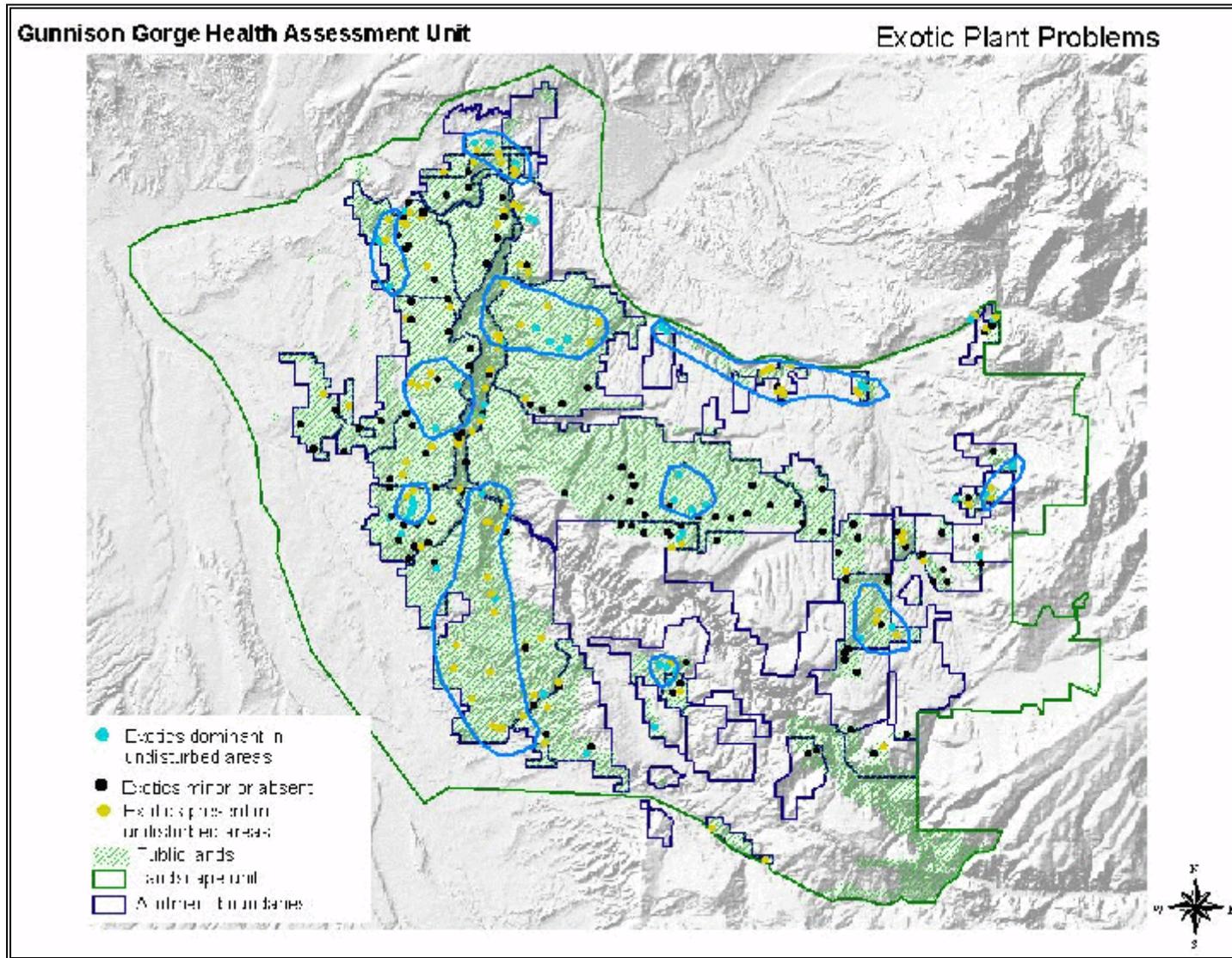
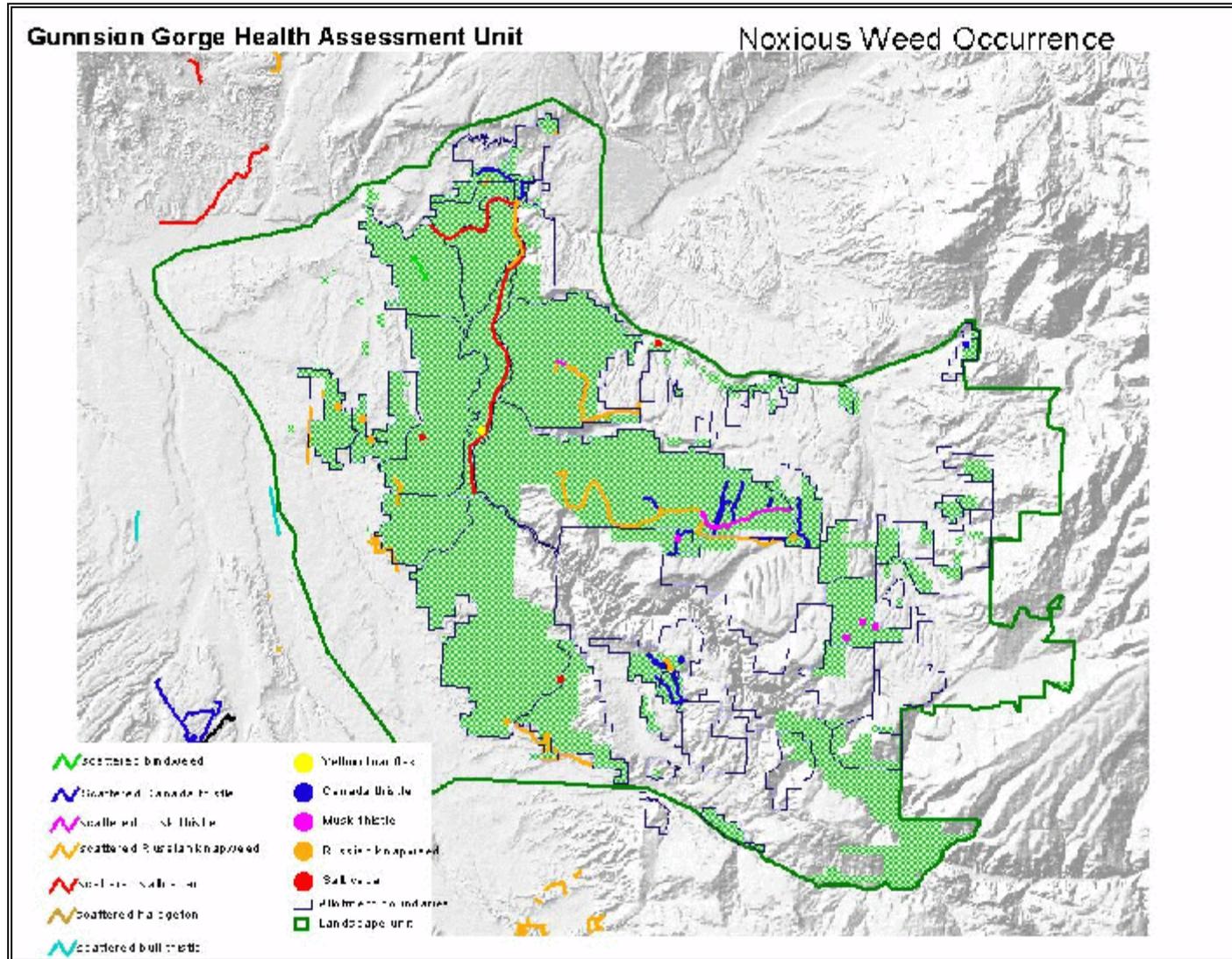


Figure 4.7 Noxious weeds. Weed occurrences that have been mapped during the road inventory, and those encountered at the health assessment sites are shown here. Weeds typically occur along the roads as isolated patches, not as continuous infestations.



Shrub Utilization

Hedging is the alteration of a shrub's growth form into a compact, dense growth of twigs. Hedging on shrubs is caused by repeated browsing by wildlife or livestock, and can result in reduced productivity and vigor of the shrub, or even death. Hedging is indicative of the balance between browsers and habitat carrying capacity. It is used here as one indicator of plant and animal community health. Many areas across the Gunnison Gorge Unit exhibited moderate hedging on palatable shrubs (Fig. 4.8). Few areas showed serious hedging. Concentrations of hedging are most evident throughout Green Mountain and the eastern edge of the unit, along with isolated concentrations above Smith Fork and Shamrock Allotment.

Shrub Vigor

Shrubs are an important component of most plant communities across the unit. They are often the dominant life form of the plant community and also provide structure, diversity and food, thus shaping many other aspects of the community. Shrub vigor or health and productivity, is used as an indicator of plant community health and wildlife habitat quality. Low vigor indicates the plants are stressed, more vulnerable to disease, unlikely to reproduce successfully, and produce less food for wildlife. Shrub vigor also provides some insight into the health trends of the community. Several fairly large areas with concentrations of sites having low shrub vigor were found (Fig. 4.9). These extend across much of the western slope of the Gorge uplift, occur on Black Ridge, above the Smith Fork, and across the eastern portion of the unit. Two shrub communities in particular, shadscale and greasewood, were identified as exhibiting very noticeable vigor problems. Shadscale vigor problems appear to be fairly widespread as evidenced by low vigor at 27 of 58 points where shadscale was dominant on the site. Greasewood declines were more localized and 2 of 9 sites sampled showed significant vigor problems. If the greasewood sample size had been larger, more sites with problems would have been identified based on observations by the ID team during their travels across the landscape unit. The causative factors for these declines are unclear at this time.

Figure 4.8 Sites with shrubs with hedge class 3 or 6 depicted as seriously hedged, sites with shrubs having hedge class 2 or 5 are moderately hedged, and sites with shrubs $\geq 2.5\%$ canopy and with hedge class 1 or 4 are not hedged. Blue circles show problem areas in landscape unit.

