North Delta Land Health Assessment
2001-2002

Uncompahgre Field Office - B.L.M.

Land Health Assessment
North Delta Area, 2002

SUMMARY

This land health assessment evaluated nearly 74,600 acres of public land. 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**
62,107	9,490	2,845
Stream Miles Meeting Standards 2&5	**Stream Miles Not Meeting Standards 2&5**	**Stream Miles Unknown 2&5**
63.6	5.9	0.4

In order to make the above determination, the North Delta 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)	39,896	30,132	1,554	2,844
Standard 2-Riparian (miles)	12.8	5.8	5.8	0.4
Standard 3-Healthy Communities (acres)	9,677	52,420	9,484	2,844
Standard 4-T&E Species (acres)	74,583	0	0	0
Standard 5-Water Quality (miles)	50.2	19.7	0	0

Major Land Health Problems

Standard 1: While there were few active, accelerated soil erosion problems observed, many areas throughout the LHA unit had heightened erosion vulnerability. Widespread problems with high bare ground, low plant basal cover and plant litter were observed.

Standard 2: The majority of streams fully met the riparian standard, but problems with noxious weed dominance and some degree of channel incision caused problems along some

stream reaches. The Gunnison River fell into the “Meeting with Problems” category, while levels of noxious weeds and deep channel incision caused Negro Creek and a portion of Oak Creek to fail to meet the standard.

Standard 3: Most areas were found to have some problems with standard 3, or not meet it. Widespread problems with perennial grass and cool season grass cover, perennial forb cover, exotic plant presence, noxious weeds (mainly Russian knapweed and tamarisk), and shrub vigor were observed.

Standard 4: No significant problems with special status species were observed in the LHA unit.

Standard 5: No outstanding water quality problems were observed or indicated in the LHA unit. Drainages passing through areas with poor watershed condition–primarily areas having high bare ground and low plant basal cover and plant litter levels–were inferred to have heightened sediment levels and to convey this sediment into the Gunnison River. Additionally, some drainages passing through the highly saline Mancos Shale Formation were flagged as potentially problematic.

Recommendations

Using existing road and range/watershed development inventories, identify actively eroding roads and developments, prioritize based on soil erodability, salinity and selenium production, and determine and implement corrective measures.

Where conditions do not meet standards or problems are indicated, adjust grazing to limit dormant season utilization to 50%, limit duration of grazing during the active growing season, avoid spring and fall grazing in the same areas, limit grazing utilization on native woody riparian species to 30%, rest vegetation treatments for two growing seasons, identify areas off limits to sheep bed ground use, and work toward occasional year-long rest for some pastures.

Using the comprehensive weed inventory for the North Delta area, develop and carry out strategy to systematically control noxious weeds. Transco Pipeline should receive highest priority for weed management.

Actively restore native vegetation communities in seriously degraded Mancos Shale depositional areas using methods developed in the Gunnison Gorge NCA.

Reintroduce fire (or simulate its effects) in portions of the North Delta area where fire has historically been an important natural disturbance. Use the Vegetation Mosaic Objectives outlined in UFO’s Fire Management Plan. Seed with native, regionally adapted species where existing vegetation is inadequate or has high levels of weedy species.

Cooperate with the National Park Service to secure a more natural hydrograph for the Gunnison River.

Work with CDOW, USFWS, and in some cases CDOT to better determine status of pronghorn, prairie dog, burrowing owl and kit fox, listed fish species and habitat needs. If necessary, recommend management actions to improve habitat for these species.

Consider amending the Uncompahgre Basin Resource Management Plan to include special designations for the CNHP Potential Conservation Areas.

TABLE OF CONTENTS

Introduction and Background.....1

Methods 34

Results Standard 1 36
Standard 2 45
Standard 3 48
Standard 4 70
Standard 5 75

Causative Factors 80

Recommendations 83

References 86

Preparers 87

Land Health Assessment
North Delta Area, 2002

INTRODUCTION

Overview

The North Delta Area is located immediately north of the City of Delta, in western Colorado. The North Delta Area extends north and west of Delta, and includes the slopes of Grand Mesa up to the Grand Mesa National Forest (see Figure 1.1). The area is bounded on the west by the Lower Gunnison River, and on the east by the large expanse of private land in the Surface Creek Valley. The unit encompasses about 147,900 acres, and is made up of parts of two Level 5 watersheds: the Tongue/Current Creeks watershed and the Wells/Alkali Creeks watershed. The unit was identified in 1998, prior to the directive to base units on fifth order watershed boundaries. However, it is centered around the south slopes of the Grand Mesa, and thereby forms a large and cohesive landscape "chunk".

The primary problems and/or issues we are aware of in the area include: excess salinity and Selenium production from badland areas composed of Mancos shales, cheatgrass, noxious weeds and other exotic plants that are present and have the potential to increase, an imbalance in the amount of mature pinyon-juniper woodland at higher elevations, increasing use and impacts of Off Highway Vehicles, the Adobe Badlands Wilderness Study Area, the recent Transco Pipeline and its rehabilitation, and the pronghorn herd. Vegetation indicators used to assess these problems included: plant canopy cover, species composition, vigor, age class, diversity, exotic plants, noxious weeds, vertical structure, grazing impacts, fire evidence, and browse class. Indicators used to evaluate soil condition included: soil surface cover, as well as systematic observations of channel type, runoff drainages, pedestals, cryptobiotic crusts, plant distribution, litter retention, stream channel characteristics, riparian vegetation characteristics, channel characteristics, limited water quality samples. Level 3 soil survey maps and remotely sensed vegetation maps were used to evaluate landscape patch distribution and arrangement. Wildlife and sensitive species evaluations were based on large-scale species distribution and trend data together with the vegetation data.

Land Status and Management

The health assessment unit boundary encompasses a little more than 147,900 acres of which 74,582 acres are public land. These public lands make up a large, contiguous block in the western third of the unit, are intermixed with private land in large blocks in the middle third of the unit, and are nearly absent in the eastern third, which is nearly all private land (see Figure 1.2). The very southern part of the unit is mostly made up of the Escalante State Wildlife Area, and managed by the Colorado Division of Wildlife. The public land adjoins the Grand Mesa National Forest to the North. The Adobe Badlands Wilderness Study Area is also located within this unit on public land in the middle of the unit.

All public lands in the unit are covered by the Uncompahgre Basin Resource Management Plan. The unit falls into nine different RMP management emphasis areas (see Figure 1.3). The western portion is in the Livestock Grazing area. The central part of the unit is made up of a Waterfowl area around the Escalante State Wildlife Area, Salinity areas where Mancos Shale

Figure 1.1 North Delta Landscape Health Assessment location map

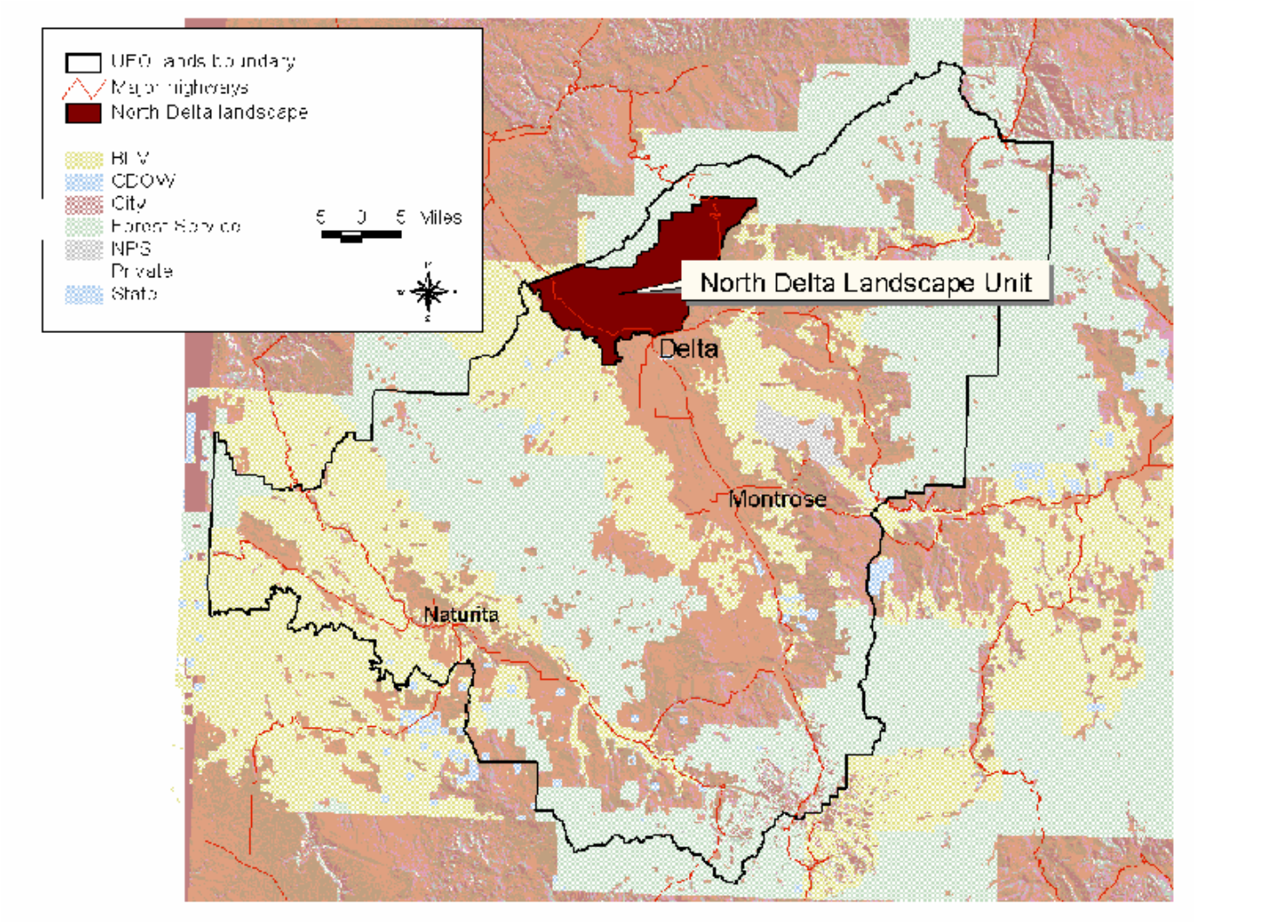


Figure 1.2. North Delta Area land ownership.

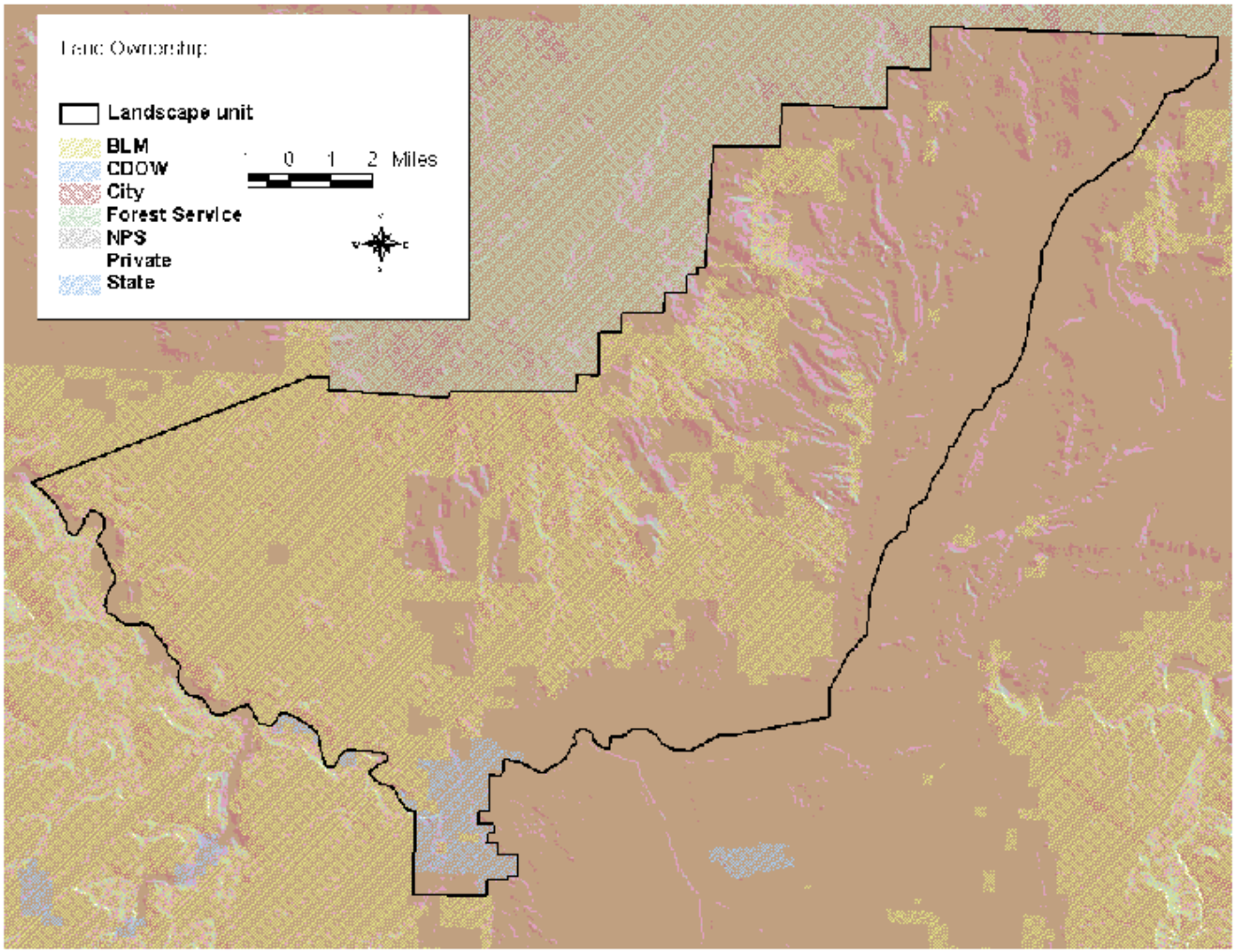
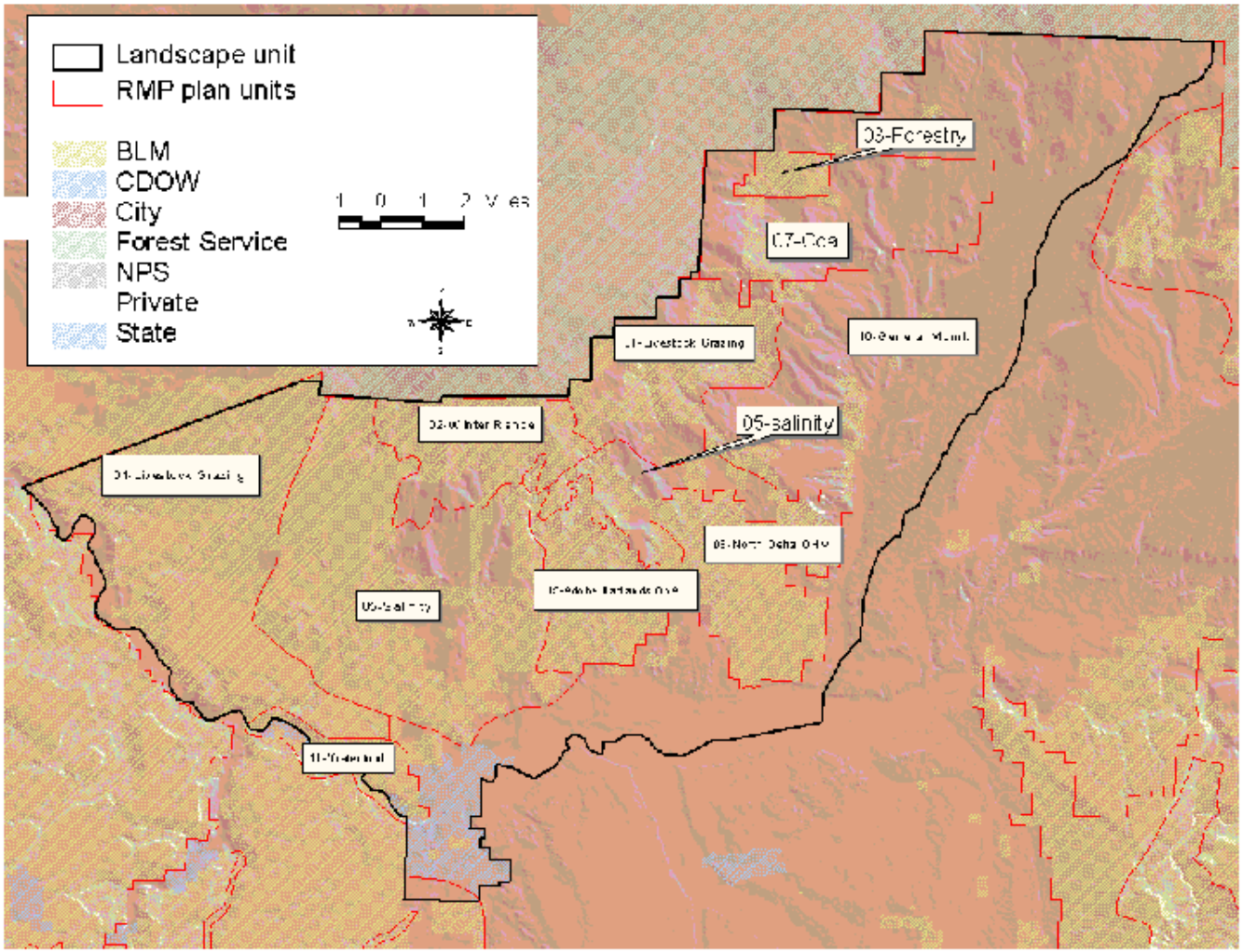


Figure 1.3. North Delta Area land management (Uncompahgre Basin Resource Management Plan) emphasis areas and Wilderness Study Areas (Unit 15 Adobe Badlands ONA (Outstanding Natural Area) on map).



forms badlands, the Adobe Badlands WSA, and Big Game Winter Range adjacent to the forest. The eastern portion is divided between Livestock grazing, Coal, General Management, and Forestry areas.