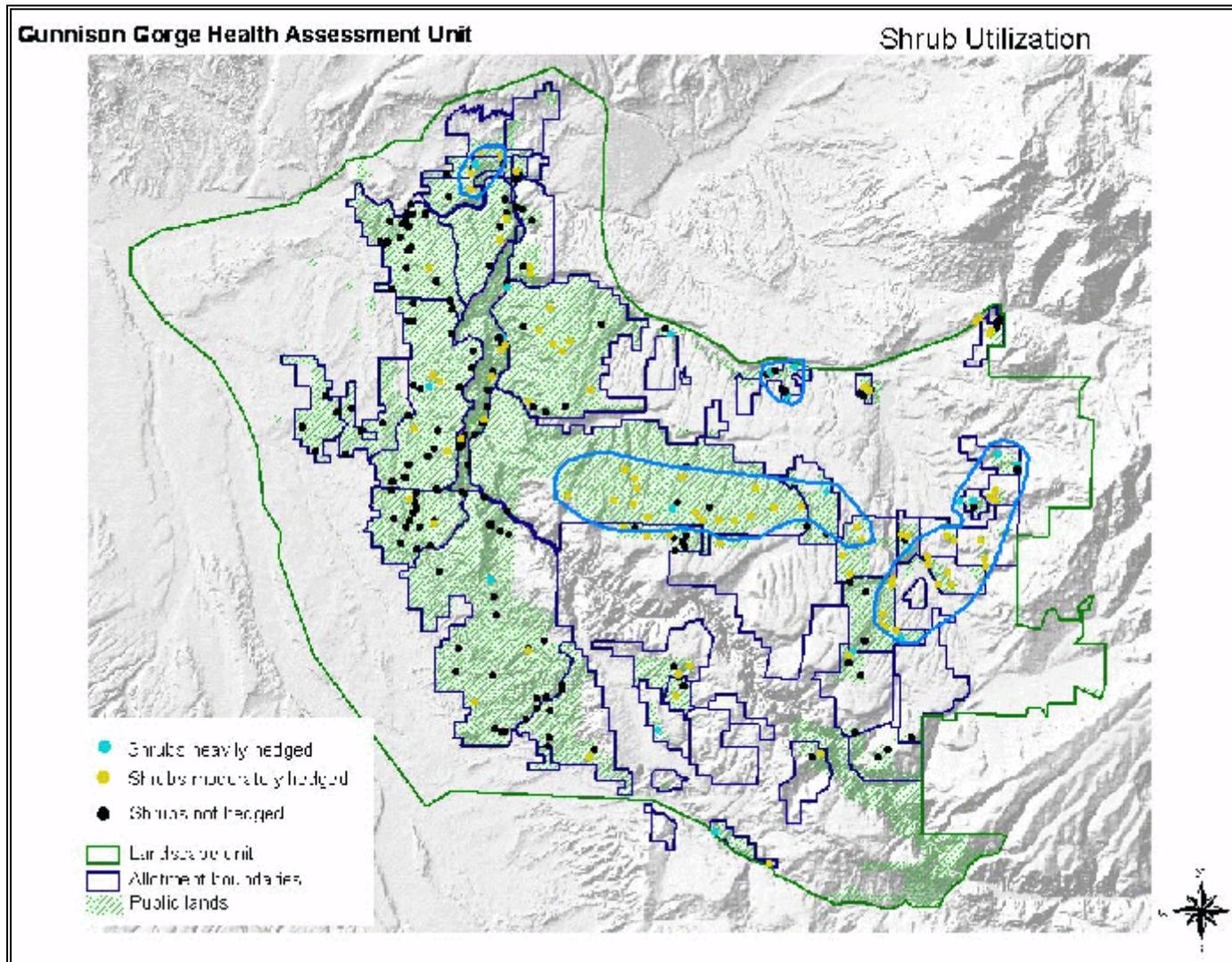
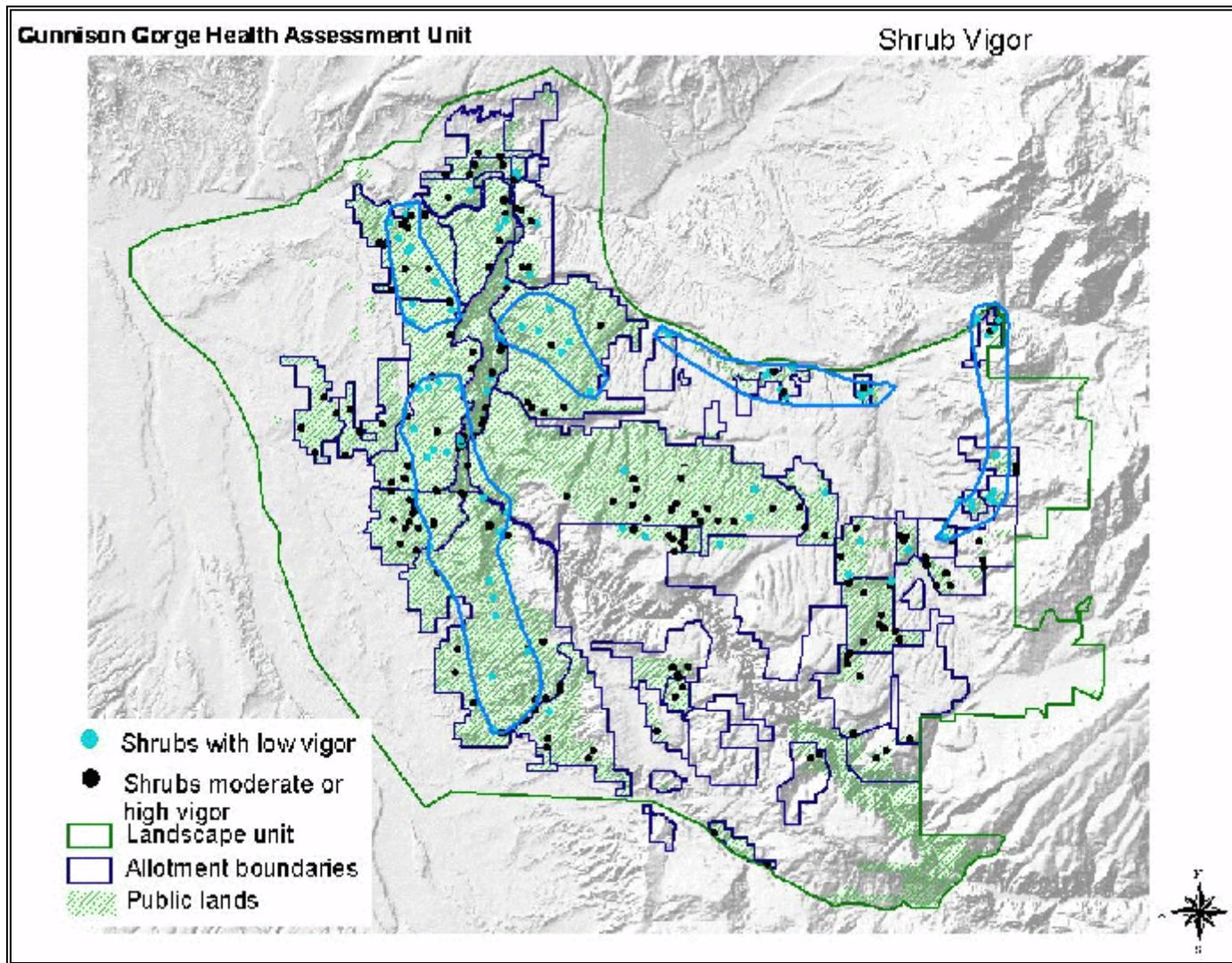


Figure 4.9 Sites with low shrub vigor have at least one major shrub species that is in low vigor on the site. Other sites shown are those with 2.5% total shrub canopy or greater, and all shrubs on them in moderate or high vigor. Blue circles show problem areas in landscape unit.



Standard 3 Landscape Scale Indicators

Healthy Wildlife Community

The wildlife community health assessment in the Gunnison Gorge unit, including habitat, was made using existing CDOW and BLM data, and qualitative knowledge in addition to data collected during the rapid assessment process. The rapid assessment process by itself does not provide adequate information. A much more complex and time consuming effort would be necessary to collect sufficient information for an accurate assessments of health of the wildlife community. Information is not available, nor is it possible to obtain these data quick enough to determine the status of many wildlife species and their habitats for this report. Additional information is needed for many of the wildlife species and their habitats; specifically sage grouse, small mammals, herp's birds, and predators.

Based on the available information, the main problems or changes that relate to Standard 3 which are occurring in the Gunnison Gorge unit at a landscape scale include: 1) major changes to habitat structure, condition, and arrangement of components across the landscape, 2) the long-term mule deer population trend is down slightly, 3) winter range quantity and quality is declining in some of the key winter concentration areas, 4) the elk population trend is up slightly and appears to have a tendency to increase rapidly without constant heavy harvest pressure, 5) several species of neo-tropical birds in the Western Colorado region are declining. The natural dynamics of this system appear to have been slowed down due to lack of natural disturbances, thus vegetation is getting older with less diversity. Also, the increase of human activities and development has caused changes to the dynamics of this area.

Specific problems or changes:

1. Wildlife habitat changes are occurring across the Landscape. Commutatively, the problems listed above in the Healthy Plant Community section are indicators of changes occurring to habitat structure, condition, and arrangement of components in the Gunnison Gorge unit, and across the larger landscape. As these habitat changes occur, so will the species present, their abundance and distribution, and perhaps their role in the community. As habitat abundance and quality declines for some species, it will improve for others.

Habitat changes that are occurring in the unit, and much of the adjacent landscape that affect the wildlife habitat quantity and quality are: Vegetation seral stage is advancing, the average patch size is getting larger, the amount of "edge" is decreasing, the size and quality of browse stands are declining, human development is expanding causing fragmentation of key habitats for several species, and the abundance and amount of area supporting exotic and noxious vegetative species is increasing. In general, this area, as well as much of the adjacent landscape, is declining in overall quality for many species, and is becoming more favorable for species that require larger patch sizes of later seral stage vegetation, and with less diversity. This ecosystem is becoming more stable, with fewer disturbances occurring.

2. The mule deer population trend is declining in this region (Game Units 63, 64, 53 & 54), and is consistent with declines in mule deer populations in adjacent areas and throughout the west. Although erratic annual fluctuations in mule deer numbers are typical, the 15-20 year trend is downward. The CDOW's desired mule deer population level for this area is 20,000 with a herd. During the early 1980's the population was estimated at over 24,000. The 1999 estimated population was 14,878, the lowest in recent years (Figure 9). (Figures based on DAU's 39 and 40 which comprise the majority of the analysis area.)

Habitat changes due to fire suppression, historic grazing, development, and fragmentation; human impacts due to commercial activities and rapidly increasing recreational use; predation from coyotes, cougars and black bears; and competition from the increased elk populations are among the suspected and possible factors interacting to contribute to this decline.

In this unit mule deer depend heavily upon sagebrush for winter forage. For mule deer to utilize sagebrush without ill effects they need an abundance of herbaceous vegetation. Mule deer do not do well when their diets consist of >30-35% sagebrush. Our assessment data shows widespread low shrub vigor and utilization, and most of the shrubs are sagebrush. Also, assessment data shows widespread low presence of cool season grasses and perennial forbs, which helps to explain the lack of utilization on sagebrush, and perhaps is a factor in the decline of mule deer numbers.

3. Winter range quantity and quality is declining in the Gunnison Gorge Unit, due mostly to: 1) the lack of disturbances scattered throughout the unit to reset succession, hence creating a more desirable mosaic of feeding and cover areas, and improving the herbaceous species composition and vigor of browse plants, 2) existing browse stands are advancing in seral stage, and in some areas browse plants are being replaced by pinyon and juniper mostly and, 3) over use by mule deer and elk, caused by their number being concentrated on the remaining amount of shrinking winter range, thus quickening the decline of winter range condition. See the Desired Landscape Objectives map for a comparison of existing mule deer winter range conditions to the desired landscape objectives for winter range.

The highest potential value of the Gunnison Gorge unit to mule deer and elk is winter range. There is abundant summer range at higher elevations of the surrounding areas. Presently, too much of the shrub area, especially the sagebrush stand, is too old and decadent, and without a good herbaceous under-story of cool season grasses and forbs. Also, not enough sites of early to mid seral stages, supporting sagebrush and/or mountain shrubs are interspersed throughout the area.

4. The elk population is increasing on the Gunnison Gorge unit, and is consistent with increasing elk populations throughout Colorado, and most of the west. Elk have a greater capacity to increase in this unit than they currently are, due to intentional heavy hunting pressure to control population growth. Unchecked, the elk population growth would likely have greater affects on the mule deer population status.

The CDOW's desired elk population level in this area is 5,250. By 1990 elk numbers had grown to nearly 13,352, when high levels of antlerless permits were issued to start reducing elk numbers. Since then elk numbers have declined (Figure W1). The 1999 estimated elk population was 9,415. Habitat changes resulting in larger areas of more mature vegetation, especially on their summer range is believed to be a significant factor in this increase. Without continued high levels of harvest to this population, it would increase rapidly. This potential of the elk population to increase is a good indicator that the wildlife community is changing to meet the conditions created by changing vegetation.

5. Whirling disease and flow related impacts to the Gunnison Gorge fishery: For the short term the only practical way to maintain the rainbow population for the area's sport fishery appears to be planting of hatchery reared fish, which will require the use of motorized equipment to get the fish into the Gorge. BLM should continue to work with CDOW, BOR, NPS, and the Uncompahgre Valley Water Users toward a long term solution to the sport fishery management within the Gorge. During completion of the pending resource management plan for the National Conservation Area, the issue of management of the fishery should be one of the issues addressed.

6. Several Neo-Tropical Migrant Bird species show population trend declines, or have inadequate data for making trend determinations in the Western Colorado region,. The Breeding Bird Survey provides the most complete and accurate data available for NTMB species throughout their range, and in the Gunnison Gorge unit.

Thirteen species (Table W2) shown population trend declines in both the 26 and 10 year Breeding Bird Survey data sets. All of these species have high “importance of area” rankings, indicating a high proportion of their habitat in this region provides essential breeding habitat components. Five of these species, Vesper Sparrow, Swainson’s Hawk, Say’s Phoebe, Rock Wren, and Loggerhead Shrike have very low abundance ratings, therefore, indicating they are the species’ of highest concern in this unit and landscape. The eight remaining species, Horned Lark, Common Nighthawk, Killdeer, Northern Flicker, Western Wood-Pewee, Chipping Sparrow, Sage Thrasher, and Brewer’s Sparrow have moderate to good abundance ratings, thus, making them species’ of second highest concern. Species for which inadequate data are available (Table W3) to make status determinations with a high degree of certainty are considered priority #3 species. Many other NTMB species are present in this area, but their status appears to be good, and not of high concern at this time. The Gunnison Gorge unit is part of the larger overall landscape that provides habitat for all these species, which is important for their long-term sustainability. To benefit those species dependent on riparian communities, work should continue on noxious weed/tamarisk control.

Table W2: NTMB species showing declines during the 26 and 10 year BBS data sets in Western Colorado.

NTMB SPECIES	HABITAT	26 year Population Trend Ranking (PT26)	10 year Population Trend Ranking (PT10)	Abundance Ranking (AB)	Importance of Area Ranking (IA)
Priority #1 species: PT26 & PT10 ranking = 4 or 5, AB ranking = 3-5, and IA ranking = 3- 5.					
Vesper Sparrow **	Annuals/Grassland	4	5	3	4
Swainson’s Hawk *	Annuals/Grassland	4	4	3	3
Say’s Phoebe **	Annuals/Grassland	4	4	3	5
Rock Wren **	Barren Land	4	5	3	3
Loggerhead Shrike *	Riparian	5	4	3	3
Priority # 2 Species: PT26 & PT10 ranking = 4 or 5, AB ranking = 1 or 2, and IA ranking = 3-5.					
Horned Lark **	Annuals/Grassland	5	5	1	5
Common Nighthawk	Annuals/Grassland	4	5	2	5
Killdeer *	Annuals/Grassland	4	4	1	3
Northern Flicker *	Generalist	5	5	1	3
Western Wood-Pewee *	Generalist	4	4	2	3

Chipping Sparrow **	Ponderosa Pine-Doug Fir	5	5	1	4
Sage Thrasher **	Sagebrush	4	5	2	4
Brewer's Sparrow **	Sagebrush	4	4	2	5

Breeding Bird Survey rankings: 1= low concern, 5 = high concern.

* =Low, **=moderate, ***=highest potential for effects (+ or -) in Gunnison Gorge area based on Breeding Bird Atlas information.

Table W3. NTMB species with inadequate data for making trend determinations (Priority #3 species.)

SPECIES	HABITAT	Abundance Ranking (AB)	Importance of Area Ranking (IA)	26 year Pop. Trend Ranking (PT26)	26 year Uncertainty Ranking (PTU26)	10 year Pop. Trend Ranking (PT10)	10 year Uncertainty Ranking (PTU10)
Northern Harrier *	Annuals & Grassland	4	3	3	4	3	4
Savannah Sparrow *	Annuals & Grassland	3	3	3	4	3	4
Common Poorwill *	Mountain Shrub	3	5	3	4	3	4
Gray Flycatcher ***	Pinyon-Juniper	3	4	3	4	3	4
Gray Vireo ***	Pinyon-Juniper	3	4	3	4	3	4
Long-eared Owl *	Riparian	3	3	3	5	3	5
Bank Swallow *	Riparian	3	3	3	4	3	5
Swainson's Thrush*	Swainson's Thrush*	3	3	3	4	3	4

Breeding Bird Survey rankings: 1= low concern, 5 = high concern.

* =Low, **=moderate, ***=highest potential for affects (+ or -) in Gunnison Gorge area based on Breeding Bird Atlas information.

Plant Distribution

Plants: 121 different plant species were documented as occurring in significant amounts on at least one site. Galleta grass, a native warm season grass was the most widespread species found on 95 out of a total of 294 sites. Utah juniper was the second most widespread species occurring on 76 sites, with shadscale the third most common on 68 sites. Muttongrass, a native cool season grass was the most common cool season grass occurring as a significant part of the plant community on 66 sites. The most common perennial forb was rock goldenrod that was significant on 16 of the sites. The most widespread exotic species was cheatgrass, which was documented as an important species on 63 sites. 34 species occurred at substantial levels on only one site, and another 50 occurred on less than 10 sites.

Both elevation and soils appear to drive where most of the plant species are located. The mancos shale soils support entirely different plant species than the sandy and loamy soils found at higher

elevations in the assessment unit. However, at the level of data collection, it appeared that most of the plant species appropriate to soil and elevation were found broadly scattered across their available habitat. This evidence indicates that no plant distribution problems are occurring that would interfere with region-level population viability or resilience.

Connectivity

Not much information is available on assessing connectivity of habitat in dry woodland or semi-desert shrubland vegetation types, particularly in very rough terrain. A map of likely barriers and dispersal routes is included (Figure 4.10)

Possible Barriers:

Impassible topographic features like rock walls and very steep slopes: There are nearly vertical cliffs on either side of the Upper Gunnison River as it passes through the National Park and below through much of the Gunnison Gorge, and along the sides of the Smith Fork as it enters the Gunnison Gorge. Southwest to northeast travel across the unit for many terrestrial wildlife species is constrained to a few passages through the cliffs down to the river (like the Ute Trail, Duncan Trail, Chukar Trail, etc.).

Water barriers (Rivers and Lakes), and dams: The Gunnison River, North Fork of the Gunnison, and lower Gunnison River all act as barriers to passage for animals unable to cross the approximately 30 to 50 foot wide river channels. Above the National Park, Crystal and Morrow Reservoirs are even wider water barriers. The dams that form these reservoirs, and Crawford Reservoir, represent a barrier to most upstream and some downstream movement for aquatic species.

Agriculture or intensive human land uses: Agriculture and residential areas are located in the western and north-central parts of the landscape unit. They represent a barrier to movement by some species out of the landscape unit, but probably do not restrict much movement within the unit. An exception to this would be the elk fences around orchards, stackyards, and most significantly, around game ranches. At least 8 miles of 6' high elk fence impedes large mammal movements off of the Poison Springs Road and removes 3 sections of habitat from their use.

Roads and trails: Roads can be a barrier to movement because they are a strip of bare or altered ground, and because they are a focus of human activity and disturbance. The road and trail network is densest in the BLM land northeast of Montrose where OHV use in the adobes has created an extensive trail network. This area is part of an existing land use plan and open OHV designation. A second area where road densities are fairly high is on Fruitland Mesa.