There are nine grazing allotments in the unit that contain public land (See Figure 1.4). Five of these are almost entirely made up of public land (Wells Gulch, Alkali Flats, Antelope, South Branch and Dirty George. Three of these are mostly public land with some private mixed in (Deer Basin-Midway, Ward Creek-Doughspoon, and Petrie Mesa). The Point Creek Allotment is mostly made up of private land. Wells Gulch, Alkali Flats and Antelope are grazed in the winter and early spring by sheep. Deer Basin-Midway and Petrie Mesa are grazed in the winter by sheep. Point Creek is grazed in the spring and fall by cattle. Ward Creek-Doughspoon is grazed in late spring and early summer by cattle, while South Branch is grazed by cattle in the summer. Dirty George is also grazed in the summer by cattle, but receives light use because it is used mostly for trailing cattle up to the forest. Some public land is unallotted for livestock grazing, and this is located in the southern and eastern part of the unit.

Landform and Topography

Elevations range between 4,800 feet in the western part of the unit along the Gunnison River to over 8,200 feet in the northeastern part (Figure 1.5). The Grand Mesa is the dominant landform in the unit (Figure 1.6). The unit lies across the southwestern flanks of Grand Mesa. The Gunnison River cuts a significant canyon on the southwestern part. The other most notable drainage is the Surface Creek drainage to the east. Broad and gentle slopes make up a large proportion of the area. Numerous buttes also exist, created out of the basalt debris and the highly erodible Mancos Shales

Geology and Soils

The North Delta LHA lands are located in the Colorado Plateau Geomorphic Province within the Canyon Lands Section and adjacent to the Uinta Basin Section (Figure 1.7). The area is between two structural features, the Uncompahgre Uplift to the south and the Tertiary lava capped Grand Mesa to the north. The Uncompahgre Plateau is a broad upwarping of sedimentary rocks within the Canyon Lands section. It is a northwest_trending uplift about 30 miles wide and 100 miles long. The sedimentary rocks consist of Cretaceous, Jurassic and Triassic sediments overlying Precambrian rocks. Grand Mesa is on the southern edge of the Piceance Basin. It is a flat topped mesa covered with Tertiary basalt flows overlying the Tertiary Green River formation.

The regional structure consists of gently dipping sediments with folding and faulting due to the Uncompahgre upwarp and the Piceance Basin. The Montrose Syncline crosses through the Assessment Area as shown on the map. There are no major known faults in the vicinity.

The geologic formations outcropping in the Assessment Area from oldest to youngest in age are: the Jurassic Morrison, Summerville and Entrada formations, the Cretaceous Dakota Sandstone, Mancos Shale, and Mesaverde formations, the Tertiary Wasatch, Ohio Creek and Green River formations and Quaternary alluvium, gravels, landslide and glacial deposits.

The Jurassic formations are mostly sandstones and claystones, they outcrop in the cliffs along the Gunnison River on the western edge of the Assessment Area. The Dakota Sandstone is mainly sandstones and conglomerates with lenses of carbonaceous shale. The majority of the Assessment Area is underlain by the Mancos Shale. It is a dark gray to black, fossiliferous silty

Figure 1.4. North Delta Area grazing allotment boundaries.

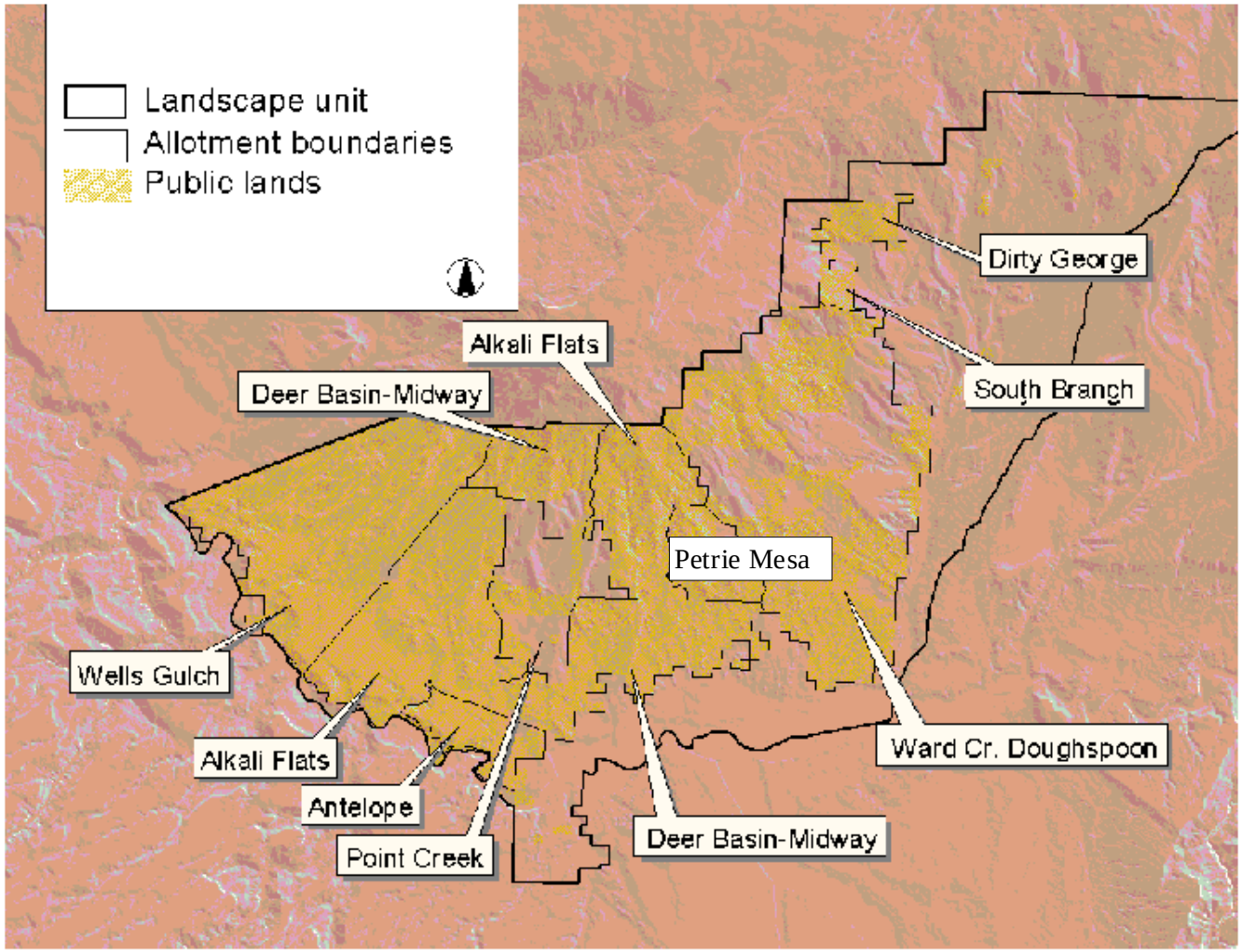


Figure 1.5 North Delta Area elevations, from Digital Elevation Model.

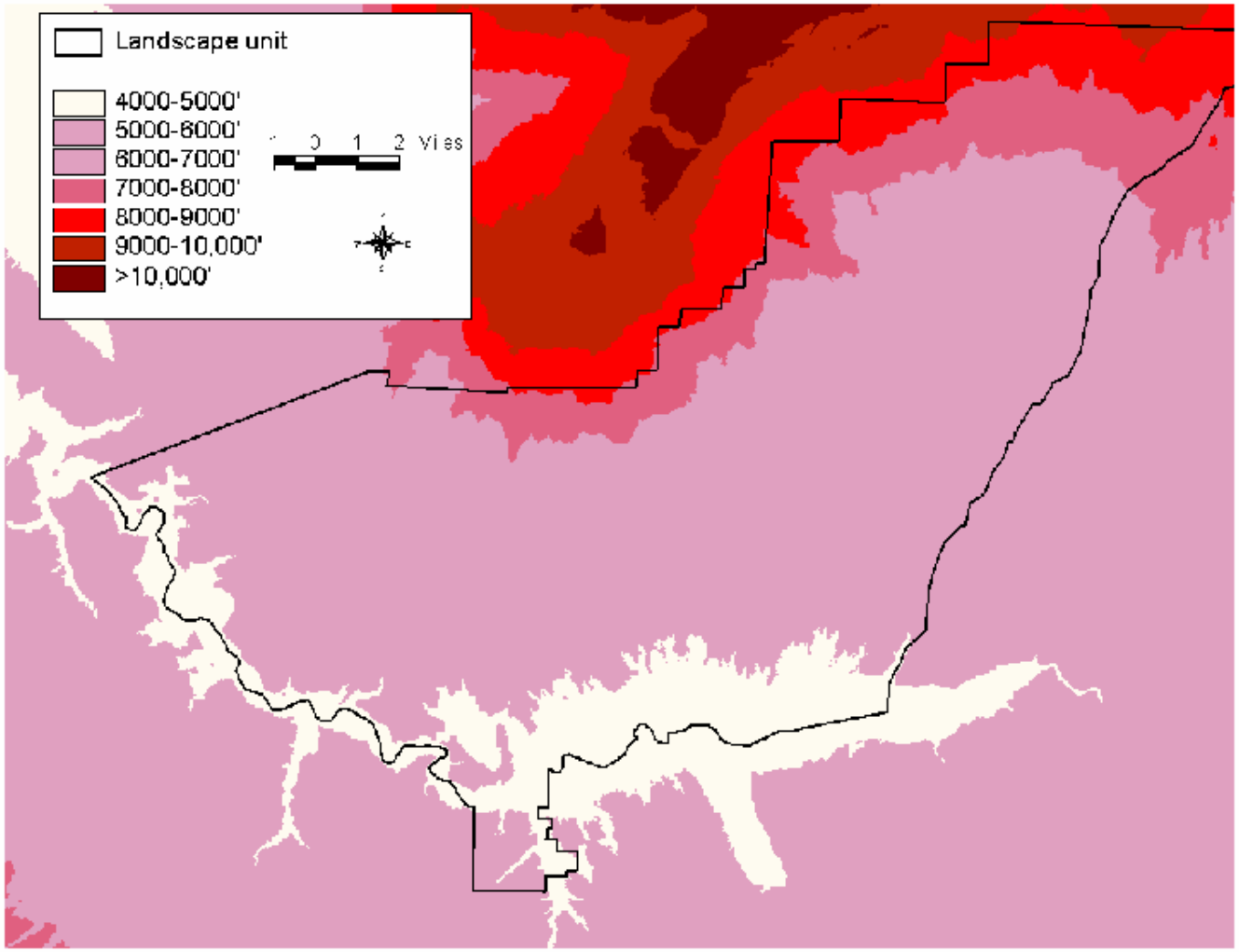


Figure 1.6 North Delta Area slopes and landforms. From Digital Elevation Model.

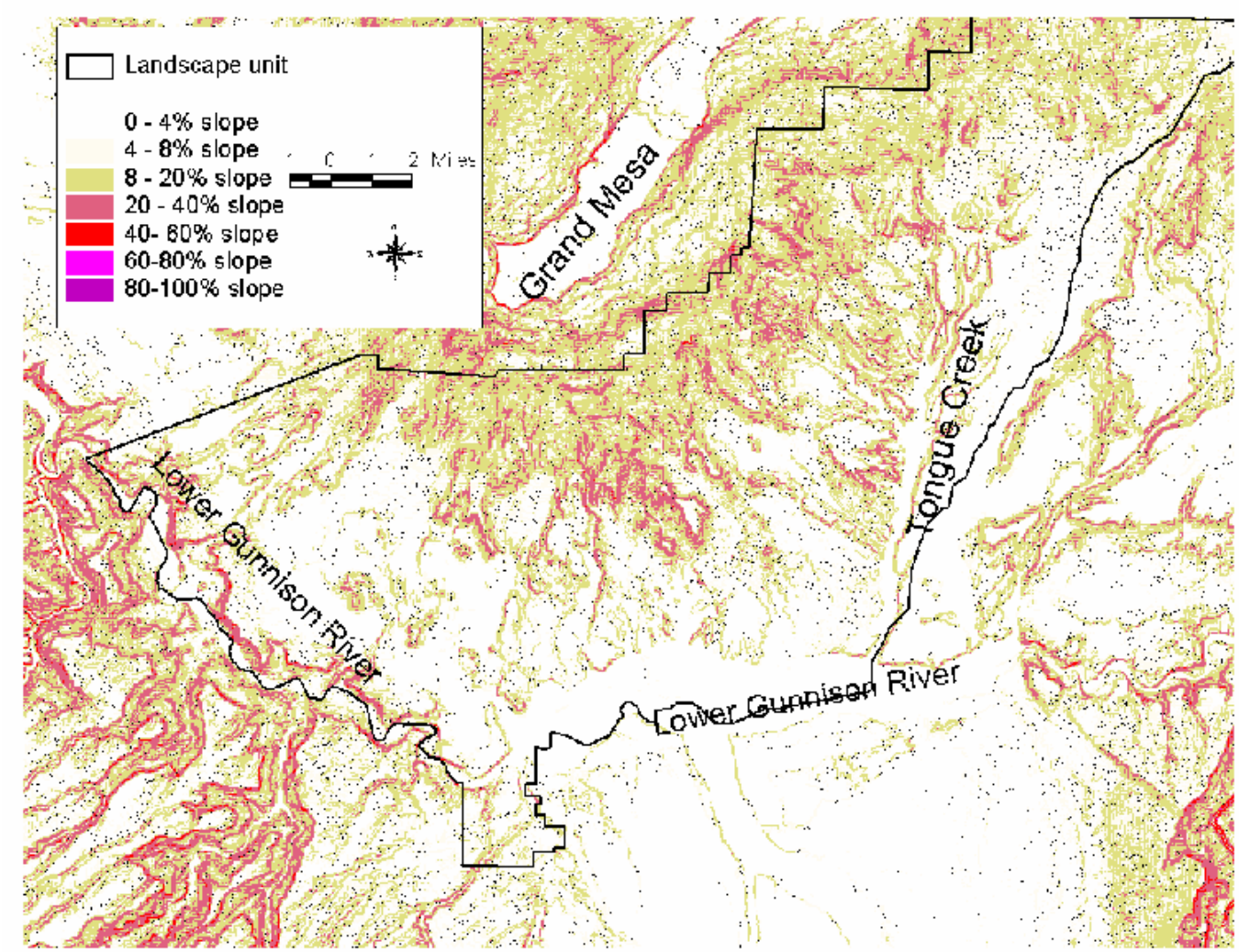
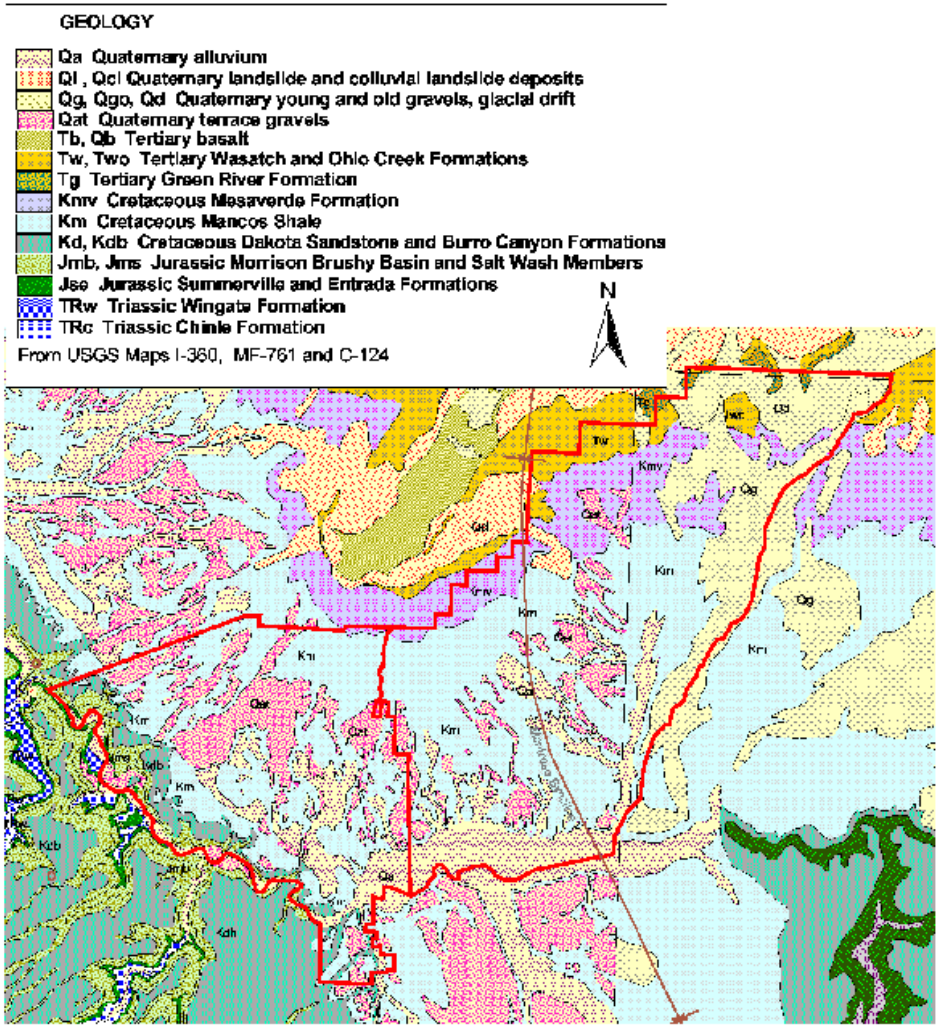


Figure 1.7 North Delta Area geology



clay shale with bentonitic beds and limestone concretions. The shale is of offshore marine origin and can be 4000 to 5,000 feet thick. The Cretaceous Mesaverde Formation and Tertiary formations outcrop on the northern edge of the Assessment area.. The Mesaverde is a sequence of siltstones and sandstones; it is a major producer of coal in the North Fork Valley to the east of the report area. The Tertiary formations are composed of sandstones, siltstones, and conglomerates. The quaternary deposits consist of recent stream deposits, as well as landslide, colluvial, terrace gravels, glacial and pediment gravel deposits. On most mesa tops and gentle slopes, the surface is covered by a pediment of basalt cobbles from the Grand Mesa.