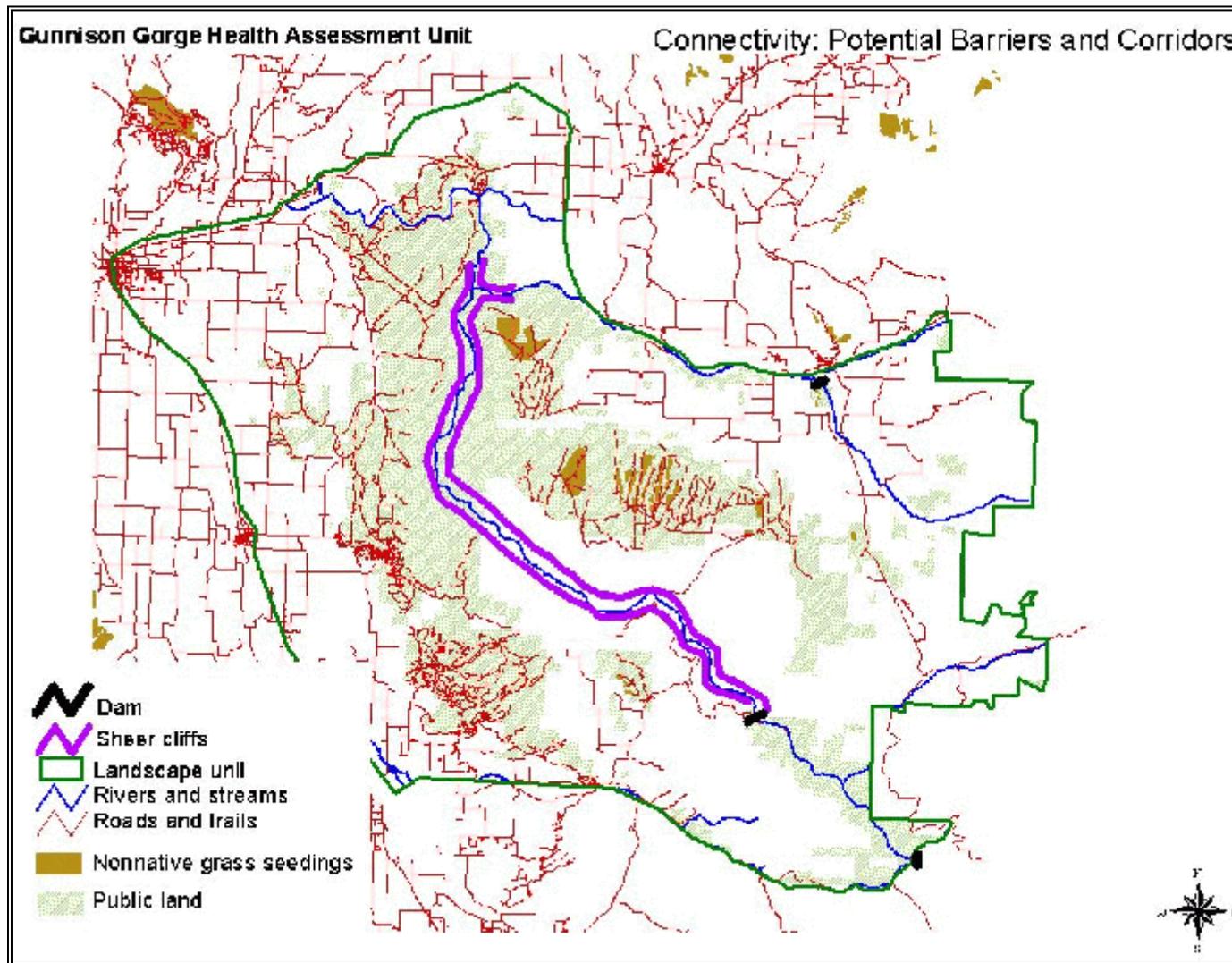
Old treatment areas seeded with nonnative grass: Old vegetation treatments seeded with crested wheatgrass and other Eurasian species are located mainly on Fruitland Mesa and Black Ridge. These may present barriers to movement by small mammals and reptiles, particularly the larger treatments where native species have not reestablished.

Possible new dispersal corridors:

Roads: Roads can act as a corridor that eases movement for some species like disturbance-related plant species. Russian knapweed was seen primarily along roads during the assessment. The open, unobstructed travelway offered by a road may also facilitate movement by animals like elk, deer and coyotes. Where roads occur, deer and elk may learn to bypass traditional use areas and use the roads to access other areas, possibly resulting in habitat or crop damage.

Livestock, people, vehicles, and pets: Livestock provide a mechanism for dispersal of seeds, insects, and disease, as do people, their vehicles, and pets. The presence of barnyard species like horsemint (*Marrubium vulgare*) along the Chukar trail is most likely tied to the heavy horse use along the trail. Domestic sheep carry diseases fatal to bighorn sheep, and may be responsible for the poor condition of the reintroduced bighorn population in the Gorge.

Figure 4.10 Landscape and habitat connectivity, showing potential barriers and corridors to plant and animal movement (roads, dams, sheer cliffs, nonnative grass seedings, and rivers or streams)



Landscape Mosaic

The assessment area is broken into 5 primary units representing different landscape mosaic objectives (Figure 4.11, Uncompahre Field Office Fire Management Plan, 2000). The table shows the desired proportions and patch sizes for each of the landscape units in the Gunnison Gorge Landscape Unit that have significant BLM acreage.

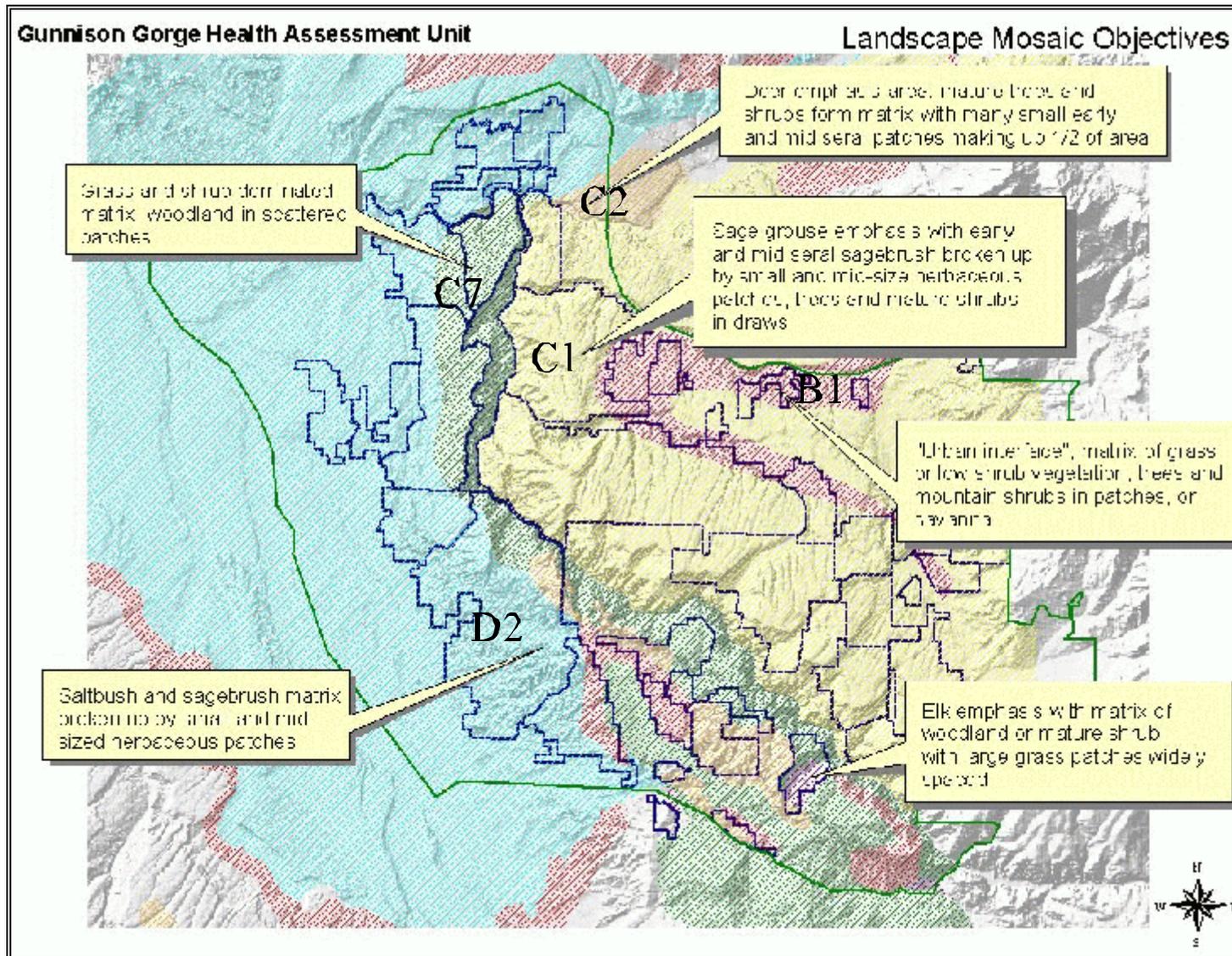
Landscape Obj. Unit (color in fig. 4.10)	Seral Stage	Seral Stage % Objectives	Seral Stage % Estimated	Desired Patch Size (acres)	Meeting Patch objective?	
D2 (blue)	grass/forbs	20%	32%	½ 1-20; ½ >20	Yes, some areas need larger grass patches	
Natural fire regime mosaic desired	shrub/grass	80%	57% remainder is later seral stages	MATRIX		
C7 (green)	grass/forbs	20%	20%	½ <10; 30% 10-50; 20% >50	Yes, distribution of patch sizes okay	
Natural fire regime mosaic desired	shrub/grass	30%	55%	½ <10; 30% 10-50; 20% >50		
	shrub/tree	20%	10%	½ <10; 30% 10-50; 20% >50		
Wintering deer optimal habitat mosaic desired	mature tree	30%	15%	½ <10; 30% 10-50; 20% >50		
	C2 (orange)	grass/forbs	25%	5%	45% <5 acres 45% 6-25 10% >25	Yes, patch distribution looks okay
	Wintering deer optimal habitat mosaic desired	shrub/grass	25%	15%	45% <5 acres 45% 6-25 10% >25	
shrub/tree		25%	15%	MATRIX		
Wintering deer optimal habitat mosaic desired	mature tree	25%	65%	MATRIX		

Landscape Obj. Unit (color in fig. 4.10)	Seral Stage	Seral Stage % Objectives	Seral Stage % Estimated	Desired Patch Size (acres)	Meeting Patch objective?
B1 (red)	grass/forb	20%	8%	20% 1-5 acres 30% 5-50 50% > 50	Yes, most patches under 10 acres
Urban interface optimal habitat mosaic desired	shrub/grasses	55%	50%	MATRIX	
	shrub/tree	15%	17%	80% 1-5 acres 20% 5-50 acres	
	mature tree	10%	25%	80% 1-5 acres 20% 5-50 acres	
C1 (yellow)	grass/forb	15%	10%	25% 5-20 acres 75% 20-100 acres	Grass/forb patches too small, improving with treatments
Sage grouse optimal habitat mosaic desired	shrub/grasses	60%	75%	40% 5-20; 40% 20-100; 20% 100-300	
	shrub/tree	15%	10%	40% 5-20; 40% 20-100; 20% 100-300	
	mature tree	10%	5%	25% 5-20 acres 75% 20-100 acres	

Unit D2 (blue): The vegetation mosaic shows more grass/forb stage and more shrub/tree and mature tree than the objective calls for. However these proportions are probably not causing ecologic imbalances because they probably reflect slight errors in drawing the landscape objective boundaries, errors in the satellite vegetation map, and perhaps ecologic site limitations. The patch distribution approximates the objective, but would improve if future disturbances could create some larger grass/forb patches.