Soils on public lands in the unit reflect the diverse geology of the area. They are described in detail in the Paonia Soil Survey (SCS, 1981). Forty one different soil mapping units are found on public lands in the North Delta Area. Of these, only 18 encompass one thousand acres or more. The dominant soil map units are listed in Table 1.1 below. The majority of soils in the unit have relatively low potential for plant production.

Table 1.1 Important soil map units in the North Delta area and descriptions of their characteristics.

Soil Map Unit	Name	BLM Acreage in Unit	Characteristics
11	Badland	17,326	Nearly barren outcrops of silty, calcareous and gypsiferous shale
80	Utaline-Torriorthents complex	10,412	Steep soils on sideslopes, typically well-drained stony loam on the footslopes, highly variable up above
70	Saraton-Agua fria complex 20 to 50% slopes	7,871	Steep, moderately deep soils on sideslopes, gravelly loams and stony loams
52	Meeteetse stony loam 3 to 20% slopes	7,153	Deep, well drained stony loam
78	Utaline sandy loam 3 to 12% slopes	5,208	Deep, well-drained sandy loam
67	Rock outcrop	3,780	Bare exposures of bedrock
73	Shavano-Lazear complex, 3 to 12% slopes	3,446	Gently sloping , moderately deep, well drained, fine sandy loam, intermixed with shallow, well drained gravelly loam

Climate

The assessment area is primarily semi-arid, although precipitation varies in response to elevation. Annual precipitation in the nearby town of Delta (which is south of the assessment and located lower in elevation --5,120' than most of the unit), has averaged 7.8" over the last 100 years. Precipitation in Cedaredge (located east of the North Delta Area at 6,180') has averaged 12.2" over the same time period. In Delta, precipitation has varied from less than 5" at its driest to 14" at its wettest. It is fairly evenly distributed across the months of the year with February the driest averaging 0.4" and August the wettest averaging 1.0". Precipitation is fairly evenly divided between cold and warm months with October through March precipitation averaging 3.3" and April through September precipitation averaging 4.5". Cedaredge is consistently wetter, but reflects these same patterns. February is the driest at 0.9" and October the wettest at 1.3". An average of 14.3" of snow falls each year in Delta, from October through May, and 45.6" falls in Cederedge between September and May.

Temperatures in Delta typically range from 12 ^{o}F lows in January to 93° highs in July. Temperatures in Cedaredge range from 14.6 ^{o}F lows to 87.8 ^{o}F highs.

The North Delta Landscape unit is subject to frontal, convectional, and monsoonal storm patterns. Soil moisture in spring is generally consistent and moderately 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 some fire starts in dry years.

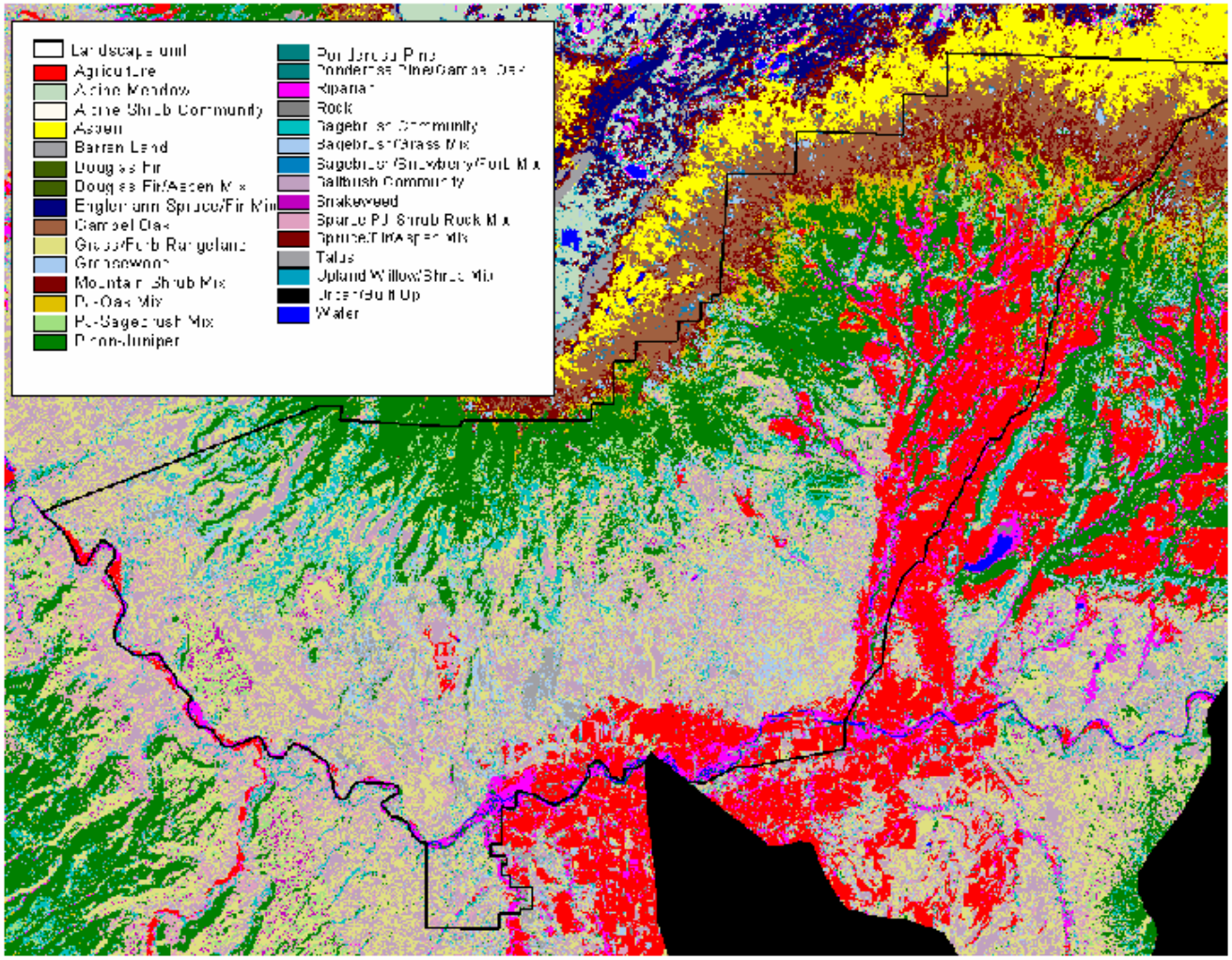
Vegetation

At least eleven distinct native vegetation types occur in the landscape unit. These are tied to soil type as well as elevation and precipitation (Figure 1.8). The adobe badlands in the south-central part of the unit support a salt-desert shrub community typified by mat saltbush (*Atriplex corrugata*) in the most extreme of these environments, and in the more moderate environments Gardner saltbush (*Atriplex gardneri*), shadscale (*Atriplex confertifolia*), bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Oryzopsis hymenoides*), galleta grass (*Hilaria jamesii*), and cottonthorn horsebrush (*Tetradymia spinosa)*. There are some areas that also support a greasewood (*Sarcobatus vermiculatus*) community scattered throughout the adobe badlands.

A semidesert grassland occurs slightly higher on the Quaternary terrace gravels. Dominant species in this community include galleta grass (*Hilaria jamesii*), shadscale, four-wing saltbush (*Atriplex canescens*), prickly pear cactus (*Opuntia* spp.), snakeweed (*Gutierrezia sarothrae*), needleandthread grass (*Stipa comata*), Indian ricegrass, and scarlet globemallow (*Sphaeralcia coccinia*). Minor occurrences of winterfat (*Krascheninnikovia lanata*), Salina wildrye (*Elymus salinus*) and green molly (*Kochia americana*) are also found in this grassland.

The grassland grades into pinyon-juniper woodland on shallower, steeper 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 a sparse and variable understory that may contain green Mormon tea (*Ephedra viridis*), yucca (*Yucca harrimanii)*, snakeweed, prickly pear cactus, or bottlebrush squirreltail. The sagebrush community contains Basin big sage (*Artemesia tridentata tridentata*), and frequently snakeweed, shadscale or four-wing saltbush with an understory of galleta grass and cheatgrass (*Bromus tectorum*). At higher elevations, the pinyon-juniper community grades into a mountain shrub community dominated by Utah

Figure 1.8 North Delta Area vegetation derived from Landsat imagery



serviceberry (*Amelanchior utahensis)*, snowberry (*Symphoricarpus rotundifolia*) and Gambel oak (*Quercus gambelii)* together with a productive understory of muttongrass (*Poa fendleriana*) and elk sedge (*Carex geyeri*).

The drainages with intermittent or perennial water contain riparian vegetation. Riparian vegetation is most prevalent along the Gunnison River where sandbar willow (*Salix exigua*), tamarisk (*Tamarix pentandra*), and Russian knapweed (*Acroptylon repens*) make up much of the vegetation. Rio Grande cottonwood trees (*Populus deltoides ssp. Wislizenii*) form occasional small groves along parts of the Lower Gunnison and smaller streams. Smaller drainages in the North Delta Area also support Narrowleaf cottonwood (*Populus angustifolia*), river hawthorn *(Crataegus rivularis*), and thin leaf alder (*Alnus incana*), with skunkbush (*Rhus aromatica*), wood rose (*Rosa woodsii*), and clematis (*Clematis ligusticifolia*) the most common species in the understory. Ephemeral drainages are typically dominated by tamarisk.

Colorado Natural Heritage Program Potential Conservation Areas (PCA):

The Colorado Natural Heritage Program (Lyon and Williams, 1998) has identified a number of sites within the analysis area that contain high quality plant communities, or assemblages of rare plants, and/or animals that they feel warrant protection and management. Each PCA was ranked for its biodiversity values, protection urgency, and management urgency. Figure 1.9 shows all nine PCA's displayed on a map of the assessment area. (There is some ambiguity in the PCA data from CNHP, in that the PCA's shown in the Delta County Heritage Inventory and those shown on the Statewide GIS file do not match. Data shown here includes all the sites from both sources.) 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.

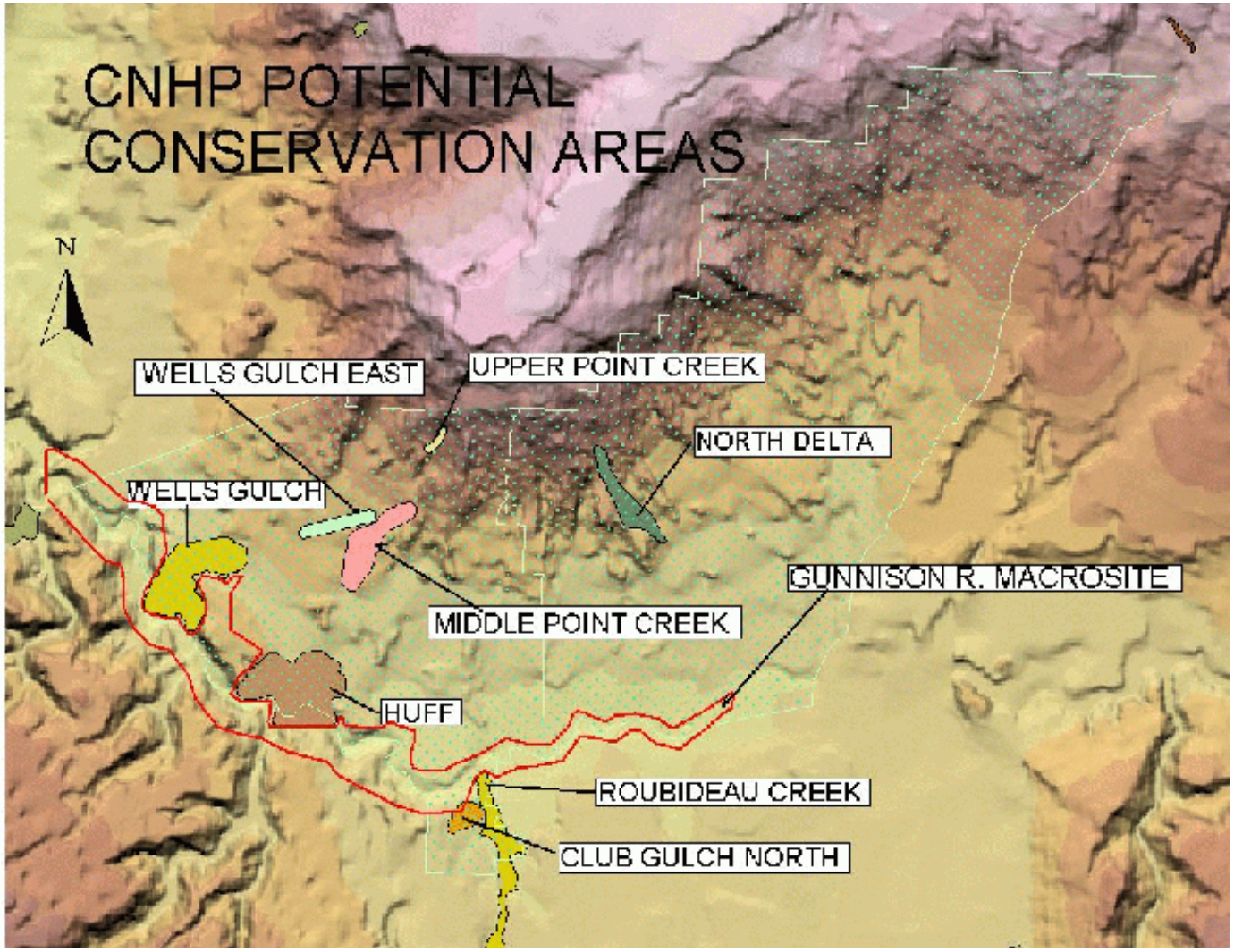
Table 1.2 Potential Conservation Areas in the North Delta area as identified by the Colorado Natural Heritage Program

PCA Name	Resource Values	Biodiversity Rank
North Delta	**Communities:** Cold Desert shrubland*: Atriplex confertifolia/Eleymus salinus* **Plants:** Uinta Basin hookless cactus (*Sclerocactus glaucus*) **Animals:** Ord's kangaroo rat (*Dipodomys ordii spp*.)	B4
Upper Point Creek	**Communities:** **Plants:** **Animals:** Gray Vireo (*Vireo vicinior*)	B4
Wells Gulch	**Communities:** Cold Desert shrublands*: Atriplex confertifolia/Eleymus salinus***; and** *Atriplex confertifolia/Hilaria jamesii* **Plants:** Uinta Basin hookless cactus **and** large flowered breadroot (*Pediomelum megalanthum*) **Animals:**	B3

PCA Name	Resource Values	Biodiversity Rank
Huff	**Communities:** Cold Desert shrublands*: Atriplex confertifolia/Eleymus salinus***; and** *Atriplex confertifolia/Hilaria jamesii* **and** *Sarcobatus vermiculatus/Sueda torreyana* **Plants:** Uinta Basin hookless cactus (*Sclerocactus glaucus*) **Animals:** White-tailed antelope ground squirrel (*Ammospermophilus leucurus*)	B3
Wells Gulch East[1]	**Communities:** **Plants:** **Animals:** Ord's Kangaroo Rat (Dipodomys ordii spp.)	B4
Roubideau	**Communities:** Fremont's cottonwood riparian forest (*Populus deltoides/Rhus trilobata*) **Plants:** Long-flowered cat's-eye (*Cryptantha longiflora*) **and** Uinta Basin hookless cactus (*Sclerocactus glaucus*) **Animals:** Northern leopard frog (*Rana pipiens*)	B4
Club Gulch North	**Communities:** Cold Desert Shrubland (*Atriplex confertifolia/Hilaria jamesii*) **Plants:** Long-flowered cat's-eye (*Cryptantha longiflora*) **Animals:**	B4
Middle Point Creek[1]	**Communities:** **Plants:** **Animals:** White-tailed antelope ground squirrel (*Ammospermophilus leucurus*) **and** Northern harrier(Circus cyaneus)	B4
Gunnison River Macrosite[1]	**Communities:** Fremont Cottonwood forest (*Populus deltoides/Rhus trilobata*) **Plants:** Uinta Basin hookless cactus (*Sclerocactus glaucus*) **Animals:** Colorado pike minnow (*Ptychocheilus lucius*) **and** razorback sucker (*Xyrauchen texanus*) **and** Flannelmouth sucker (*Catostomus latipinnis*) **and** roundtail chub (*Gila robusta*) **and** great blue heron (*Ardea herodias*)	B2

[1.] GIS data was not available for these sites, so the areas shown in Figure 1.9 are approximations
Biodiversity rank: B2- Very High Significance, B3- High Significance, B4-Moderate Significance, B5- Significant

Figure 1.9: North Delta Area Potential Conservation Areas (CNHP)



At the present time, the Uncompahgre Basin Resource Management Plan, as amended, does not place any of these PCA's into special management categories that directly benefit the specific resources of the PCA. Most of these areas, (North Delta excepted) are open to off highway vehicle use, mineral material disposal, locatable mineral activity, location of rights-of-way, and all are subject to livestock grazing. This assessment did not set out to evaluate these sites, but there are some known problems on the sites.

Wildlife

The North Delta Area supports an undetermined variety of upland, riparian, and aquatic wildlife species. Table 1.3 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 in this unit is largely driven by elevation changes, secondarily by geologic substrate, and topography. 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 1.3 North Delta 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.
Desert Bighorn Sheep	Canyon benches, mesa tops, and valley bottoms	Uncommon, may be present along the Gunnison River from time to time
Pronghorn Antelope	Salt Desert Shrub communities	Common, yearlong
Cougar	All types, mostly along rim-rock areas.	Common, yearlong
Bobcat	All types	Uncommon, yearlong
Coyote	All types	Common, 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; sagebrush/grass	Accidental if present

Species (Common Name)	Habitat Type	Occurrence
Chukar	Salt desert "Adobes", foothills-east side	Uncommon, yearlong
Neo-tropical birds	All types	Common, warm season
Small mammals	All types	Common, yearlong
Amphibians-Reptiles	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 Figure 4.11 and 4.12 and accompanying text). Most deer and elk use occurs along the toe slopes of Grand Mesa. Summer range is located mostly at higher elevations on Grand Mesa, and Uncompahgre Plateau. Winter range is located at lower elevations in the sagebrush, salt desert shrub, and pinyon-juniper vegetation. Some of the area is classified by the Colorado Division of Wildlife as winter range for both deer and elk, and a smaller amount is classified as severe winter range with winter concentration areas. Winter concentration and severe winter range areas are shown in Figure 1.9. 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.

Due to the large acreage of salt desert shrub community, with no hiding or thermal cover, winter range quantity and quality could only be classed as fair within most of this area On some of the winter concentration areas winter habitat conditions are declining. The exact location of problem areas are unknown at this time.

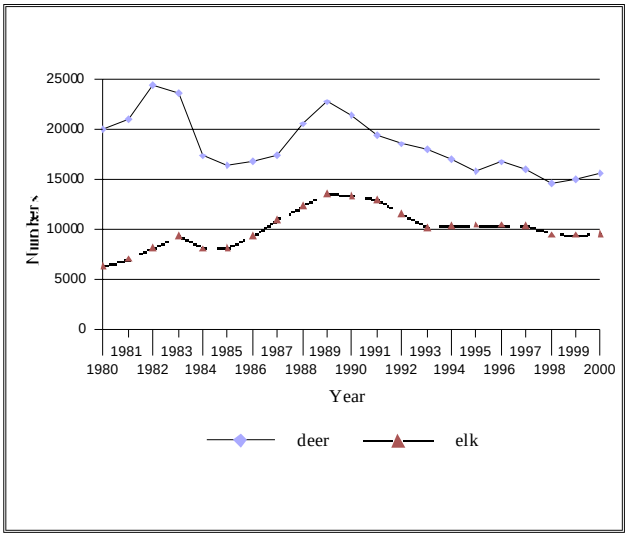


Figure W1. Mule deer and elk population trends, 1980-2000.

The long-term (15-20 year) 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 north on Grand Mesa. Data shown in Figure W1 is CDOW data for deer data analysis units– CDOW data analysis unit D-12/E-14 comprises the majority of the LHA area (D-12 is the deer unit and E-14 is the elk unit). A small sliver of D-19/E-20 occupies the area between Highway 50 and the Gunnison River. These areas are shown on Figure 1.10.

Figure 1.9 Mule deer and elk winter concentration and severe winter range areas (CDOW data)

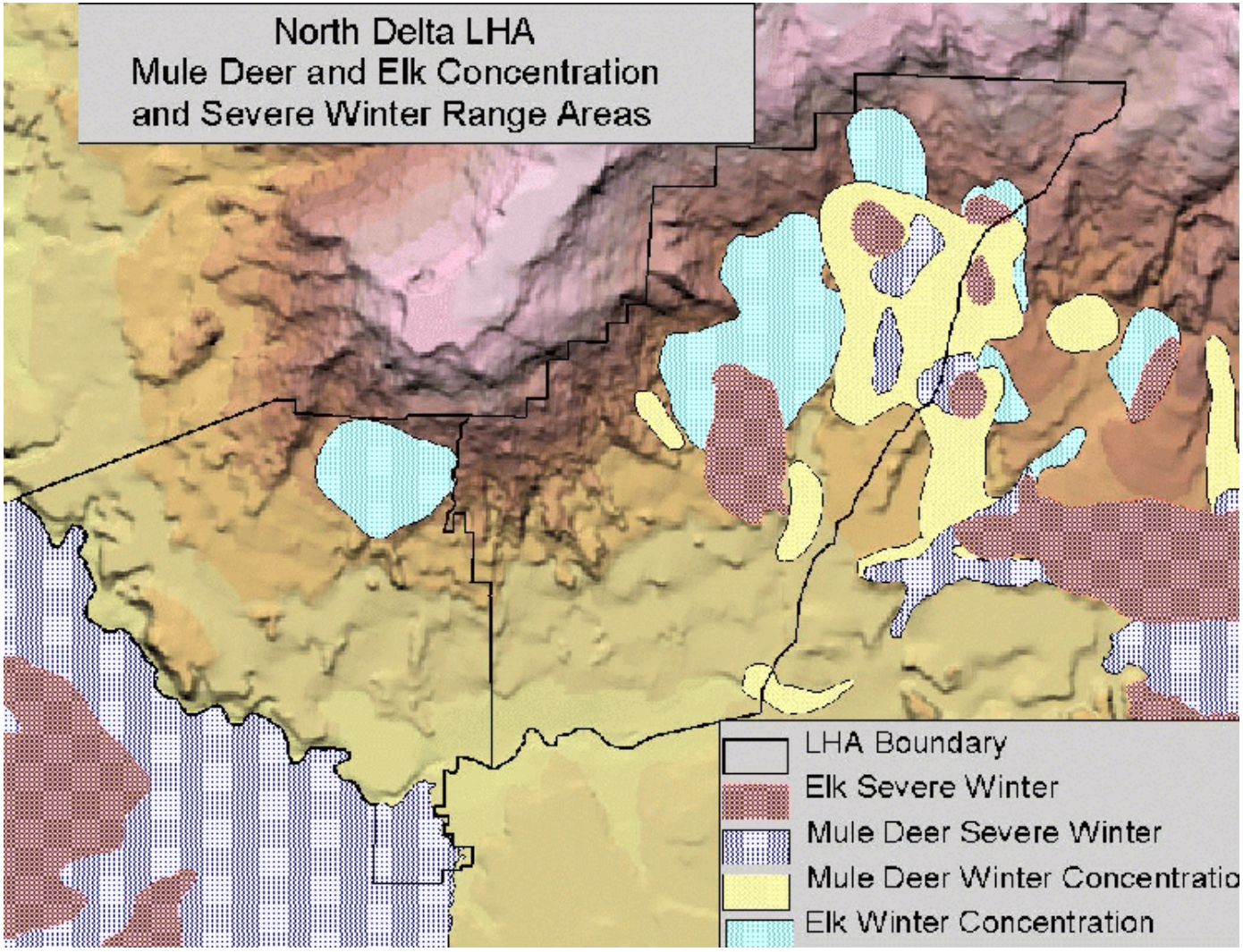
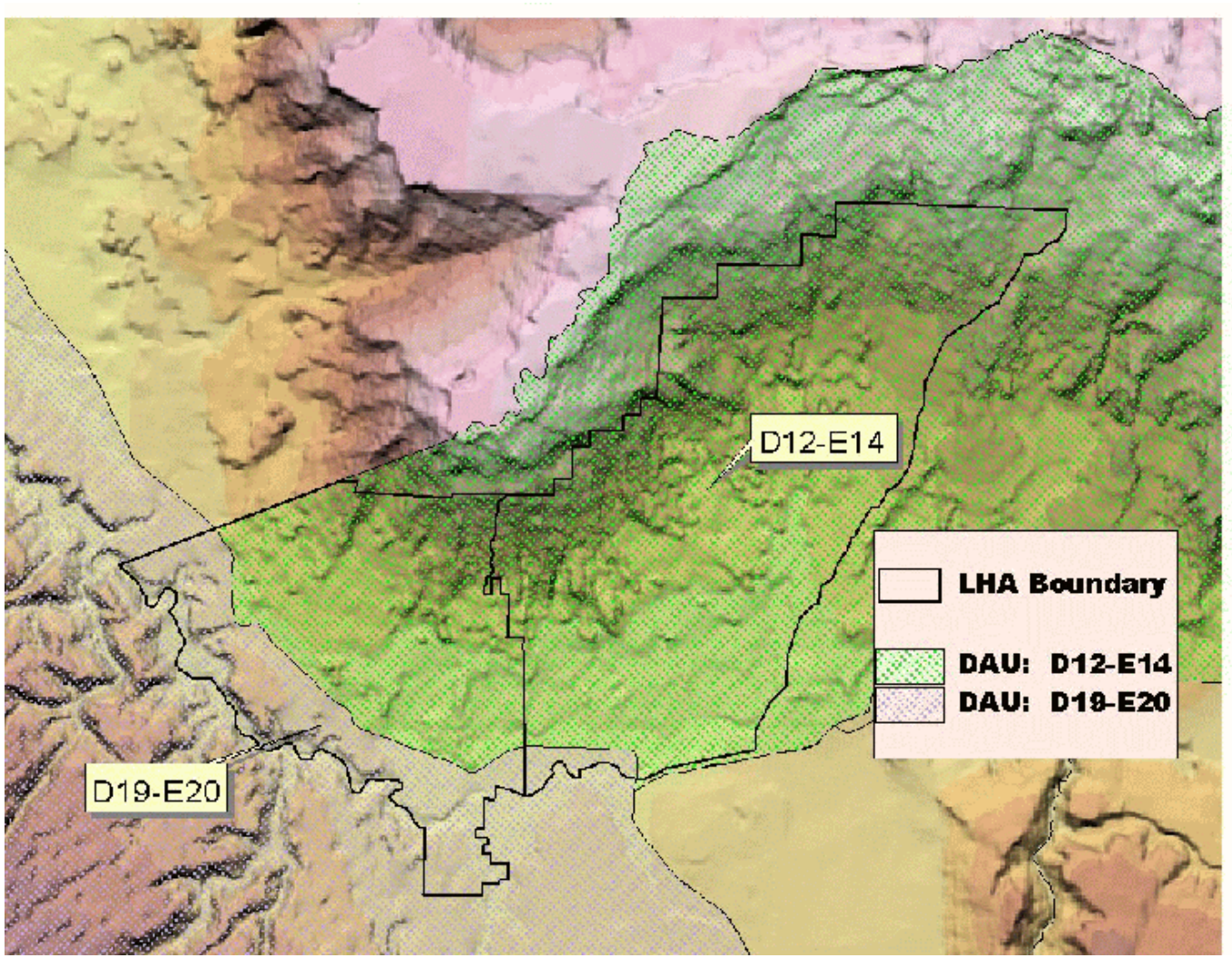


Figure 1.10 CDOW Big Game Data Analysis Units within the LHA.



Antelope are present within the LHA as year round residents . The population is small, estimated at 150 animals (including those southwest of the Gunnison River, outside the LHA), with a static or declining population trend (Figure 1.11). This population has remained at this relatively low number for decades, in spite of the addition of water sources to especially dry areas of the LHA during the 1980's. Traffic on Highway 50 has increased from an annual daily average of 7,009 vehicles per day in 1981 to an annual daily average of 8,034 vehicles per day in 2001 for the stretch between the Mesa County line and the City of Delta (http://www.dot.state.co.us/App_DTD_DataAccess/Traffic/index.cfm?fuseaction=FutureTraffic) . This increase, coupled with increased speeds, and its upgrade to 4-lanes during the 2000's appears to have increased antelope/auto collision mortality. No provisions were made by the Colorado Department of Transportation during the upgrade of this road to help reduce antelope mortality. BLM has not completed a habitat assessment for antelope in this area, but if there is a potential range condition problem, it may be related to poor water distribution and the lack of perennial forbs for use by the kids and adults during the spring and early summer period. There is some forage competition between winter sheep use and antelope, but the forage requirements for this small herd are so small (less than two hundred Animal Unit Months, based on an AUM equivelancy of 9.6 antelope per AUM (Stoddard and Smith)) that this competition is not likely to be creating problems for either animal.

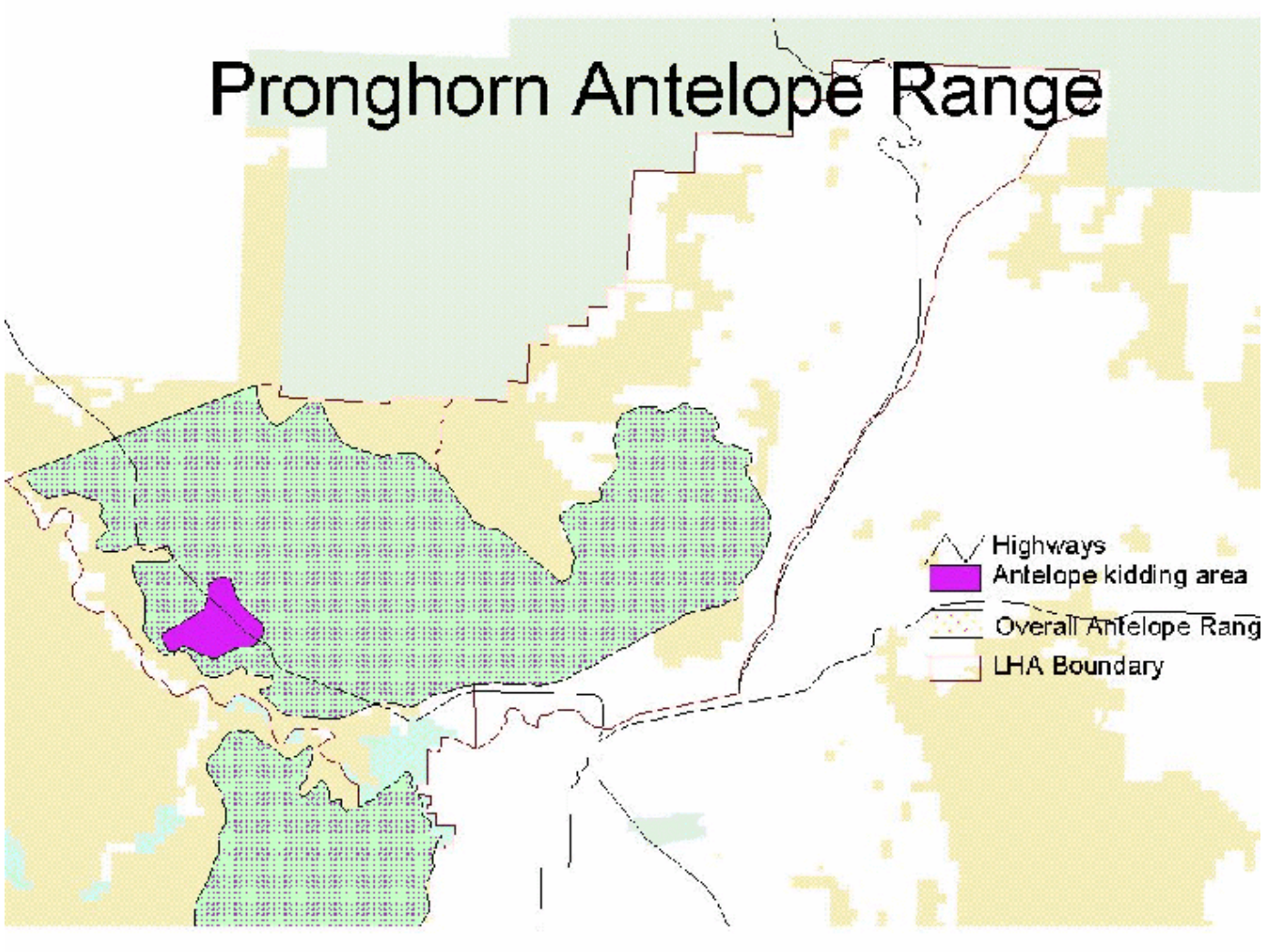
At the present time there is no established population of desert bighorn sheep within the LHA, but they are present in Dominguez Canyon and Escalante Canyon. It is probable they are present in the LHA from time to time, but the only suitable habitat is within the Gunnison River canyon proper. According to Bruce Watkins, CDOW, this population has now contracted pneumonia and is expected to die out. If this occurs, there will be no bighorn sheep within the LHA for at least a few years, until they can be reintroduced safely.

Merriam turkey habitat within this LHA is limited to the toe slopes of Grand Mesa, and some of the agricultural interfaces. They 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.

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 widespread. Coyotes are also subject to population control efforts by USDA Wildlife Services personnel on the winter sheep ranges within the LHA. These efforts are not believed to have much impact on the total numbers of coyotes in the area, but they do help to alleviate depredation problems on the wintering sheep flocks. Black bear primarily use the major drainages 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 bluffly areas along the Gunnison River and its major tributaries. 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 a warm water fishery whose flows

Figure 1.11 Pronghorn antelope range in North Delta Area.



are governed largely by the management of upstream dams and the use of irrigation water. Negotiations are underway between the Bureau of Reclamantion, 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. 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 (U.S. Fish and Wildlife Service, 1995). Some frogs, toads, and water snakes are known to be present, but their status is unknown.

Most public land riparian systems are in fair condition, but flow alterations for irrigation and other uses, along with the invasions of salt cedar, and Russian knapweed have degraded the usability of some areas for native wildlife, especially non-game birds. Tamarisk has established itself on most tributary streams, irrigation canals, BLM water impoundments, and other locations where runoff water may be temporarily detained. BLM has been working on control of this woody species, but funding is sporadic, and at the current level of effort, full control or eradication is not likely. Prior to construction of the Curecanti Project, the riparian system on the lower Gunnison River probably looked quite different than it does today. The large differences between spring flows and late season and winter flows resulted in a riparian system that lacked the stability we see today, with a good probability that there were more side channels, backwater areas, and gravel bars. It is also likely that there was a slightly more dense cottonwood gallery along the river, but since it is now slightly incised, there is little suitable establishment habitat for cottonwoods, and most of the galleries along the river consist of old trees, with little replacement evident (CNHP, 1998). Most tributary streams are also incised, likely due to historic events, and many of them are still in the process of maturing; establishing a wider flood plain, and riparian system.

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. In the 1980's, waterfowl were common along the entire stretch of the Gunnison River within the LHA (Uncompahgre Field Office, bald eagle winter range counts). Larger concentrations of wintering and breeding birds tend to concentrate around the main segment of the Escalante State Wildlife Area, near Delta.

Heron rookeries are present in two locations along the Gunnison River within the LHA; 0.2 and 1.0 miles downstream of Escalante Creek (CNHP, 1998). Continued maintenance of habitat for heron rookeries depends on healthy cottonwood communities with reproduction evident. Under the current conditions along the lower Gunnison, replacement of cottonwood galleries is not taking place at a rate that would sustain habitat for great blue heron rookeries.

Whitetail Prairie Dogs are found in the lower elevation areas of the LHA. Concentrations of animals have been large enough in the past to provide potential habitat for black-footed ferrets, especially in the Wells Gulch area. 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 North Delta area in 1978-79, but there has been no follow-up mapping. Plague caused fluctuations in the prairie dog populations have resulted in some of the previously mapped sites being abandoned. It also appears that there has been a general reduction in the total number of prairie dogs living in the area, but there is no quantified data to support this

observation.