Unit C7 (green): The vegetation mosaic has more shrub/grass stage and less of the later seral stages than the objective calls for. While this may reflect some problems with the satellite vegetation map, it may be fairly accurate, suggesting that future disturbances be limited in size. The patch size distribution appears to meet the objective.

Figure 4.11 Desired landscape mosaic from U.F.O Fire Management Plan



Unit C2 (orange): The vegetation mosaic appears to have too little grass/forb and shrub/grass vegetation, and too much mature woodland. Although the public lands in this unit are not extensive, this unit appears to be the most in need of disturbance and the creation of earlier seral stages. Patch size distribution does not seem to be a problem.

Unit B1 (red): This unit is a little low in grass/forb vegetation and has too much mature woodland. This should also be a higher priority for disturbance and creation of earlier seral stages. The patch size distribution appears to be appropriate.

Unit C1 (yellow): This unit is a little low in grass/forb vegetation, and a little high in grass/shrub vegetation, and the typical grass patch size is low compared to the objective. Ongoing vegetation treatments are improving the situation, but more should probably be done, particularly those that set the plant community back to the earliest seral stages.

Standard 4:

Special status, threatened and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.

Indicators used to assess this standard include: stable and increasing populations of endemic and protected species, suitable habitat is available, minimal levels of undesirable or noxious plants, native plant and animal communities distributed adequately to assure sustainability, age class diversity to sustain recruitment and mortality fluctuations, adequate habitat connectivity, photosynthetic activity throughout growing season, community exhibits resilience to human activities, appropriate plant litter accumulations, and landscapes are composed of a variety of successional stages.

Acreage Figures:

Meeting Standard 4		Not Meeting Standard 4	Unknown
Meeting	Meeting with problems		
84,692 acres	26,433 acres	0 acres	0 acres

See figure 5.1 for locations of problem polygons.

Specific Problems:

All areas were considered to meet Standard 4 for Threatened, Endangered, and Sensitive species. The acreage in the Crawford sage grouse population occurs was rated as meeting the standard with problems. See discussion below for details.

Analysis of indicators:

The analysis of T&E, BLM sensitive species, and rare species has been conducted largely with existing information from the BLM files, CDOW data, or CNHP data, as well as the knowledge of the BLM staff, some of whom have been in this area for over twenty years. The rapid assessment process is not designed to provide the kind of data required for evaluating rare species. Where this analysis uncovers a significant data gap, recommendations will be made to help resolve it.

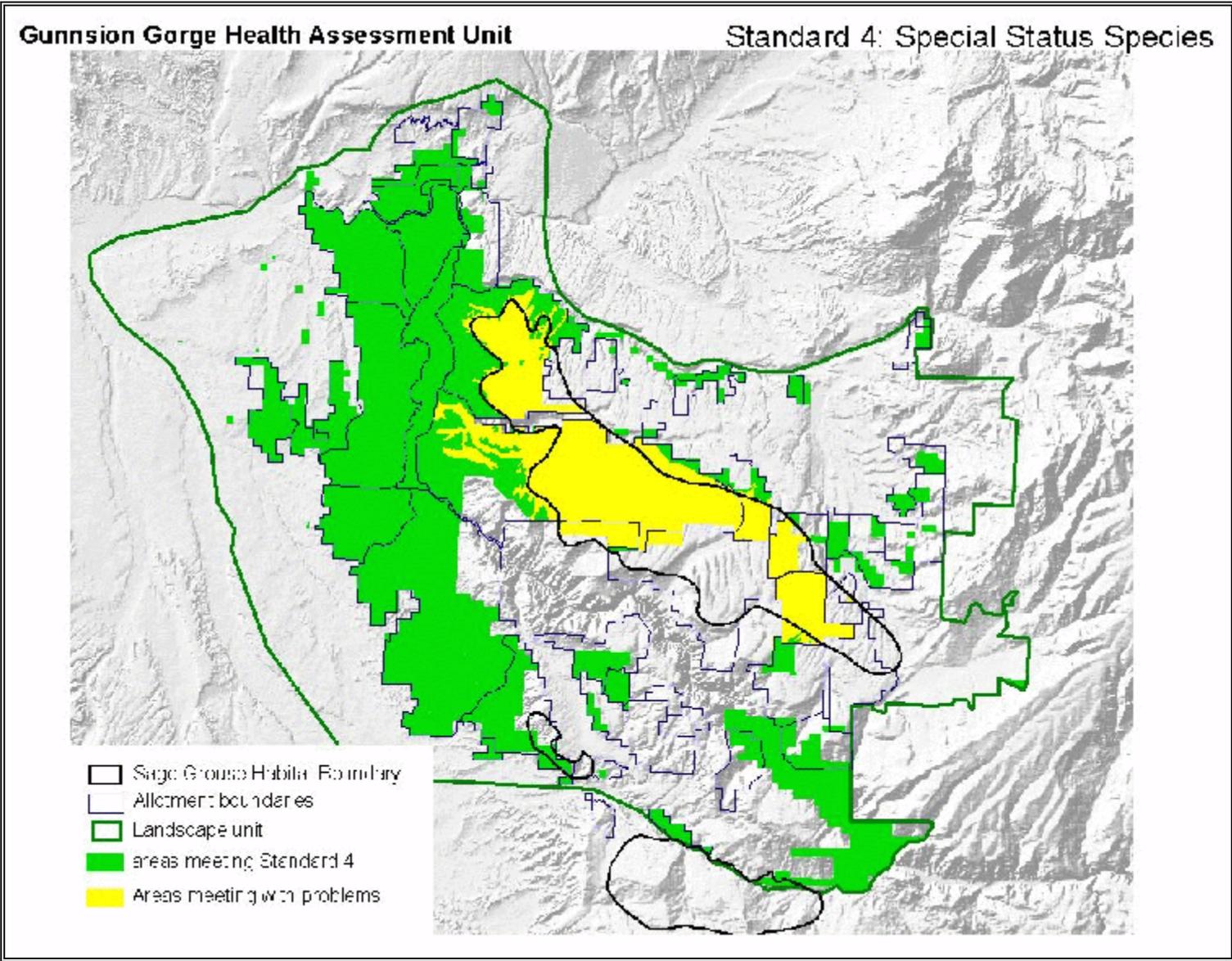
Stable or increasing populations of endemic and protected species: Most of the listed species which are known to occur in the analysis area occupy ranges that are much larger than the analysis area. For those like the bald eagle, southwestern willow flycatcher, and Uinta Basin hookless cactus, the percentage of the population and its habitat that is represented by the analysis area is very small, which means that management of this specific area is not likely to have a detectable impact on range wide populations.

As is the case elsewhere within its range, the populations of wintering bald eagles in the area appear to have increased in the last ten years. Populations, and suitable habitat for the southwestern willow flycatcher have never been documented on public land in this area, and there is not sufficient data to determine if this species was ever present in greater numbers. No habitat sites on public land in the analysis area have been identified as currently meeting habitat requirements for this species.

Clay loving wild buckwheat populations on public land appear to be stable and subject to little negative impact, but local populations on private land are vulnerable to loss. There is potential for increasing impacts due to recreational uses, including off highway vehicles. If off highway vehicle use continues to grow with the local population, restrictions may be needed to protect this species in

particular. More data needs to be collected on the status of this species within the analysis area,

Figure 5.1 Standard 4 Special Status Species



and its vulnerability to disturbance from recreation use, including off highway vehicles.

BLM sensitive plant populations appear to be as healthy as they have been over the last twenty years. Primarily due to improved inventory data, there are more documented locations of the clay loving wild buckwheat, Uinta Basin hookless cactus, Delta lomatium, Montrose penstemon, Montrose bladderpod, and Wetherill milkvetch. There is insufficient information to determine the actual populations trends for these species, and ideally some monitoring studies should be established to determine this information. In general, there does not appear to be any notable BLM management impact on these species either beneficial or negative. The biggest potential threat to rare plants on public land in the analysis area is the continued expansion of off highway vehicle use. BLM should work with CNHP to develop a suitable monitoring program to help determine the extent and rate of impact from this activity. BLM also needs to contract with CNHP to complete data collection on suitable habitats elsewhere within the analysis area.

Suitable habitat is available: All suitable habitats for wintering bald eagles appear to be used. The rare plants in the area appear to occur reliably on the substrates which are suitable for the individual species, but there appear to be vacant areas suitable for colonization.

Minimal levels of undesirable or noxious plants: Although noxious plants occur in the area, there is no evidence to indicate that they are causing problems for the rare plants and animals in the area. Cheatgrass has the potential to explode in some communities to the detriment of all the local native species, but within the analysis area this plant has not expanded to the point where it is likely to be problematic for rare plants and animals. The presence of tamarisk and Russian knapweed in riparian zones has no doubt reduced the habitat quality for southwestern willow flycatchers, but given the lack of flycatchers even in high quality habitats, this possibility is pure speculation.

Native plant and animal communities distributed adequately to assure sustainability: Based on habitat selection, and requirements, the listed, and sensitive, plant and animals in the assessment area are believed to be distributed adequately to insure sustainability. The sole exception to this may be the kit fox, but sustainability issues relative to kit fox are outside the scope of BLM's management authority. Current data on the distribution and health of the area's prairie dog colonies is not available to help assess the trend or sustainability of habitat for those species dependent on prairie dogs, such as the burrowing owl. A renewed mapping/evaluation effort for the prairie dog colonies in the area should be pursued to help evaluate change in some areas and establish a baseline in others.

BLM's current management plans do not recognize the existence of the Potential Conservation Areas identified by CNHP to help sustain native plant and animal communities. One PCA, Fairview, contains the BLM Fairview Research Natural Area that was designated to help protect the clay loving wild buckwheat and Montrose penstemon. Most of the resource values associated with the PCA's, except the plant communities, and CNHP watch species, are protected on a case by case basis by BLM. Since all of these sites were identified under current BLM management schemes, BLM believes that current management is compatible with continued maintenance of these sites.

Age class diversity to sustain recruitment and mortality fluctuations: There is no data available to determine if age class diversity is optimal for the species evaluated in this section. At this time nothing indicates that there are survival or recruitment problems for any of the species considered under Standard #4, except perhaps sage grouse and kit fox. Of the two, the kit fox genetic isolation from the larger western Colorado/eastern Utah population does not appear to be solvable.

Photosynthetic activity throughout growing season: In most areas photosynthetic activity is present throughout the growing season. Exceptions to this would be the steep south facing slopes in the Mancos shale habitat areas, where high temperatures and lack of available moisture preclude the establishment and maintenance of plant cover. This is a natural situation in the adobes and endemic species have evolved to cope with this condition.