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 above list, 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 Table 1.4 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.

Table 1.4 Potential Special Status Species in North Delta Area

Threatened Endangered and Special Status Species			
Common Name	Scientific Name	Status[1]	Occurrence
Black-footed Ferret	*Mustela nigripes*	FE, SE	Not known to occur, but prairie dog host is present in the analysis area.
Bald Eagle	*Haliaeetus leucocephalus*	FT, ST	Winter foraging and some concentrations along the lower Gunnison River
Southwestern Willow Flycatcher	*Epidonax traillii extimus*	FE, SE	Nesting birds found at Escalante State Wildlife Area, and suitable habitat is present on public land, no nesting documented on public land.
Whooping Crane	*Grus americana*	FEx, SE	Overflys the area during Migration. May stop at Crawford Reservoir, Gould Reservoir and Hart's Basin, but not in the LHA.
Sandhill Crane	*Grus canadensis*	SC	Overflys the area during migration. May stop at Crawford Reservoir, Gould Reservoir, and Hart's Basin, but not in the LHA.
Colorado Pikeminnow	*Ptychocheilus lucius*	FE, ST	Occupied and critical habitat in Gunnison R.
Razorback Sucker	*Xyrauchen taxanus*	FE, SE	Occupied and critical habitat in Gunnison R.
Bonytail Chub	*Gila elegans*	FE, SE	Occupied and critical habitat downstream of analysis area in Colorado R.
Humpback Chub	*Gila cypha*	FE, ST	Occupied and critical habitat downstream of analysis area in Colorado R.

Common Name	Scientific Name	Status[1]	Occurrence
Yellow-billed Cuckoo	*Coccyzus Americanus*	FC, BLMS	Potential habitat along the lower Gunnison River, no individuals found in 1998 BLM survey of the river corridor.
Gunnison Sage Grouse	*Centrocercus minimus*	FC, BLMS	Not known to occur within this analysis area
River Otter	*Lutra canadensis*	SE	Potentially occurs in the lower Gunnison River
Kit Fox	*Vulpes macrotis*	SE	Adobe habitats in the LHA
Spotted Bat	*Euderma maculatum*	BLMS	Potentially present
Big Free-tailed Bat	*Nyctinomops macrotis*	BLMS	Potentially present
Western Burrowing Owl	*Athene cunicularia*	ST	Present in prairie dog colonies, known to breed in the area.
Peregrine Falcon	*Falco peregrinus anatum*	SC	Known to breed in Roubideau Canyon and Dominguez Canyon, not in the LHA.
Ferruginous Hawk	*Buteo regalis*	BLMS, SC	Present during migration, no nesting in the planning area.
Curlew, Long-billed	*Numenius americanus*	BLMS, SC	Present during migration
White-faced Ibis	*Plegadis chihi*	BLMS	Present during migration .
Flannelmouth Sucker	*Catostomas latipinnis*	BLMS	Second most common fish in the lower Gunnison River (USFWS, 1995)
Roundtail Chub	*Gila robusta*	BLMS, SC	Found in the Gunnison River(CNHP and USFWS 1995).
Midget Faded Rattlesnake	*Crotalus viridis concolor*	BLMS	Present in PJ, rocky areas, greaswood/sage and sagebrush/rabbitbrush
Northern Leopard Frog	*Rana pipiens*	BLMS	Ponds and irrigation canals
Clay Loving Wild Buckwheat	*Eriogonum pelinophilum*	FE	Not documented as occurring on public land in this LHA
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	FT	Present in significant numbers along the lower Gunnison River, and some upland sites, including Mancos shale areas.
Delta Lomatium	*Lomatium concinnum*	BLMS	Not documented as occurring on the Mancos shale hills in the LHA
Common Name	Scientific Name	Status[1]	Occurrence
Rocky Mountain Thistle	*Cirsium perplexans*	BLMS	Disturbed sites, including Mancos shale, not currently documented in the analysis area.

Long flowered cats eye	*Cryptantha longiflora*	CNHP	Not known to occur within this LHA
Giant Helleborine Orchid	*Epipactis gigantea*	BLMS	Riparian areas, wetlands and seeps, not currently documented in the analysis area.
Wetherill milkvetch	*Astragalus wetherillii*	CNHP	steep slopes, canyon benches and talus slopes on sandy clay soil in pj, sage and mahogany communities, not currently documented in the analysis area.

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 lising; 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, Breeding Bird Atlas
CDOW Web Site

Critical habitat for Colorado pikeminnow and razorback sucker are located within 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. If conflicts with rare plants and activities on public land had been noted, they would be documented here.

From early December through early April, wintering bald eagles forage throughout the LHA, and to some extent concentrate, and day roost on the lower Gunnison River. Helicopter and ground surveys, conducted by BLM in the early 1980's, did not locate communal roost sites along the lower Gunnison River. 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). There are no known nest sites on public land in the analysis area.

Black-footed ferrets have not been documented in the area. Survey work conducted by ENSR for the TransColorado gas transmission pipeline, and the Colorado National Guard, did not locate any black-footed ferrets in the LHA area. It is unlikely that there are black-footed ferrets in this area at this time.

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. All suitable habitat sites on the lower Gunnison River and tributaries were surveyed for the presence of this species during the breeding season in 2001, and no individuals or nesting pairs were located. 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 2003 this species will no longer be a management factor for this office.

Although the riparian corridor of the lower Gunnison River provides suitable habitat for yellow-billed cuckoo, the species is not present there (BLM, 1998, and Kingery, 1998).

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.

There is no indication that any individuals or population of Gunnison sage grouse are present in the LHA area. Sagebrush communities are not a significant component of the plant communities in this LHA, resulting in little potential for this species to be present or to expand into the area.

Inventory efforts by the U.S. Fish and Wildlife Service (1995) have razorback sucker and Colorado pikeminnow populations in the Gunnison River within the LHA area. One individual humpback chub has been collected in the Gunnison River by USFWS, but there is no indication that there is a resident population of this species (USFWS, 1995). Critical habitat, consisting of the 100 year floodplain, has been designated on the lower Gunnison River within the LHA area. For the last several years, stocking of the river with fingerling razorback suckers has been carried out by the U.S. Fish and Wildlife Service. The same data indicates that the river is inhabited by roundtail chubs. All of these listed and rare fish have been negatively impacted by upstream water management practices, incision of the river, lack of gravel bars and the lack of readily accessible floodplains which are inundated annually (CNHP, 1998). At this time it is doubtful that any of BLM's management activities within the LHA or the surrounding area are having an impact on the listed or sensitive fish.

There is little data on the condition of the river otter populations within the lower Gunnison River. The otters were reintroduced into the Gunnison Gorge in 1977, and there are occasional reported sightings on the lower Gunnison River. It is doubtful that any BLM activities or management are having any effect on this species.

The LHA provides habitat for kit fox. All indications are that the numbers of kit fox present in this area area and have been low for some time. The kit fox population in the LHA area and the Uncompahgre River Valley is believed to be part of the larger population that extended 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 (Fitzgerald, 1996). 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 few individual remaining are isolated from the larger population, and perhaps suffering some genetic stagnation.

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 Uinta Basin hookless cactus (*Sclerocactus glaucus*) population in this area is part of the larger Gunnison River metapopulation, which probably constitutes the bulk of this species

numbers in Colorado (Figure 1.12). With a few exceptions, BLM inventories have identified few real impacts to this species from other activities on public land, including livestock grazing and off highway vehicle use, but any concentrated surface use that coincides with occupied habitat for this species could result in direct impacts to the local populations. Vehicle parking areas and sheep camps/bed grounds are examples of concentrated uses that can impact this species when they are located improperly. Within the past few years a new sheep camp/bed ground has been located on occupied Uinta Basin hookless cactus habitat near Escalante Canyon. Outbreaks of a cactus borer seem to have the greatest impact on local occurrences of this species. In some instances, very large occurrences have been known to disappear very rapidly as a result of this borer.

The Delta lomatium, and Montrose penstemon are Mancos shale endemics which are obligate to that geologic type, however, BLM and CNHP inventories have not located any populations of these species within the LHA area.

The Rocky Mountain thistle is found in Ouray, Montrose, Delta, and Mesa counties, but there are no documented locations within this LHA.

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. No locations of the long flowered cat's eye are documented in the LHA area.

Watersheds, Drainages, and Water Quality

The North Delta Landscape Unit is entirely within the Lower Gunnison Basin (Hydrologic Unit Code (HUC), 4th field: 14020005), 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 North Delta Landscape Unit, to 5th Field.

Region	Subregion	Accounting Unit	4th Field Watersheds	5th Field Watersheds
14 Upper Colorado	02 Gunnison	00	14020005 Lower Gunnison Drainage	1402000509 Wells/Alkali Creeks
				1402000513 Tongue/Currant Creeks

The Wells Gulch/Alkali and Tongue/Currant watersheds are 119,330 and 248,612 acres, respectively. These watersheds typically drain to the south or southwest in to the Gunnison River. The landscape is mostly arid to semi-arid, exhibiting few perennial stream systems (Figure 1.13). The few perennial streams in the landscape originate in the high elevation, alpine zone of the

Figure 1.12 Sclerocactus glaucus locations

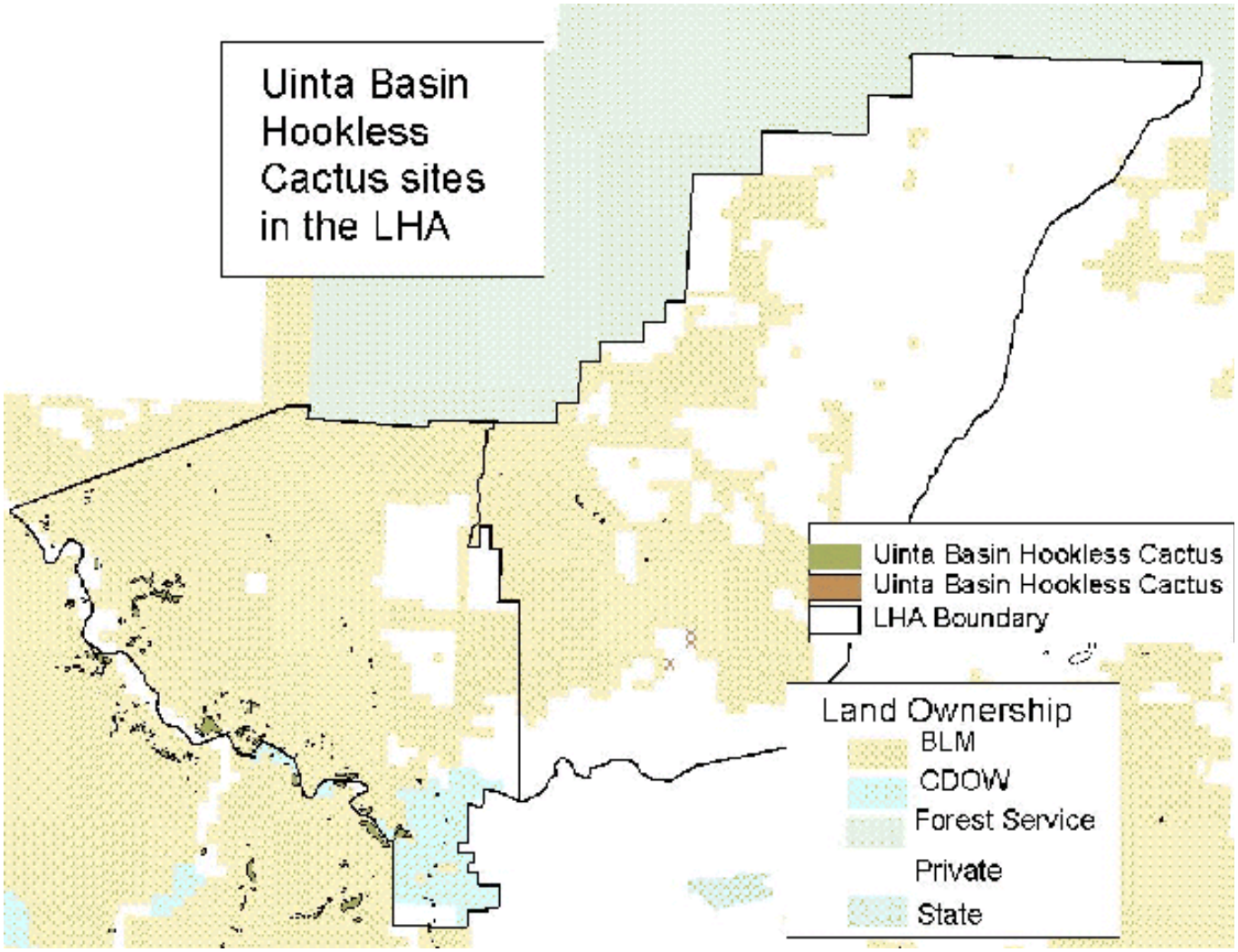
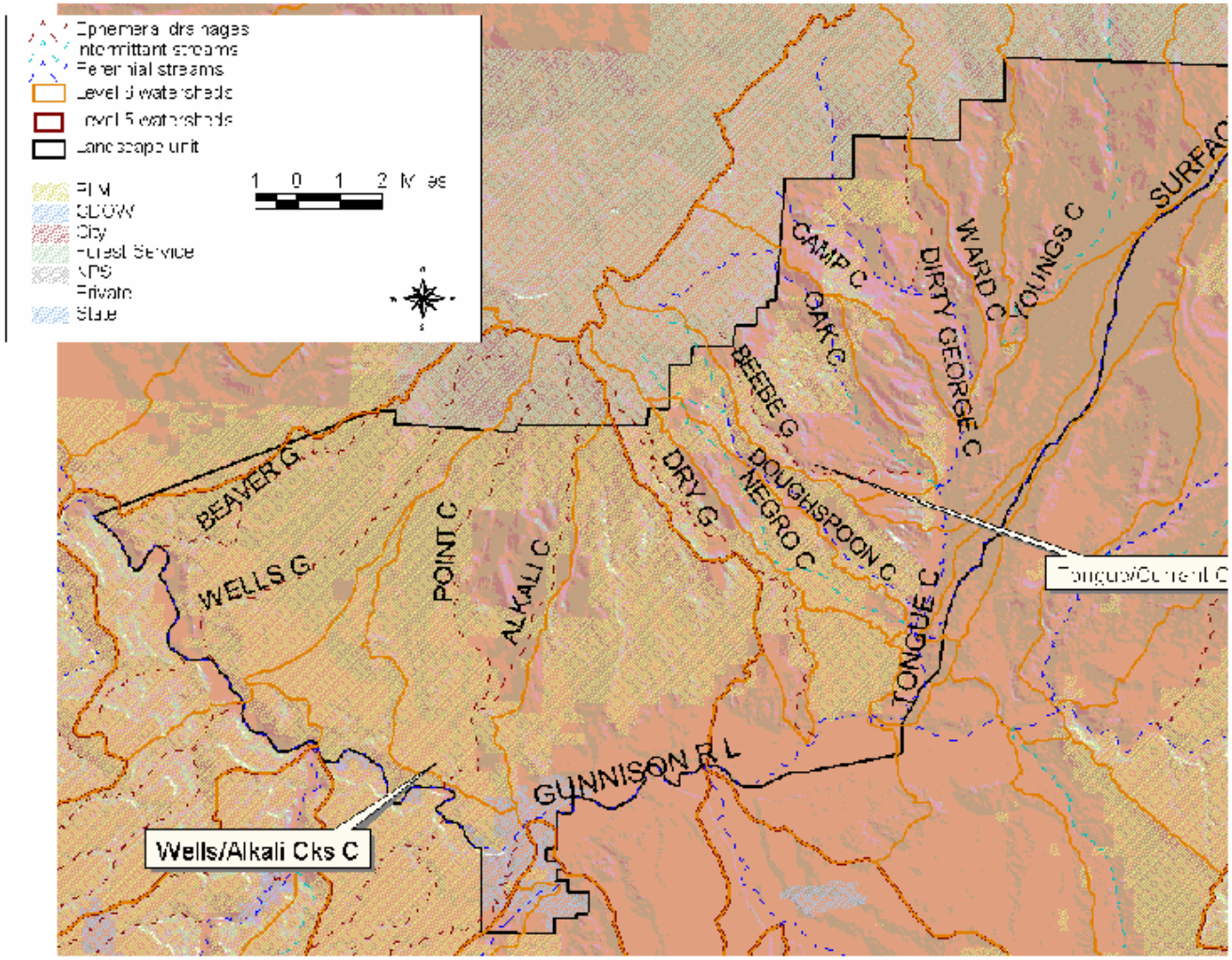


Figure 1.13 North Delta Area Streams and Watersheds.



southern portions of Grand Mesa. These streams experience high flows from both Spring snowmelt and rainfall events. Snowmelt runoff, generated in the higher elevations of the landscape unit can result in elevated stream 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 Gunnison River.

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 (Figure 1.13), most common in the lower elevations of the landscape unit, are especially vulnerable to high rates of soil erosion and salinity yields. Water quality in the Lower Gunnison River 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 shows the variation in soil salinity with soil surface conditions and topographic position. The data was collected in Elephant Skin Wash an area dominated by Mancos shale in the Uncompahgre watershed, that exhibits conditions similar to those in the landscape unit.

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 for the landscape unit.

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 North Delta Landscape Unit

4th Field Watersheds	Stream Segment	Stream Designation	Stream Classifications
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

None of the stream or river segments within the landscape unit are on the state's 303(d) list for impaired water quality. However, the mainstem of the Gunnison River from it's confluence with the Uncompahgre river to the Colorado River is listed in the Colorado 1998 Monitoring and Evaluation List for suspected sediment impairment. There is also a state imposed, temporary modification to the Selenium numeric standard on the Gunnison River and it's tributaries, to allow the existing ambient quality through 12/31/2006. Selenium concentrations in reaches of the Gunnison River and some tributaries are, at times, elevated well above the Colorado State Water Quality Standard of 4.6 ppb (chronic) ans 18.5 ppb (acute). 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 near the landscape unit show Selenium levels to be approximately 34 times levels found on similar soils under cultivation.

A recently developed golf course (Devil's Thumb) within the landscape unit has resulted in salinity and Selenium ground water discharges on both public and private lands from deep water percolation associated with golf course operations. Seep water from the shale, down gradient from the golf course has been measured to have dissolved solids as high as 21,900 mg/l, and Selenium concentrations up to 18,700 ug/l (data source: US Geological Survey). Additionally, Dry Fork Reservoir, just north of the golf course is a 1960's vintage BLM project that is resulting in salt and Selenium leaching from seepage, much like the impacts from the golf course but on a much smaller scale.

The Uncompahgre Basin Resource Management Plan (RMP) identified portions of 5th level watershed 1402000509 for salinity control management, primarily the western portion of the landscape unit. Identified as Management Unit D-5 in the RMP, management actions to reduce salinity yields include: in-channel structures and land treatments, strict land surface protection measures, including seasonal closures, and forage utilization management to basal ground cover objectives (see page 3-35 of draft RMP). RMP, Management Unit D-8, the eastern portion of the landscape unit, is managed as open to OHV with minimal restrictions on surface disturbing activities.

Colorado's Unified Watershed Assessment, 12/98, ranked 14020005 (Lower Gunnison), 4th field watershed as Category 1, "Watersheds in Need of Restoration. 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 also contributed to the lack of meeting clean water and other natural resource goals. 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. Water Quality Indicators for Selected Streams in the Land Health Assessment Area

Water Source*/ *Grazing Allotment*	Date	pH	Electrical Conductance uS/cm	Macroinvertebrates
Camp Creek	8/29/01	6	93	Tricoptera
South Branch				Ephemeroptera
Negro Creek	9/4/01			
Ward Cr. Doughspoon		6.4	1270	unknown
Oak Creek	8/16/01			
Ward Cr. Doughspoon		6.8	5950	unknown
West Fk. Doughspoon Creek	8/28/01	6	129	Ephemeroptera
Ward Cr. Doughspoon				Diptera
Alkali Creek	8/16/01			
Alkali Flats and Deer Basin-Midway		6.2	160	Ephemeroptera
Alkali Creek	8/16/01	6.4	425	Coleoptera
Point Creek				Tricoptera
Gunnison River	8/15/01			
unallotted		6.4	1070	unknown
Gunnison River	8/9/01			
unallotted		6.3	1010	unknown
Gunnison River	8/7/01			
unallotted		6.4	1080	unknown

Water Source*/ *Grazing Allotment*	Date	pH	Electrical Conductance uS/cm	Macroinvertebrates
East Fork Doughspoon Creek	9/6/01	6.0	128	Plecoptera: Pteronarcyidae
Ward Creek-Doughspoon				Coleoptera: Dytiscidae
Gunnison River	8/7/01			
unallotted		6.4	990	
Beebe Gulch	9/4/01			
Ward Creek-Doughspoon		6.8	1130	Odonata: Zygoptera

* Some of the water sources may be influenced by water diversions or imports.

Table 4 lists some filed measured water quality parameters for selected streams within the LHA area. The pH and electrical conductance (EC) values for all streams are within the range expected for the subject area. It is typical to measure increases in EC when streams are flowing through Mancos shale terrain (e.g Alkali Creek) Streams where aquatic invertebrates were sampled indicate relatively good water quality. Invertebrate species indicating nutrification and other water quality problems were not found in significant numbers.

METHODS

The land health assessment was conducted on public lands in the North Delta Unit during July and August of 2001. The following procedure was used:

1). The area was first broken apart into around 40 different polygons. Polygons were based on soil mapping units and allotment boundaries. Polygons ranged from147 to 8,034 acres in size.

2). The interdisciplinary team ranged between 6-8 people. At the beginning of the field work period, 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 1 and 6 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. Nearly every point was mapped by a GPS unit in the field. A photo of each stop point was also taken.

4). Riparian Proper Functioning Condition data was collected at points along nearly all perennial and intermittent streams during the summer of 2001. Where data was not collected in 2001, similar data from 1995 was used. This data was used to address Standard 2. In addition, to the PFC data, macroinvertebrate samples were collected in 2001 at these points where there was live water, and species were identified. Qualitative data on sediment and water quality was also collected at these points. On ephemeral or intermittent drainages, qualitative data on likely sediment production was also collected. Standard 5 was evaluated using this data in association with the PFC data and upland health assessment data. This data was evaluated against Colorado's stream water quality designations.

5). A comprehensive weed inventory of the North Delta Area was conducted in the summer of 2001. All likely sites for weed invasion were visited in the field, and weed infestations that were found were documented and data entered into GIS. These likely sites for invasions included known soil disturbances, drainages and travel corridors.

6). Data from the field forms was entered into an ACCESS database, 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 of groundcover and plant growth form cover were calculated for each ecological site type (unique combinations of ecological site, slope and aspect). These were then used as a standard of comparison to assess each individual site.

7). A final determination for Standards 1 and 3 for each polygon was made by the ID team. This was done by identifying problems (either low range health indicator scores of 1 or 2), or by finding lower than average values for the ecological site type, for either plant growth form cover or groundcover. 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 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.. Reasons for the rankings, and likely causes were documented. Riparian Functioning at

Risk ratings were directly translated into “Meeting With Problems”, as they had been in past land health assessments.

8). 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 meeting with problems for any standard were discussed by an ID team with reference to grazing dates, actual use, and by evaluating the type of problem based on evidence seen in the field.

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

10). 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.

11). 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			
39,896	30,132	1,554	2,844	157

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 of 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 was only noted at five widely scattered locations and was mostly associated with the edges of pediments that were eroding into the Mancos shale badlands (see Figure 2.2). Overall, pedestalling was not a significant problem in the unit. Two areas in the central part of the unit each had several sites with active pedestalling, but again, much of this seemed to be associated with the very erosive badlands.

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. As with pedestals and gullies, runoff drainage problems were relatively insignificant across the unit (Figure 2.3). The same two areas having pedestalling problems had more sites with runoff drainage problems. Again, much of this was in association with the erosive badlands in these locations.

Elevated Bare Soil Levels

Bare soil is that part of the ground surface that is not protected by rock, plant basal area, cryptogamic crusts, or litter. Bare soil is vulnerable to the erosive forces of water and wind. The percent cover of bare soil was an important indicator used to evaluate soil erosion hazard.

Figure 2.1 North Delta Area Standard 1 polygon ratings

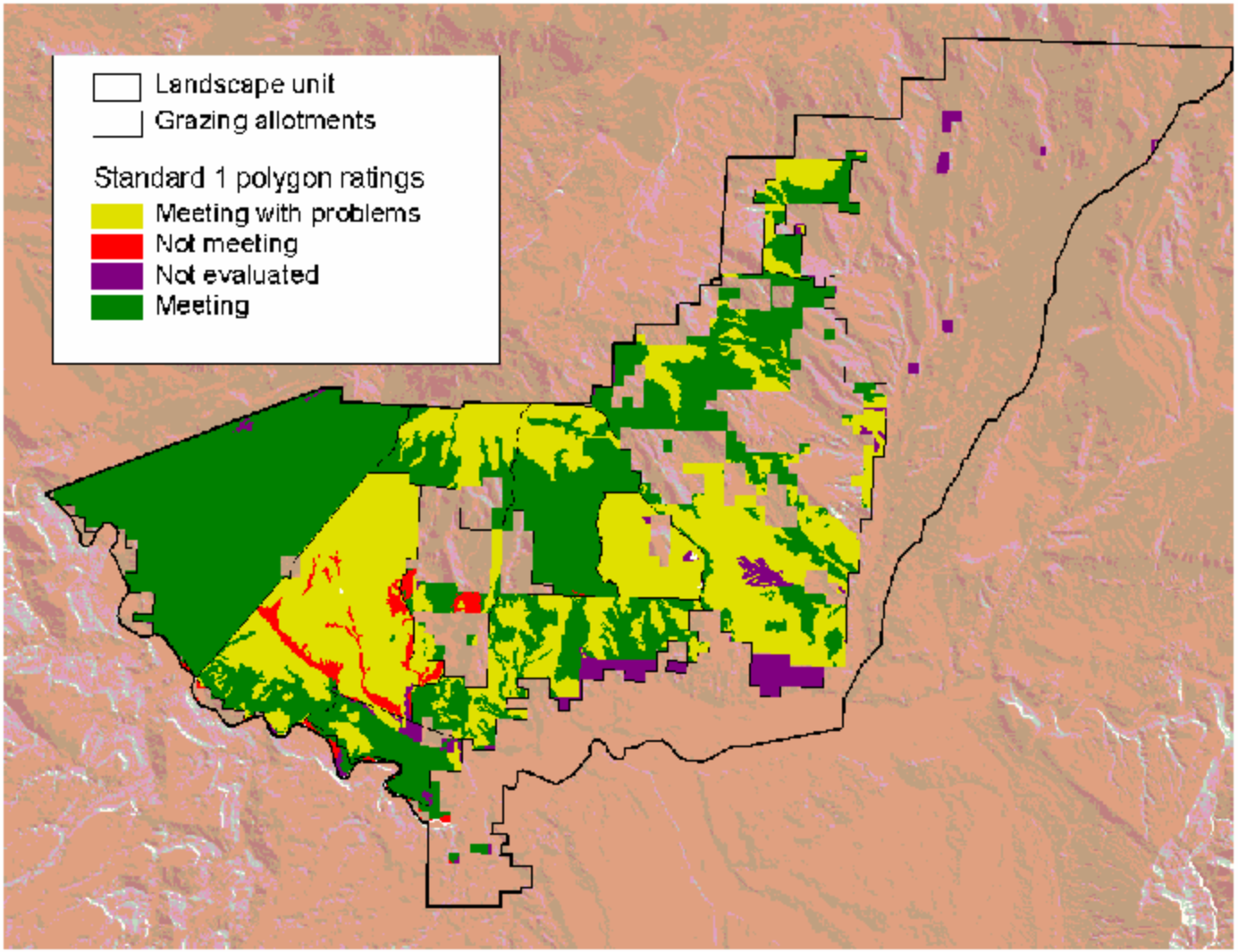


Figure 2.2 North Delta Area soil loss problems: map shows all sites with gully activity (Rosgen type F and G channels), and soil pedestalling (sites with scores of 1 or 2 on the Rangeland Health Indicators data sheet.)

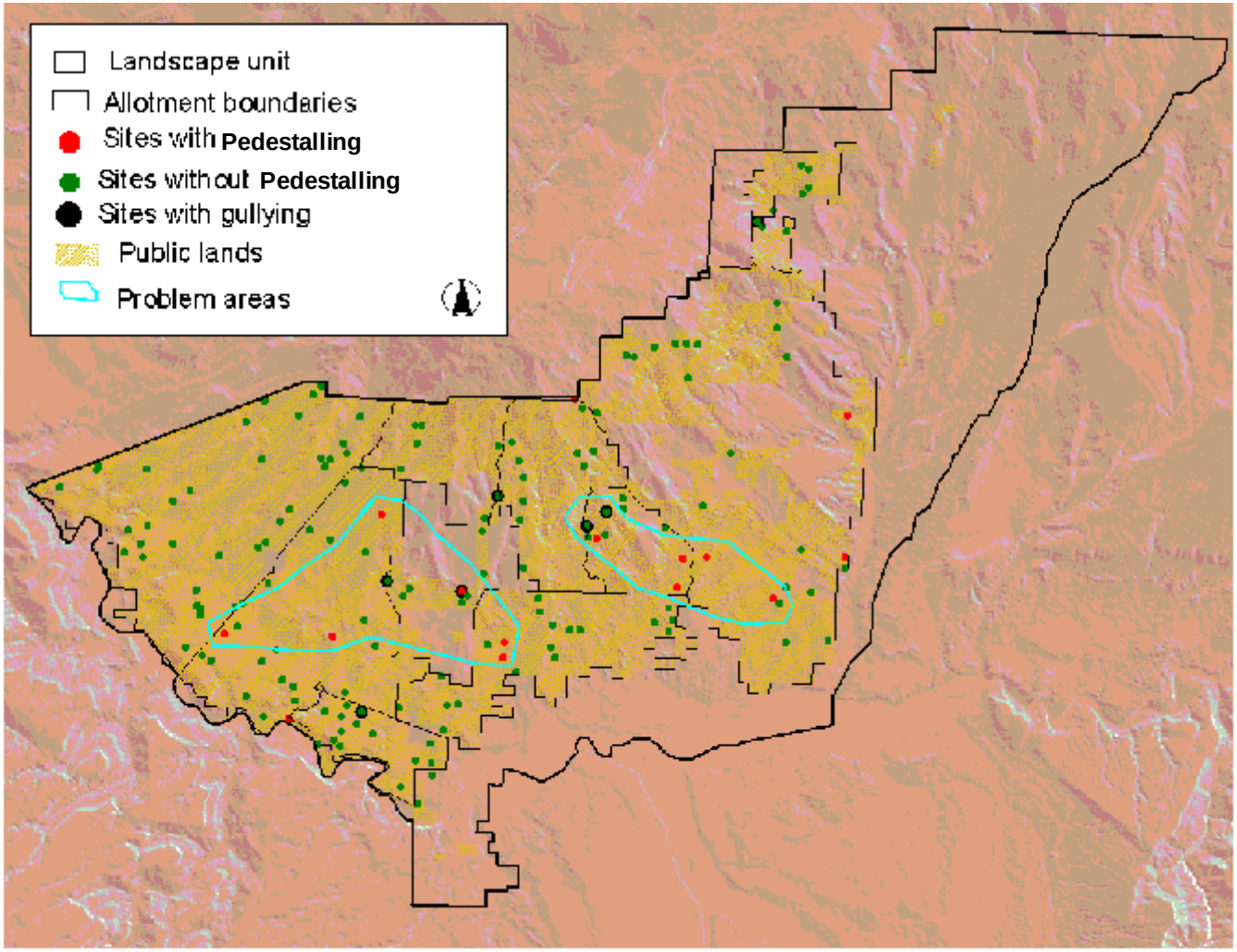
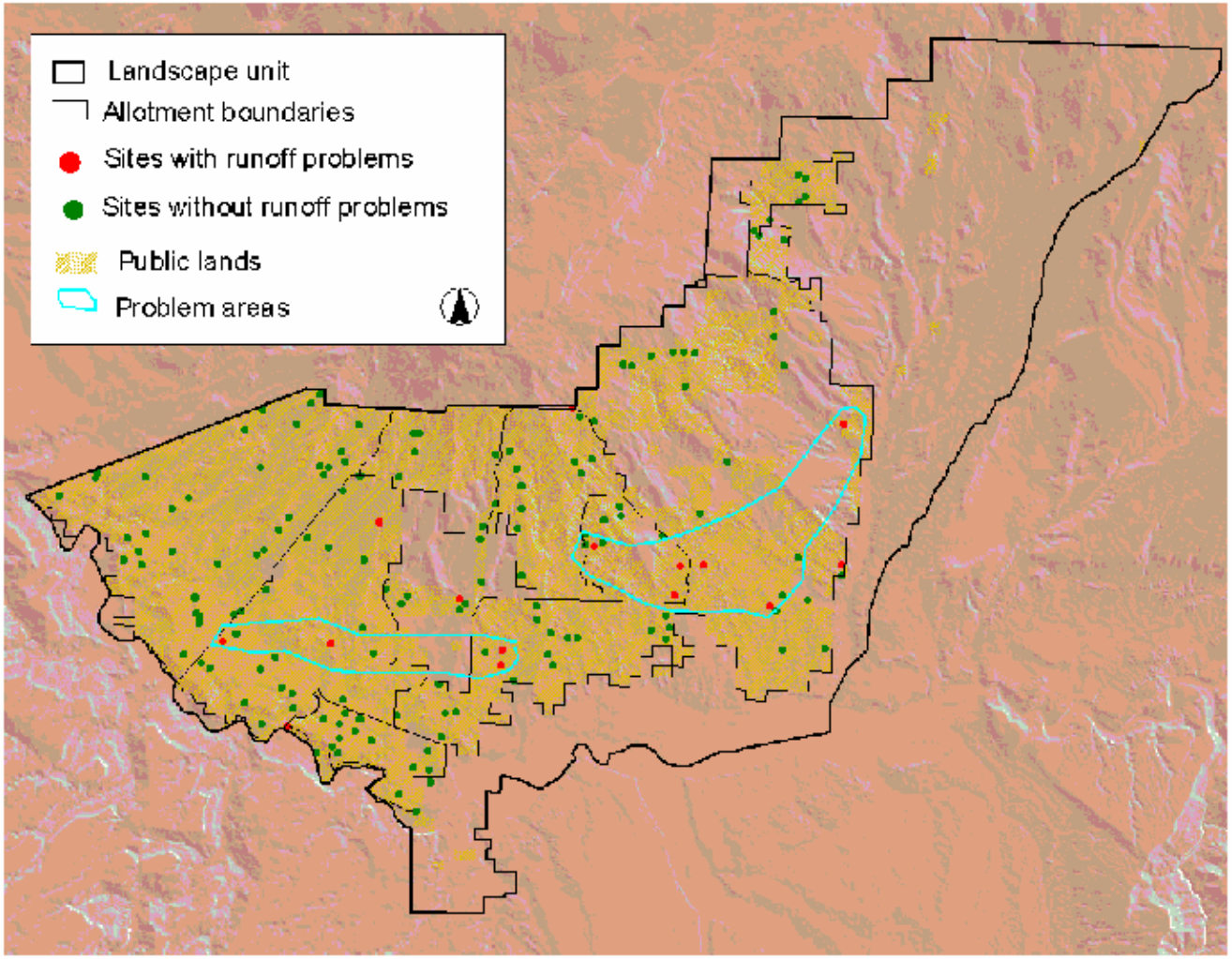


Figure 2.3 North Delta Area runoff drainages. Sites with soil loss associated with overland flow: runoff drainage scores of 1 or 2 on the Rangeland Health Indicator sheet are considered problem sites.



Higher than average bare soil for the site type appears to be a widespread problem across the unit (Figure 2.4). Sites with bare soil problems were especially prevalent in the southwestern part of the unit, in a broad band across the central part of the unit, and in a small area in the north central part 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. High Risk was found in the central part of the unit, and correlates closely with the maps showing where the majority of soil loss is occurring (Figure 2.5).