Community exhibits resilience to human activities: Data on this subject is limited, but BLM believes that the Mancos shale communities naturally exhibit little resilience to disturbance. The soil chemistry and structure, low precipitation, and small amount of useable soil moisture result in communities that do not recover well from disturbance, and often become dominated by annual weeds, including noxious weeds. In some cases, especially in depositional valley bottom areas, after removal of perennial plants, the soil surface seals over in response to rainfall events and establishment of seedlings appears to be precluded. The rare endemic plants in the area appear to have evolved with this difficult habitat and have the mechanisms to tolerate the difficult growth conditions. We have very little data at this time to help determine how well the rare endemic plants establish on disturbed sites, but there is evidence that the Delta lomatium, Montrose penstemon, Rocky Mountain thistle, and Montrose bladderpod all have some ability to recolonize disturbed sites. The general local perception of the adobes is that there is nothing living there, and its highest use is for a vehicle play ground, utility location site, and dump site. These perceptions are likely to result in long term conflicts between the maintenance of healthy native plant and animal communities in the Mancos shale areas.

Appropriate plant litter accumulations: This indicator does not pertain to the species involved in this standard.

Landscapes are composed of a variety of successional stages: Within this analysis area the Mancos shale communities probably do not follow successional stages as commonly understood for most communities. Jayne Belknap, with the Biological Survey, (2000) indicated to Jim Ferguson that she feels that the successional pathways in these communities are very short, and may simply cycle from the endemic perennial species to annuals and back to the endemic perennials, which in some areas may be a monoculture of mat saltbrush. As a consequence, successional stages in these habitats may not be an appropriate measure of health. However there is still some concern that too much of the adobe landscape, especially in the valley bottom areas, is devoid of native perennial species.

As reported under Standard 3 many of the other plant communities in the area are moving toward late seral stages in large patch sizes. This situation may have some negative effects on the distribution and health of some of the rare animal species, such as the Gunnison sage grouse (see discussion below). Effects on the bald eagle, if any, would probably not be detectable above the normal range of variability of the systems on which eagles depend. Although this late seral situation may be having effects on other

rare animals within the analysis area, there may be no practical way to collect sufficient information to determine how important that effect might be.

Gunnison sage grouse habitat is shrinking in size, declining in quality, and losing connectivity. Specific habitat problems include: 1) fragmentation of habitat components throughout entire area, i.e. too much distance between nesting and brooding areas, 2) p-j invasion into all habitats; breeding, nesting, brooding, and wintering, 3) not enough grass and forbs in most sagebrush stands; needed for cover and food, 4) low age class diversity in sagebrush stand, too much the same - too old with low vigor, 5) limited lek sites, too much cover on leks, and 6) short supply of wet areas, for brooding and feeding.

The population and habitat goals listed in the Conservation Plan for the Crawford area are; 1) population - maintain a sage grouse population that is in balance with the carrying capacity of the habitat, striving for a desired minimum of 225 birds and an optimum of at least 480 birds; increase the minimum number of birds over time to at least $225 \pm$ in 2001, $350 \pm$ in 2005, and $480 \pm$ total birds in 2010, 2) habitat - maintain on suitable sites across the Crawford landscape relative large, contiguous stands of sagebrush with a variety of vegetative conditions interspersed throughout, in the desired arrangement with good connectivity to provide the quantity and quality of sage grouse habitat to support at least the desired optimum population level by 2010.

Standard 5: *The water quality of all water bodies, including groundwater where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the state of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and antidegradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.*

Indicators used to assess this standard include: appropriate populations of macroinvertebrates, vertebrates, and algae, pollutants and sedimentation attributable to human activity is within amounts specified by the Water Quality Standards established by the State of Colorado.

Acreege Figures: Stream Miles Evaluated Against Standard 5

Stream Type	Meeting Standard 5		Miles Not Meeting	Unknown
	Miles Meeting	Miles Meeting but Problem Areas		
Perennial	32.4	0	4.4	0
Intermittent	3.0	0	0	0
Ephemeral	39.3	5.0	0	0
Total	74.7	5.0	4.4	0

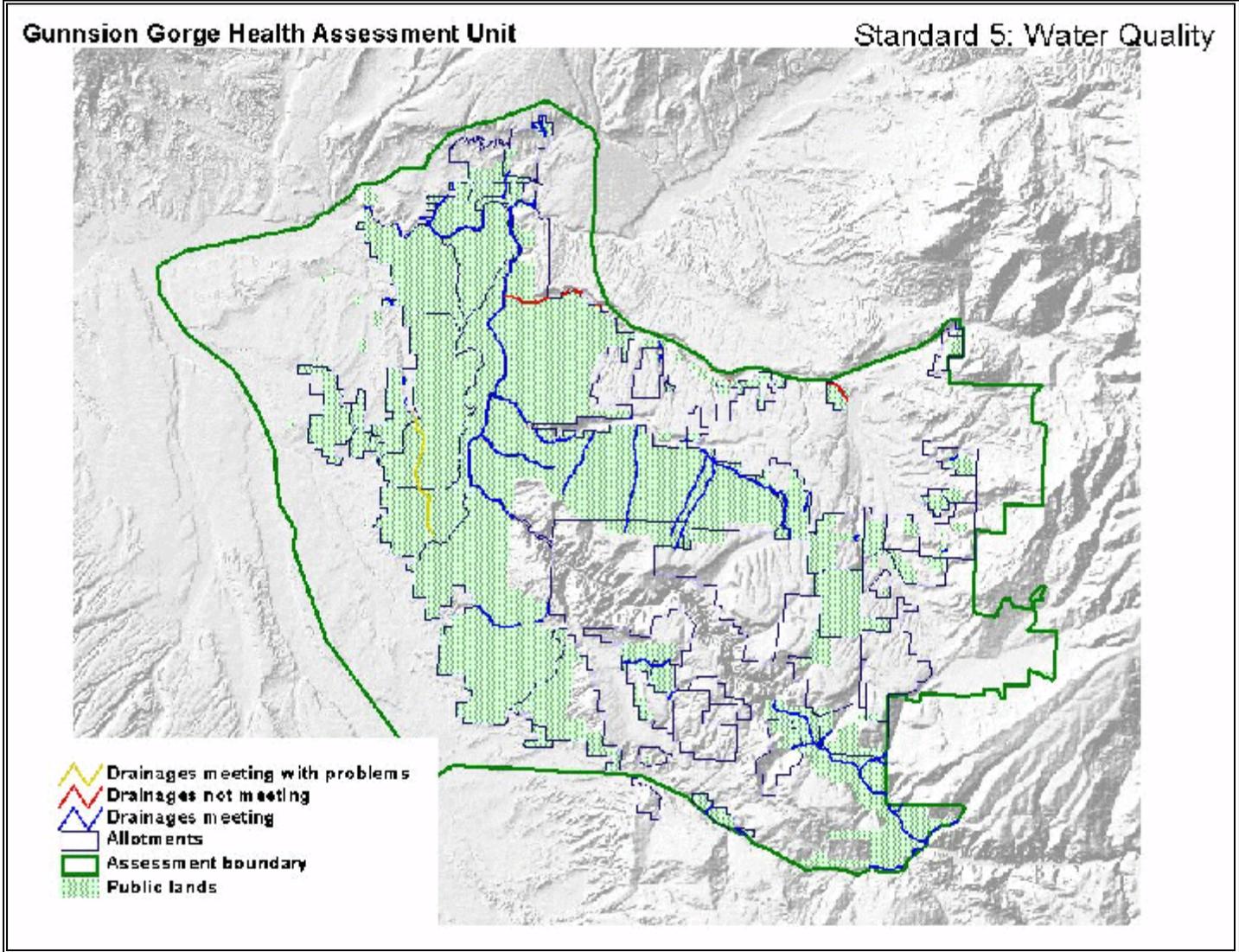
Specific Problems

The potential non-point source water pollutants yielded from the landscape unit include, sediment, salinity, selenium, nutrients, and biological pathogens (primarily bacteria and protozoans). Much of the accelerated levels of sediment production are a result of historic and some present uses that have resulted in poor watershed condition and unstable stream channels.

Disturbed soils typically have higher rates of erosion and sediment production. OHV use and grazing on much of the Mancos shale badland areas in the landscape unit has disturbed vegetation communities and altered natural flow patterns. The areas within the landscape unit observed during field assessments that have been most impacted from OHV include the Mancos shale badlands within the following 5th level watersheds: Uncompahgre (Hydrologic Unit Code (HUC) 1402000607), Peach Valley in the headwaters of HUC, 1402000413 and Spring Creek/Happy Canyon (HUC 1402000640) watersheds.

The majority of named stream channels (the major drainages—even intermittent—are all named on USGS quad maps) in the assessment area were judged to be meeting Standard 5 (Figure 6.1). There were some areas with watershed condition problems, but they did not occur in sufficient concentrations in watersheds that drained into named stream channels to warrant a rating of meeting with problems to any named channel. For example, portions of the landscape unit that encompass both the Spring Creek/Happy Canyon and Lower Uncompahgre watersheds are mostly ephemeral, first and second order headwater channels that drain to the Uncompahgre River. Site

Figure 6.1 Standard 5 Water Quality--Drainage Ratings.



visits to these watersheds during the year 2000 found several areas exhibiting poor upland watershed condition (high rates of bare ground, low plant basal cover, soil pedestaling, and excessive runoff drainages) and unstable/incised channel conditions. The poor upland watershed and channel conditions increase the potential for increased sediment and salinity delivery to the downstream receiving drainages (e.g. Uncompahgre River). However, significant runoff events needed to transport sediment and salinity are fairly infrequent. Consequently, any sediment and salinity conveyed to downstream drainages from the landscape unit would be very episodic. The Uncompahgre River is on the State's 303(d) list for impaired water quality and on the Monitoring and Evaluation list for suspected excessive sediment loading.

The ephemeral Peach Valley drainage in HUC 1402000513, also exhibits unstable channel and poor watershed conditions, especially in the headwater area in the southernmost portion of the watershed. This area drains directly into the Gunnison River, downstream of the confluence with the North Fork, which is not state listed for water quality impairment. This section was judged to be meeting with problems.

The perennial drainage systems in the landscape unit include: the Gunnison and the North Fork of the Gunnison Rivers, and the Smith Fork and one of its tributaries, Iron Creek. The "Recreation 1" classification on both the Gunnison River and Smith Fork allows for fecal coliform concentrations to reach 200 colonies/100ml. This limit on bacteria assumes there is the potential for some human ingestion of water, such as would be expected from swimming or boating activities. Recreational use on the Gunnison Rivers includes boating, fishing, and camping from early spring to late fall. The Smith Fork, at its confluence with the Gunnison is a popular spot for boaters to stop and wade or swim. Recreational uses and livestock grazing have the potential to introduce water-borne biological pathogens to these surface water systems. Consequently, to maintain adequate protection for river recreationists and to ensure compliance with state water quality standards, water quality monitoring for fecal coliform concentrations should be initiated on both the Gunnison River and the Smith Fork.

The Gunnison and Smith Fork are also classified Aquatic Life Cold 1. This classification requires that either the waters are currently capable of sustaining a wide variety of cold water biota, or could sustain such biota but for correctable water quality conditions. The Gunnison River meets this classification, even with a current outbreak of whirling disease that has nearly decimated the rainbow trout population. The Smith Fork, however, from the mouth and upstream for at least 7-8 miles shows very limited potential for any aquatic life. Results of a water quality sample collected on 9/5/2000 show high dissolved solids, 3,320 mg/l, and a warm water temperature of 23 degrees C. Even though the dissolved oxygen was 2.67 times saturation, from high water turbulence, no aquatic life was found during a visual reconnaissance. Consequently, the Smith Fork does not meet Standard 5. Additional monitoring of the Smith Fork is needed to better define the causal factors for the impaired water quality.

Muddy Creek from the outflow of Crawford Reservoir to the confluence with the Smith Fork also is not meeting Standard 5. A site visit during in 2000 observed and documented poor upland watershed condition on areas next to the channel. Excessive channel erosion was also apparent from channel incisement, possibly aggravated by the poor condition uplands. A water sample analysis showed moderately high dissolved solids, 1,460 mg/l, and a low pH of 5.40. Very limited aquatic life was observed during a visual reconnaissance. It is possible that Muddy Creek contributes to the impaired water quality of the lower Smith Fork. Additional monitoring of Muddy Creek will be needed to define the causal factors for the impaired water quality.

CAUSATIVE FACTORS

Causative factors behind land health problems are addressed here for all standards taken together. The reason behind this is that one cause may impact several indicators and health standards at once. In addition, most of the land health problems observed in the landscape unit are not clearly linked to one causative factor, nor are they always related to a cause that is presently occurring. Often, causes were indirectly suggested, using the condition of indicators as evidence. In many areas, problems are occurring as a result of several causative factors which overlap spatially. As a result, acreage figures reported below may overlap for various causes.

Historic Grazing: Regional accounts of settlement in this part of Colorado indicate that livestock numbers grazing the public rangelands were once many times what they are now, and that the vegetation changed dramatically following the introduction of livestock. The adobe hills east of Montrose and Olathe were once major stock driveways for domestic sheep moving from summer to winter range. In addition, areas close to towns typically had heavy winter, spring and fall use until the middle of the 20th century. The interdisciplinary team identified 29,693 acres where historic grazing had contributed to a polygon either failing to meet a standard, or meeting with problems. The primary indicators used to infer this included landscape position and topography coupled with lack of cool season grasses in otherwise grassy communities, lack of forbs, or dominance by annual plants.

Current Grazing: The main evidence used to conclude that current livestock grazing was causing problems with soil or vegetation were signs of heavy use (such as abundant cow pies, sheep concentration areas, terracing of slopes, or livestock paths) in poor condition areas, or heavy use on four-wing saltbush or other such palatable species. This was typically coupled with unduly long season and duration of use from the grazing permit. Timing of grazing and watershed condition were also used to infer if grazing might be contributing to problems with water quality. The influence of recent livestock grazing on water quality varies considerably with site specific conditions and is highly dependent on the frequency, magnitude and timing of runoff events in combination with when livestock are present. Additional factors that moderate this relationship are watershed condition, number and class of livestock, proximity of livestock to surface water systems, and duration of grazing. While these are not definitive indicators that current livestock grazing is the cause, they point toward a potential problem. Utilization information would be stronger evidence, however this has not been gathered very consistently nor uniformly across the area in the past. There were also some polygons where the team was not sure whether grazing was contributing to problems and identified the need to monitor impacts more closely. Combining these two together, there were 10,694 acres where the ID team identified current grazing practices as likely to be causing a polygon to fail to meet a standard or to meet with problems. There were an additional 422 acres that failed to meet or had some problems due to trespass grazing.

Old Vegetation Treatments: Vegetation treatments which were completed mainly to improve livestock forage conditions in the 1950s through the 1980s were a primary cause for 3,663 acres failing to meet a standard, or for meeting with problems. The use of and subsequent dominance by nonnative grass species, or where improper follow-up management had led to poor groundcover or exotic annuals taking over the site caused the polygons to fail to meet standards.

Roads: Poor road placement, road maintenance, weeds associated with a road, and the increase in travel on roads during wet periods were identified as contributing to causing 1,818 acres not to meet a standard, or to meet with problems.

Fire Suppression: The absence of a natural fire regime caused by aggressive fire suppression policies of the past and lack of fine fuels necessary to carry burns contributed to 12,574 acres failing to meet a standard, or to meet with problems. Dominance of large landscape areas by old age class woody species and residual low vigor shrub and grass species in pinyon-juniper woodland were considered to be evidence supporting lack of fire as a causative factor.

Poor Seedbank: Impoverished seed banks were thought to be a contributing factor for 3,211 acres failing to meet a standard, or for meeting with problems. Although other factors may have caused the seed bank to diminish, the ID team thought the problem with meeting the standard could not be remedied without putting new seed on these sites.

Noxious Weed Infestation: (this includes cheatgrass). Weed dominance, and the competitive nature of the weeds was considered to have caused 13,302 acres to fail to meet a standard, or to meet with problems. Another 21.7 stream miles failed to meet a standard or met with problems because of weed problems.

Heavy Browsing on Shrubs: Heavy browse utilization caused by grazing animals (wildlife and livestock) contributed to 9,916 acres failing to meet a standard, or to meet with problems. During this assessment, no attempt was made to determine which type of animal caused the heavy use. Adjustments in grazing and rejuvenation of old shrub stands may help to ease this problem.

Recreation: Recreational activities including off-road driving and dispersed campsite creation contributed to 15,782 acres failing to meet a standard or to meet with problems. Recreational OHV use occurs most of the year in many of the adobe soil areas, and hunting season is the main time of impact for the other areas. Increasing levels of various recreational uses are also potentially contributing to water quality degradation. Along the Gunnison River within the Gunnison Gorge NCA, increased camping, fishing and general recreation use is resulting in a progressive increase of soil disturbance on campsites and trails. OHV use on much of the Mancos shale badland areas in the landscape unit has disturbed vegetation communities and altered natural flow patterns as evidenced by very high trail densities in many of these areas.

Flow Regulation: The flow regulations imposed by the Aspenall Unit on the Gunnison River have dramatically changed the hydrograph along the Gunnison. The North Fork of the Gunnison and the Smith Fork (via Muddy Creek), also have had flow alterations due to dams. Changes in flow may be responsible for much of the nonnative vegetation including saltcedar that occurs along these rivers. Flow regulations were cited as causing 24 miles of riparian area to fail to meet a standard, or to meet with problems. Flow augmentation, which generally results from irrigation practices was determined to contribute to 1.3 miles failing to meet or meeting with problems.

RECOMMENDATIONS

Standard 1 Soils:

- 1) Assess identified gully systems in the eastern end and Peach Valley parts of the landscape unit as to their stage of development and causal factors, and prepare corrective actions.
- 2) Reduce bare ground and increase perennial basal cover in areas circled on maps by using the following tools:
 - a. Adjust livestock grazing to leave more litter where it has been determined that current livestock grazing is a causative factor of high levels of bare ground, through practices like: reduced grazing duration and increased intensity, reduced utilization during dormant seasons, more rest, increased trampling as opposed to trailing, two growing season's rest on treated sites, and short duration grazing rotated with some rest to maintain herbaceous species growing on treated sites
 - b. Preserve existing cryptogamic cover and encourage its development in early-mid, late-mid and late seral areas by reducing trampling, improving road management, and avoiding disturbance treatments where good cryptogamic communities exist
 - c. Increase herbaceous dominated early and early-mid seral patches in the land unit by using a combination of fire, mechanical, possibly chemical treatments, followed by seeding in areas with poor seed banks in B1 and C2 landscape mosaic units.
- 3) Identify travel management and maintenance actions that will reduce road-related erosion. Use information from road inventory to identify the areas and set priorities for management action.
- 4) Prepare map of high risk soils to help identify road and vegetation treatment priority areas using the soil k factor >0.2 , bare soil $>50\%$, and slopes $>4\%$
- 5) Increase perennial plant basal cover in annual dominated swales in the Mancos shale areas by establishing series of trial plots experimenting with various treatments followed by widespread application of the most successful approaches. A review of existing literature on Mancos shale should be performed to identify appropriate technology.
- 6) Manage and/or mitigate OHV activities to:
 - a. avoid further destruction of perennial vegetation and cryptogamic crust
 - b. avoid use of areas that are being restored
 - c. encourage use to occur in areas where soil erosion will be minimal because of low erosion risk
 - d. concentrate use and create trails in such a way that erosive water flow will not be channeled along them
 - e. concentrate use where nearby vegetation is able to collect soil displaced by OHVs and overland flow

Standard 2 Riparian:

- 1) Weed control efforts should continue for saltcedar, yellow toadflax, and Russian knapweed along the Upper and Lower Gunnison Rivers and North Fork of the Gunnison, with the highest priority given to the wilderness area. A systematic inventory should first be carried out followed by treatment, monitoring, and retreatment until the infestations are eliminated. Improve the training of field personnel in weed recognition.
- 2) BLM should cooperate with the Park Service to secure occasional high spring flows along the Upper Gunnison River sufficient to move the accumulating bed material, scour banks, and prevent additional establishment of nonnative vegetation.
- 3) Grazing levels along perennial and intermittent streams should be managed to improve riparian conditions, especially native woody plants.
- 4) Water quality along the Smith Fork— See recommendations for Standard 5.

Standard 3 Healthy Native Communities:

- 1) Improve perennial grass cover, forb cover, and cool season grass cover in circled areas on maps by:
 - 1) Increasing herbaceous dominated early and early-mid seral patches in the land unit by using a combination of fire, mechanical, possibly chemical treatments, followed by seeding with a diverse seed mix of native grass and forb species, coupled with changes in livestock grazing to maintain the seeded vegetation
 - 2) Converting degraded valley bottom and swale communities to native grass and forb communities (see below)
 - 3) Where it has been determined that livestock grazing is a causative factor, implementing grazing strategies that: minimize grazing on regrowth during active growing stages, incorporate rest, vary timing of use from year to year, allow dormant season utilization of no more than 50%, allow two growing seasons of rest following treatment and seeding of areas, and that encourage livestock to graze some of the less palatable species (either through herding, increased numbers and reduced time, or through livestock supplements like protein.)
 - 4) In those areas where none of the above techniques result in recovery of the plant communities, grazing and other conflicting activities should be eliminated until community health is restored.
- 2) Convert invasive weed dominated flats in the Mancos shale areas to plant communities where native species dominate by:
 - 1) Information review on restoring salt-desert shrub dominated areas
 - 2) Data collection/revisit of existing treatment efforts in valley
 - 3) Series of trial plots experimenting with most promising treatments and most successful native species for establishing and competing with exotic weeds
 - 4) Develop conservation demonstration areas, and apply successful approaches elsewhere as appropriate.
 - 5) Review literature on impacts of different grazing seasons in cheatgrass dominated systems, and

native marine shale communities; implement grazing strategies that reduce spread and dominance of these and other exotic annuals.