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 perennial plants was used as an 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, less vigorous vegetation, or a different type of vegetation than it is capable of producing. Low basal cover also appears to be a widespread problem across the unit (Figure 2.6). Large areas dominated by sites with lower than average plant basal cover were found in the south-central, west-central, and northeastern parts of the unit.

Low Litter Cover

Litter cover is another plant-related source of soil protection. Although fine litter tends to be less permanent that plant basal cover, it serves to protect the soil surface and enhance water infiltration by slowing movement of overland flow. In addition, as litter decomposes, it adds to the organic material in the soil, increasing soil productivity. Low litter cover appeared to be another widespread problem in the unit (Figure 2.7). Three areas had the majority of sites with low litter: the south-central and north-central portions, and the eastern portion of the unit.

Figure 2.4 North Delta Area sites vulnerable to soil erosion because of high levels of bare soil: In this map, only sites having bare soil values of more than 5% above the average bare soil value for the site type are characterized as having high bare soil levels.

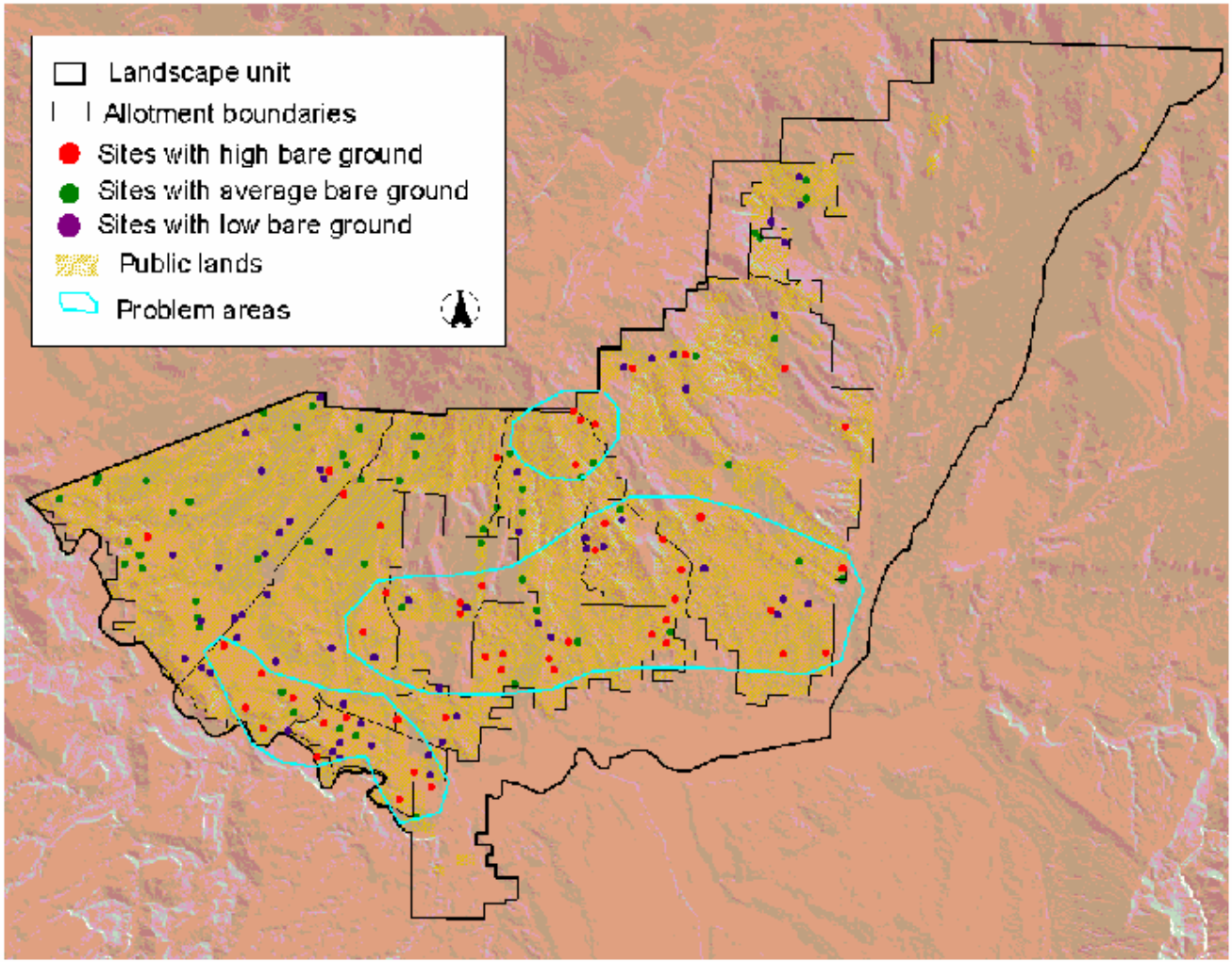


Figure 2.5 North Delta Area sites with high erosion hazard: soil k factor > 0.2, bare soil > 50%, and slopes > 8% at highest risk, slopes between 4 and 8% at moderate risk.

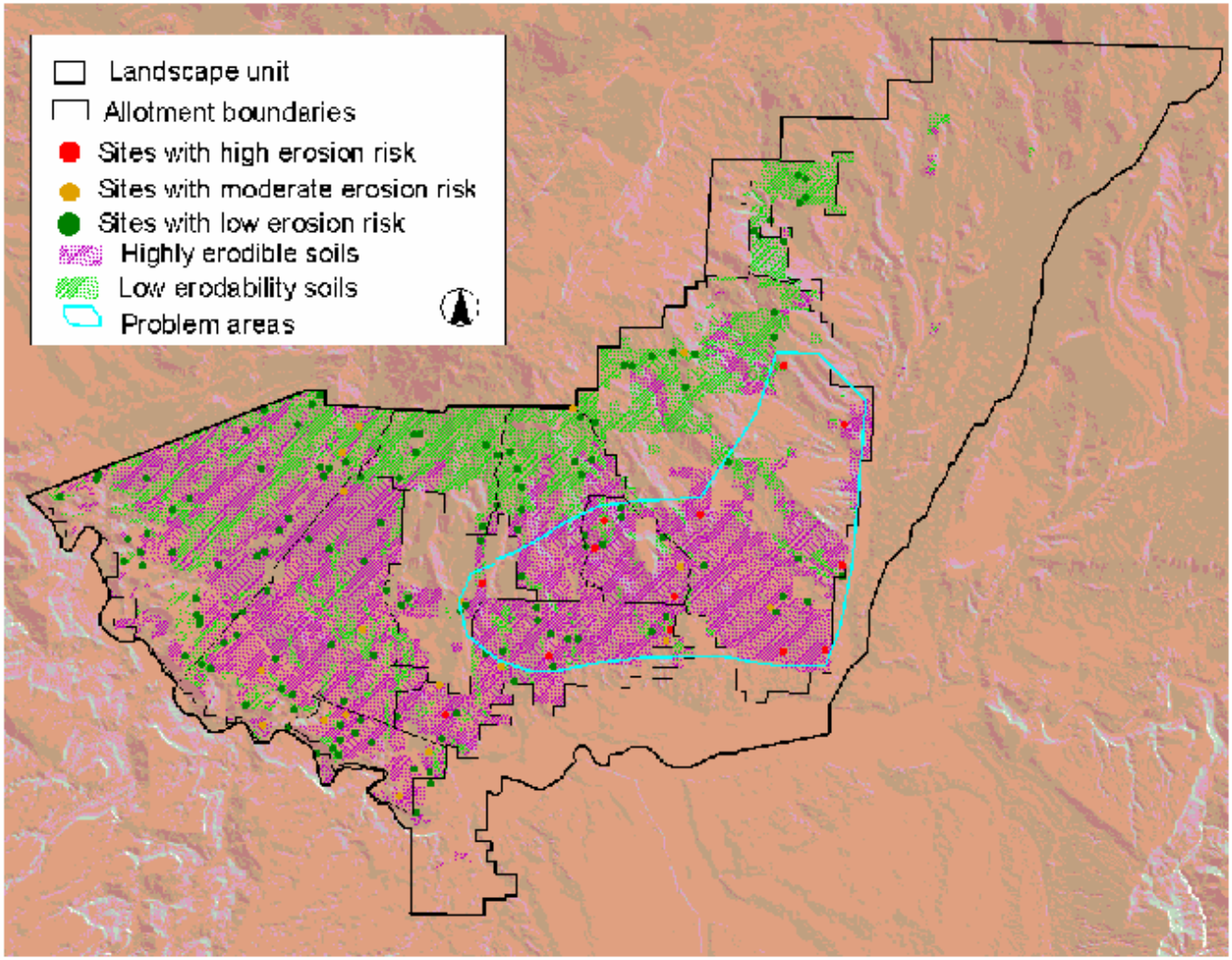


Figure 2.6 North Delta Area sites with less plant basal cover than average for the site type. In this map, only sites having basal cover values of less than 10% below the average basal cover value for the site type are characterized as having low basal cover.

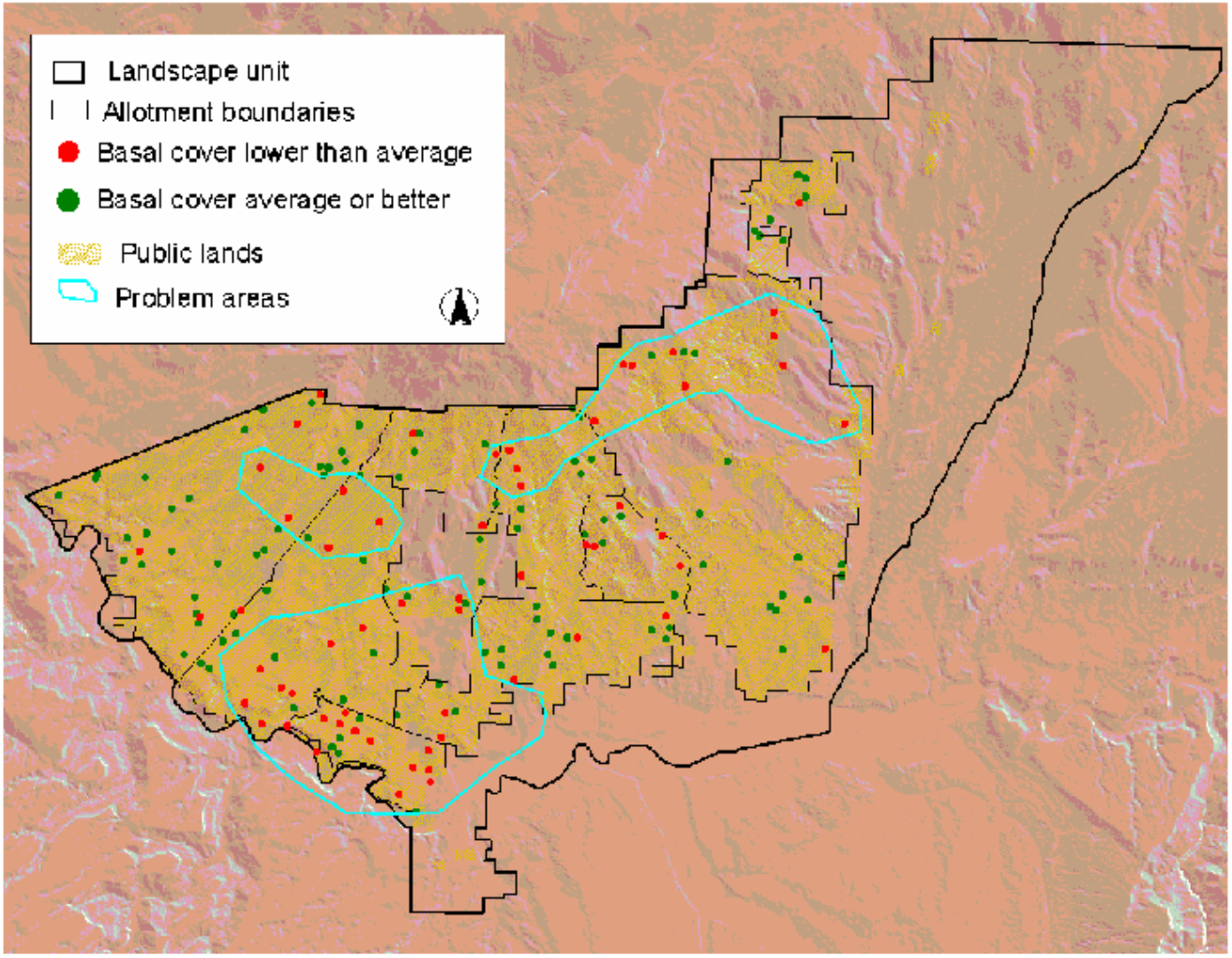
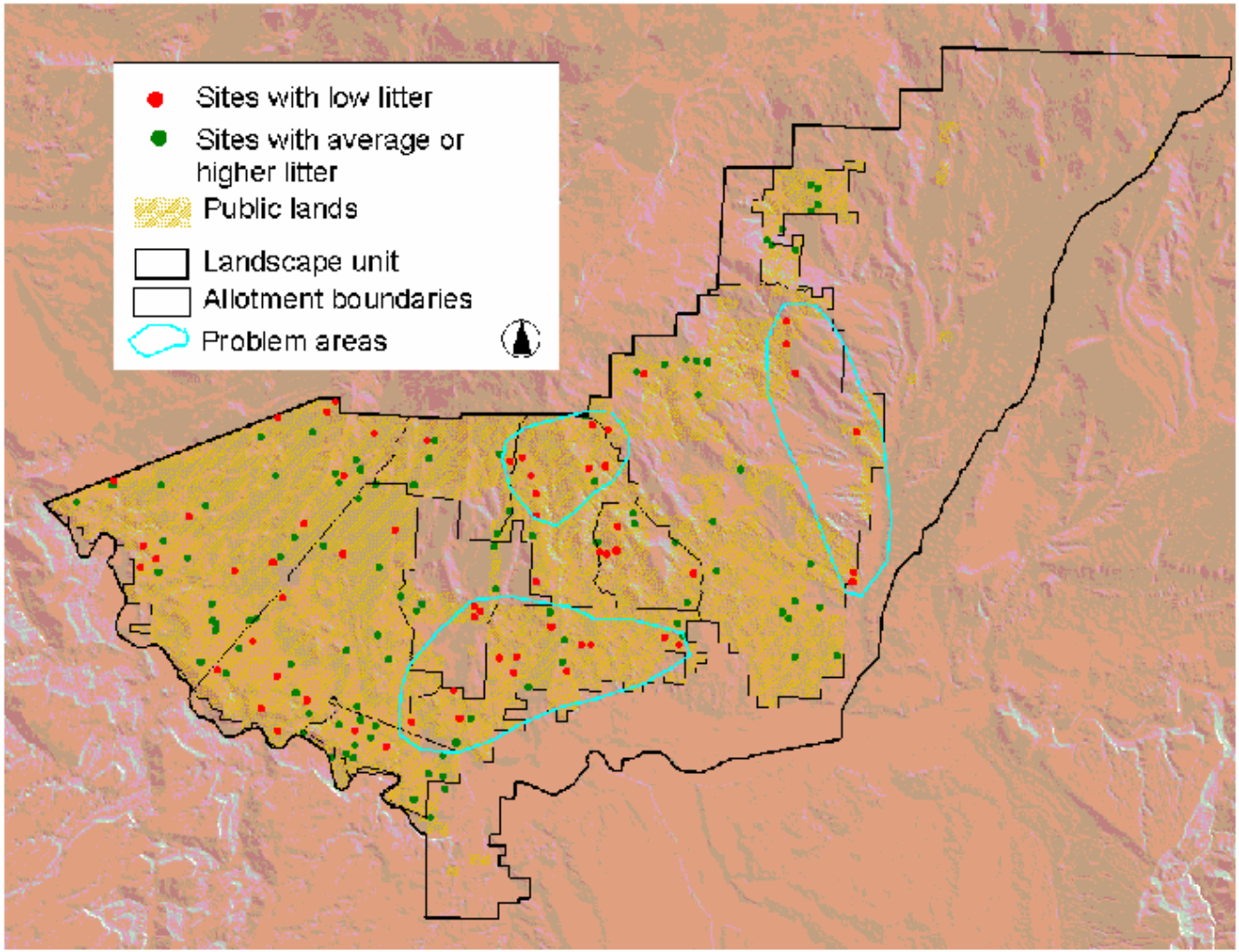


Figure 2.7 North Delta Area sites with lower litter cover than average for the site type. In this map, only sites having litter cover values of less than 10% below the average litter cover value for the site type are characterized as having low litter cover.



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		
12.8	5.8	5.8	0.4

See figure 3.1 for locations of problem streams.

Specific Problems

The majority of riparian areas on public land in the landscape unit fully met Standard 2, having no evident problems with hydrology, vegetation, or excessive erosion and deposition from either stream channel or from the watershed. Another 5.8 miles were rated as “functioning at risk”, which is customarily translated into “meeting Standard 2 with problem areas”. There were 5.8 miles of riparian areas that did not meet Standard 2. The stream reaches having problems are described here in more detail.