6) Protect restored areas and adjust uses accordingly to maintain their condition.

3) Evaluate road and weed inventory data to: improve road management, identify and rehabilitate unnecessary roads, manage the impacts on native wildlife and plant communities, for improving road management and rehabilitating unnecessary roads which are a major corridor for weed spread and detrimental to some wild animal and plant species when the road network is too dense.

4) Manage and/or mitigate OHV activities to achieve land health standards:

- a. avoid further destruction of perennial vegetation and cryptogamic crust
- b. avoid use of areas that are being restored
- c. avoid use in areas where rare species or high quality native plant communities are located
- d. educate all users about the environmental values and sensitivity of the Mancos shale areas, and how their activities could effect their potential impacts

5) Expand weed inventory to include all other likely areas of infestation (e.g. range improvements, buried pipelines, irrigation ditches, drainages). Prioritize and treat the mapped infestations. Train appropriate field personnel in weed recognition.

5) Reseed all fires, vegetation treatments, or soil disturbing activities in areas where exotic species are present so that exotics will not overtake the disturbed areas.

6) Improve shrub vigor in circled areas by treating portions of low vigor shrub stands with the most appropriate method, in accordance with the landscape mosaic described in the fire plan.

7) Improve the landscape mosaic to be compatible with the Fire Management Plan landscape objectives. Treatments should take place using a combination of fire, mechanical, and potentially chemical methods in the following units in order of priority: units C2, B1, and C1. In order to provide means to monitor landscape mosaic, improve the accuracy of the existing Landsat based vegetation map , and, if necessary, complete aerial photo mapping where issues require finer detail.. Incorporate results from pinyon-juniper stand characterization study, and the fire history study into Fire Plan landscape objectives.

8) Adjust grazing to allow for the accumulation of fine fuels in burnable areas in some years in order for cool ground fires to be able to burn more of the landscape and maintain a more desirable mosaic.

9) Obtain additional information for many of the wildlife species and their habitats; specifically sage grouse, small mammals, reptiles, amphibians, birds, and predators.

11) Cooperate with the University of Wyoming, and the Black Canyon National Park, to complete a floristic inventory within the NCA area. This would provide a better understanding of the biodiversity of the area and a more thorough understanding of the composition of the plant communities.

10) Determine the reasons for the decline in vigor of shadscale and greasewood communities; a literature review should be conducted first to determine if a specialist should be contracted, or research initiated, to help find a cause and help determine what techniques could be used to restore vigor to these communities.

Standard 4 Special Status Species:

1) Explore methods to successfully restore native species to valley bottom areas, within the Mancos shale habitats, which are devoid of native perennial species. Complete a literature review, establish some trial plots, or initiate research to develop restoration techniques. If successful, apply the techniques to Conservation Demonstration Areas and more widely throughout the Mancos shale sites.

2) Complete an overview of the assessment area to determine if there are benchmark sites that should be protected from degradation, and used to establish reasonable goals for BLM management of similar sites.

3) As the management plan for the Gunnison Gorge NCA is constructed, BLM should consider formal recognition and protection for the Potential Conservation Areas (PCA's) identified by the Colorado Natural Heritage Program.

4) More data needs to be collected on the status of the clay loving wild buckwheat within the analysis area, and its vulnerability to disturbance from recreation use, including off highway vehicles, sheep bed grounds, and other human disturbances. In cooperation with the U.S. Fish and Wildlife Service, determine if the recovery plan for this species should be updated.

5) Monitoring studies should be established to determine Uinta Basin hookless cactus, Delta lomatium, Montrose penstemon, Montrose bladderpod, and Wetherill milkvetch population trends, and the impact of BLM management decisions on those populations.

6) The biggest potential threat to rare plants on public land in the analysis area is the continued expansion of off highway vehicle use. BLM should work with CNHP to develop a suitable monitoring program to help determine the extent and rate of impact from this activity. BLM also needs to contract with CNHP to complete data collection on suitable habitats in the Uncompahgre Field Office.

7) A renewed mapping/evaluation effort for the prairie dog colonies in the area should be pursued to help evaluate change in some areas and establish a baseline in others.

8) Carry out actions identified in the Gunnison Sage Grouse Conservation Plan for the Crawford Area.

9) Complete a aerial photo based habitat map for the Gunnison sage grouse habitat areas, and collect sufficient field information to determine how the plant communities compare to the habitat requirements of sage grouse. This data will enable agencies to better determine progress in implementation of the sage grouse management plan.

10) In sage grouse habitat areas, management should be primarily to benefit grouse rather than livestock, recreation, woodland management, etc.

11. Implement management actions that will protect the good condition Great Basin wild-rye plant community upstream of Ute Park.

Standard 5 Water Quality:

1) Monitor for fecal coliform bacteria in the Smith Fork, Gunnison River, and the North Fork to ensure concentrations do not exceed State Water Quality standards.

2) Additional chemical analysis of the water quality in both the Smith Fork and Iron Creek should be completed to identify causal factors. If water quality is determined to be unsafe, BLM should work with state and local entities to move the stream toward compliance. BLM should also inform recreationists of potential health hazards associated with the water.

3) Establish a baseline inventory of macroinvertebrate taxa on perennial water systems within the landscape unit. Stream water depletions and/or changes to the releases from the Aspinall Unit to satisfy either the Black Canyon Reserved Right or the lower Gunnison threatened and endangered fish species can affect both the physical and chemical qualities of water, which would be manifested in the aquatic invertebrate populations.

4) BLM should remain involved with the ongoing, state driven, Selenium - Total Maximum Daily Load process that is ongoing in the Lower Gunnison Basin. The ultimate goal of the process is to reduce Selenium loading in the areas surface waters to be at or below 5 ppb. Remedial actions to achieve this goal could involve public lands that are strongly influence by the Mancos shale. Implement actions that will reduce selenium loading in the landscape unit.

5) Additional monitoring should be initiated on areas where watershed condition is showing problems, especially on soils derived from Mancos shale. These soils are most prone to surface erosion, and salinity and selenium production. Monitoring efforts should be concentrated on the problem areas previously identified in HUC #'s 1402000640, 1402000607, and 1402000513. Watershed condition problems also to be diffusely occurring on scattered headwater, public land parcels in HUC 1402000205.

6) Assess identified gullied systems as to their stage of development and causal factors, and prepare corrective actions, where appropriate.

7) Monitor watershed conditions in areas where watershed conditions are showing problems.

References:

- Belknap, Jayne. 2000. Personal Communication with Jim Ferguson regarding Mancos shale ecological processes.
- Burdick, Bob D. 1995. Ichthyfaunal Studies of the Gunnison River, Colorado, 1992-1994. U.S. Fish and Wildlife Service, Grand Junction, C O PP. 60+
- Elliott, J. G., and R. S. Parker, 1997. Altered Streamflow and Sediment Entrainment in the Gunnison Gorge. American Water Resources Association. Water Resources Bulletin, Vol. 33, No. 5, October 1997.
- Elliott, J. G., D. M. Murphy, and K. S. Tucker, 1994. Resource Management Considerations in a Changing Physical Environment - The Gunnison Gorge, Colorado. In: Proceedings, American Water Resources Association, Annual Symposium, Jackson Hole, Wyoming, June 26-29, pp.619-628.
- Hebein, Sherman. 2000. Fish Inventory Data for the Gunnison Gorge. Colorado Division of Wildlife, Montrose, CO
- Ireland, Terry. 2000. Notice of Designation of the Gunnison Sage Grouse as a Candidate Species, Federal Register: December 28, 2000 (Volume 65, Number 250). PP. 82310-82312.
- Lyon, Peggy. 2001. Personal Communication with Jim Ferguson regarding clay loving buckwheat.
- Lyon, Peggy, T. Stephens, J. Siemers, D. Culver, P. Pineda, J. Zoerner. 1999. The Uncompahgre River Basin, a Natural Heritage Assessment. Colorado Natural Heritage Program, Ft. Collins, CO.
- Lyon, Peggy, and Earl Williams. 1998. Natural Heritage Biological Survey of Delta County, Colorado. Colorado Natural Heritage Program. Ft. Collins, CO.
- Kingery, H.E. ed. 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife. Denver, CO.
- Masden, D. 2001. Personal communication with Jim Ferguson.
- Merigliana, Lesica, Natural Areas Journal, vol. 18(3), pp. 223-230.
- Navo, Kirk. 1999. Bat Inventory Information for the Gunnison Gorge and Black Canyon National

Monument. Colorado Division of Wildlife, Monte Vista, CO. Unpublished.

Reveal, James. PhD. 2000. Personal Communication with Jim Ferguson.

Soil Conservation Service, USDA, 1981. Soil Survey of Paonia Area, Colorado. Parts of Delta, Gunnison, and Montrose Counties.

USDI Bureau of Land Management, Uncompahgre Field Office. Various. Rare Plant Inventories. Montrose, CO.

USDI Bureau of Land Management, Montrose District Office. 1980. Bald Eagle Inventories. Montrose, CO.

_____. 1998. Gunnison Sage Grouse Conservation Plan, Crawford Area- Colorado. Bureau of Land Management, Montrose, CO.

_____. Various. Bald Eagle Winter Survey Data. Colorado Division of Wildlife. Ft. Collins, CO.

_____. 2001. Whooping Crane. U.S. Fish and Wildlife Service Web Site (http://species.fws.gov/bio_whoop.html)

_____. 2000. AB Lateral Hydropower Project, Supplemental Environmental Impact Report. Uncompahgre Valley Water Users. Montrose, CO.

_____. Various. Colorado Division of Wildlife Big Game Population Statistics and Population Objectives. Gunnison, CO.

U.S. Fish and Wildlife Service. 1999. Endangered and Threatened Wildlife and Plants; Proposed Rule to Remove the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife. Federal Register, July 6, 1999. Vol. 64, #128, PP:36454 to 36464.

Weber, W. 2001, personal communication

_____. various. CDOW data on big game population objectives and status. Gunnison, CO and Montrose, CO.

United States Geological Survey. Study which shows steadily accumulating deposits of boulders at the mouths of the tributary canyons

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