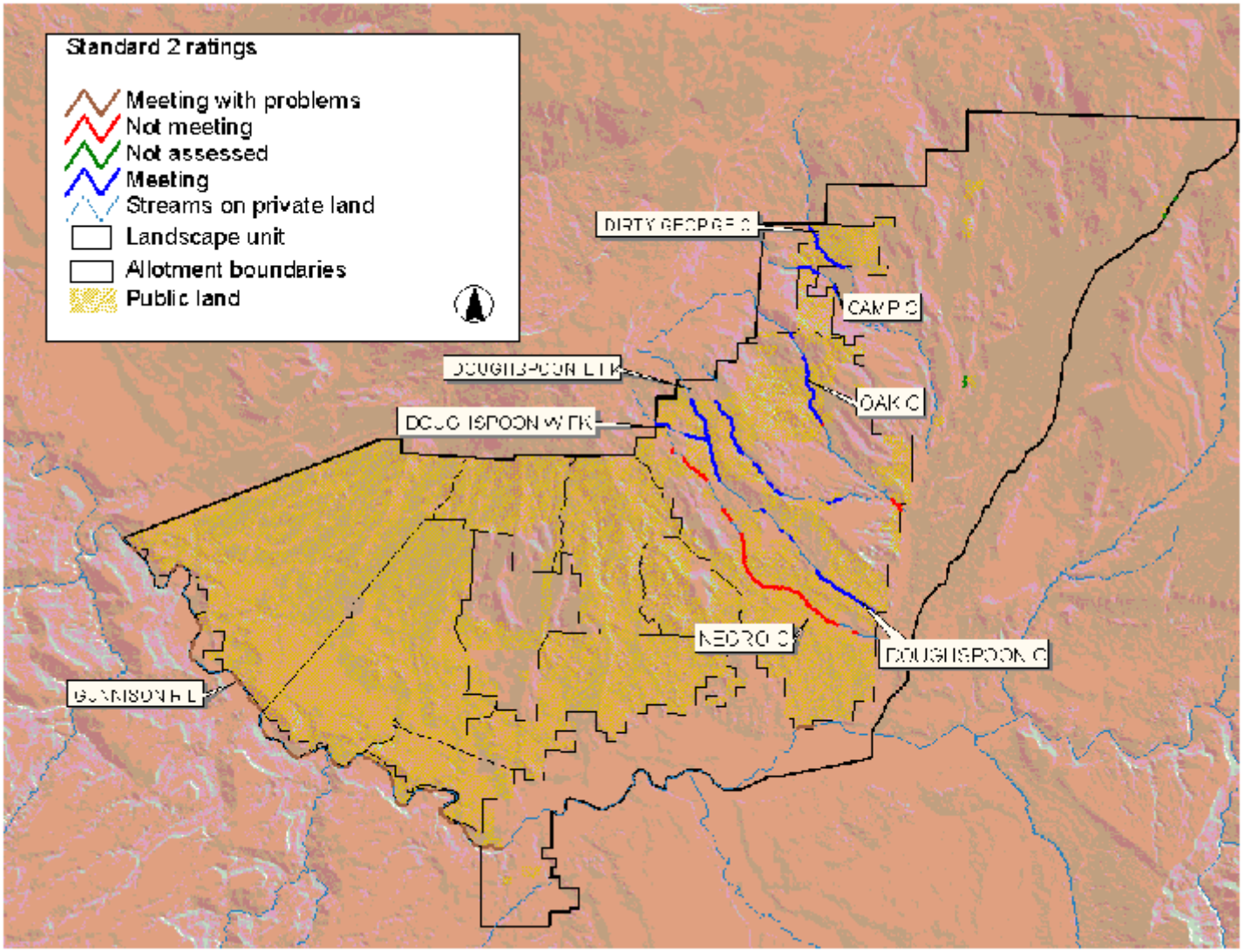
Lower Gunnison River

A total of 5.8 miles of the lower Gunnison River passes through public land in the North Delta Area. This was rated as “Meeting with problems” because of the riparian vegetation which is dominated by nonnative species – predominately tamarisk with some Russian olive and expanses of Russian knapweed. At this elevation, Rio Grand cottonwood, sandbar willow, silver buffaloberry (*Shepherdia argentea*) and skunkbush should be dominant species. This vegetation shift is probably a result of the change in flow resulting from the dams on the Upper Gunnison and North Fork of the Gunnison, in combination with nearby irrigated agriculture. The dams together with upstream channelization and dike construction have reduced spring flooding on floodplains and low terraces of the river as it passes through the public lands. These flow alterations are also thought to be responsible for the dramatic reductions in native warm water fish populations in this reach of the river.

Negro Creek

Negro Creek, which makes up 5.2 miles of riparian area on public land in the North Delta Area is rated as “not meeting Standard 2". Negro Creek is considered an intermittent stream with flows observed

Figure 3.1 North Delta Area Standard 2 ratings.



in November and September. However, for an intermittent stream it drains a small watershed. It is deeply downcut, and has minimal riparian vegetation, and scattered tamarisk. The source of flow is unclear – it may be augmented by irrigation return flow, or groundwater from irrigation. The watershed contains many breached erosion control dams, indicating that the area is subject to sudden, high runoff events. Observers were not able to identify the source of the problems, but noted that livestock use did not appear to be a contributing factor.

Oak Creek –lowest reaches

The lowest reach of Oak Creek makes up 0.6 miles of riparian vegetation on public land in the North Delta Area. This reach was rated as “not meeting Standard 2" because it is deeply downcut and channelized. Only a few individuals of a native riparian species (sandbar willow) were found, and they were in poor condition. Tamarisk was abundant. High flows were cited as causing damage to the stream. Poor upland condition may have been a factor in the original downcutting. Now the system is not capable of withstanding high flows without additional damage occurring.

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			
9,677	52,420	9,484	2,844	157

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. Problems with low perennial grass cover were widespread across the North Delta Area (see Figure 4.2). Large areas where the majority of sites had low perennial grass cover were found in the eastern and south-central parts of the unit.

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. In addition, cool season grasses use the same growing period as cheatgrass, and can compete with cheatgrass. The percent canopy cover of cool season perennial grass was used as an indicator of plant community health and wildlife habitat quality. As with perennial grasses, problems with low cool season grass cover were widespread across the unit (Figure 4.3). Large areas where the majority of sites had low perennial cool season grass cover were found in the eastern and central parts of the unit.

Perennial Forb Cover

Perennial forbs are a source of diversity, nectar, seeds, varied photosynthetic periods and root morphologies. These characteristics increase a community's water and sunlight capturing capabilities,

Figure 4.1 North Delta Area Standard 3 ratings

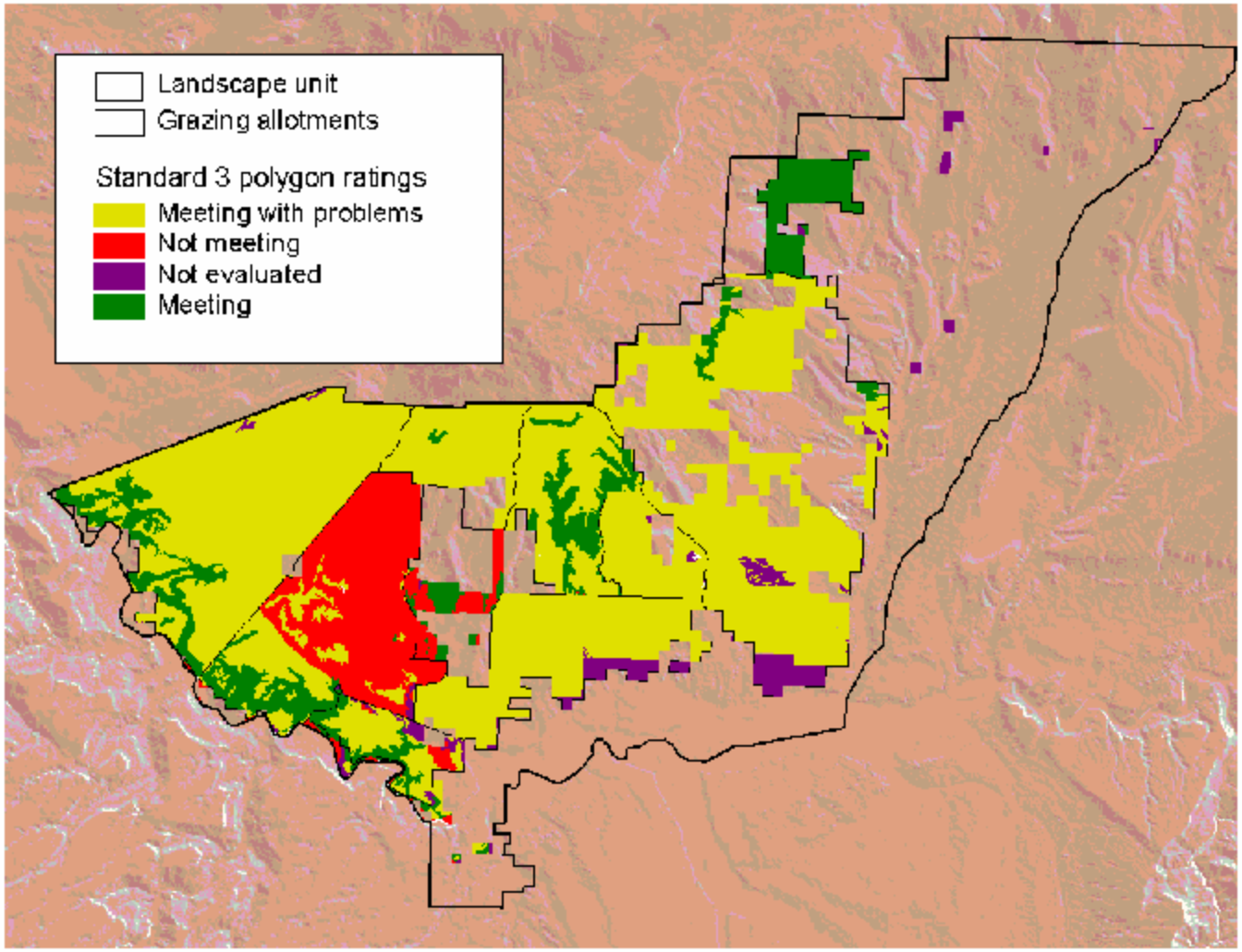


Figure 4.2 North Delta Area perennial grass cover. In this map, only sites having perennial grass canopy cover values of less than 10% below the average perennial grass cover value for the site type are characterized as having low grass cover.

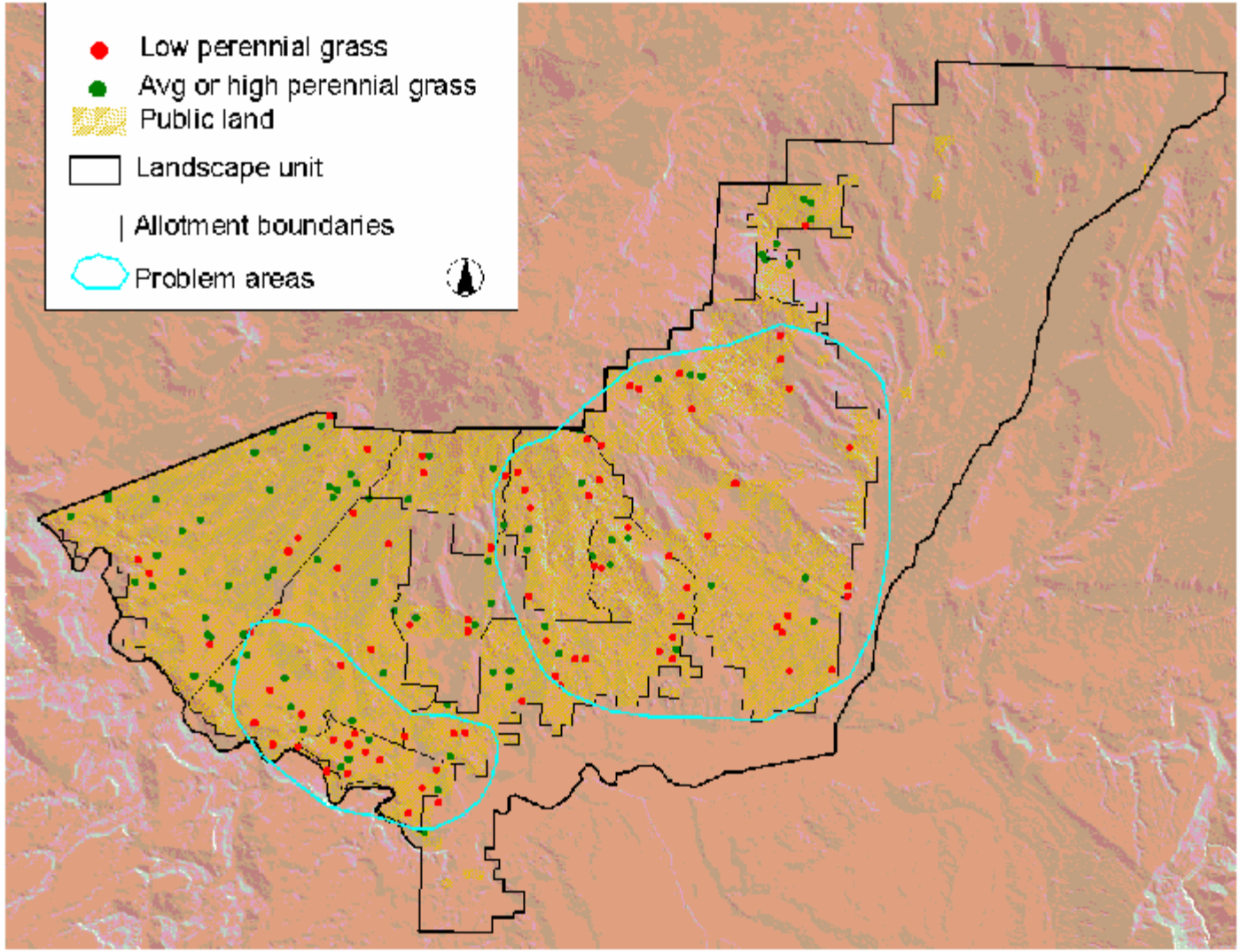
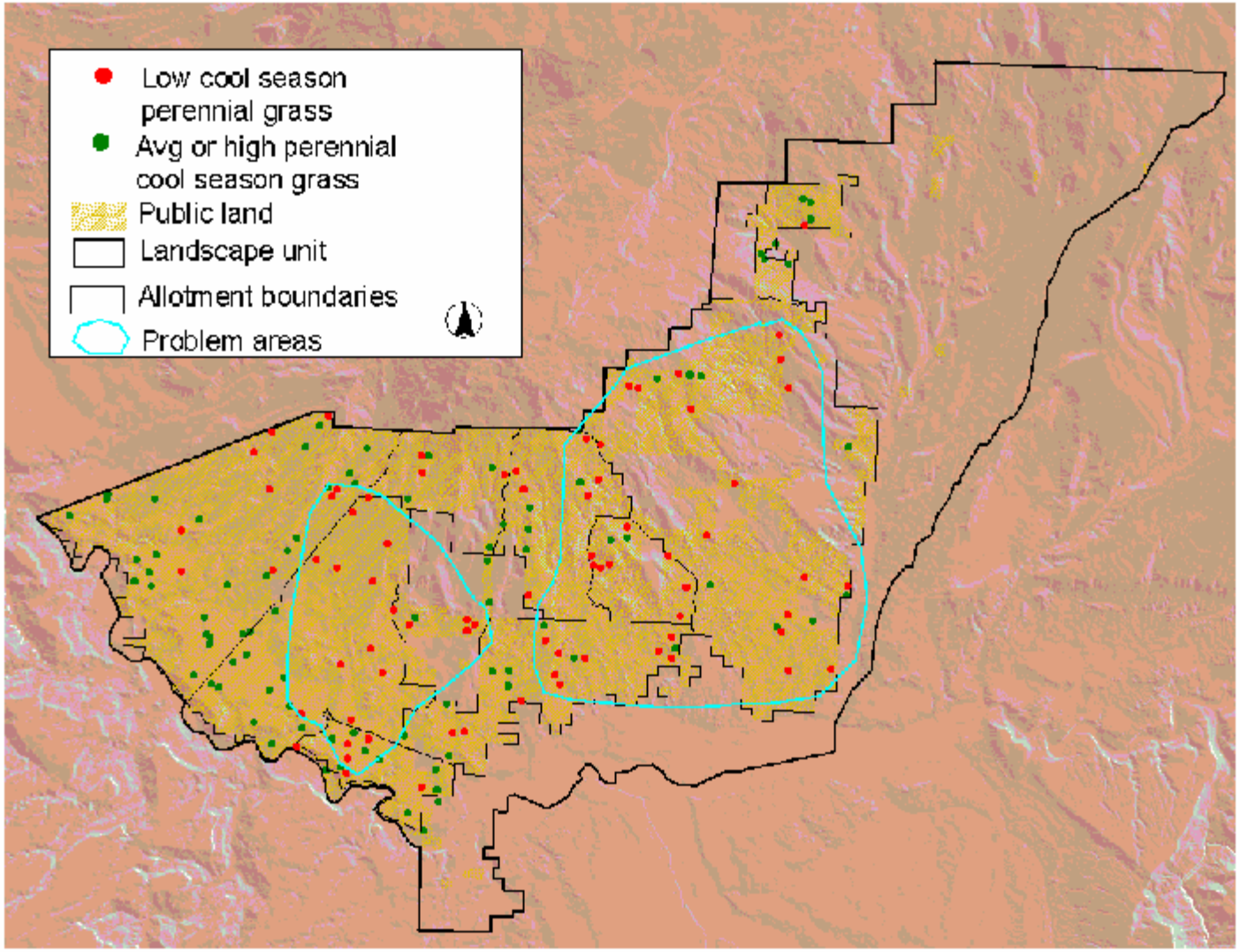


Figure 4.3 North Delta Area perennial cool season grass cover. In this map, only sites having perennial cool-season grass canopy cover values of less than 10% below the average cool season grass cover value for the site type are characterized as having low cool season grass cover.



biomass production, and ability to support animals. Although typically not a dominant plant type, forbs 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. Low perennial forb cover was a widespread problem across the unit. Figure 4.4 shows large areas that were dominated by sites with low forb cover to occur in the western and east-central parts of the unit.

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. This phenomenon was found at many of the higher elevation sites. While pinyon-juniper woodland only occurs at the higher elevations, most of those sites that are capable of supporting the tree species had young pinyon or juniper dominating (Figure 4.5). This probably reflects some expansion of woodland downward into other vegetation types, as well as a density increases within existing woodlands, particularly of young pinyon.

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, halogeton, Jim Hill mustard, alyssium, and Kentucky bluegrass -- were present at significant levels in the native plant communities at 47% of the sites visited (Figure 4.6). Large areas where the majority of sites were infested by exotic plants occur in the northwestern section, and south-central part of the unit. The primary exotic species here is cheatgrass, with halogeton as a secondary threat, particularly where the soil has been disturbed. The Transco Pipeline was found to be especially infested with halogeton.

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, field bindweed, whitetop, and tamarisk. Weeds were fairly widespread across the unit. The primary species found to occur in the unit were tamarisk and Russian knapweed (Figure 4.7). Another weed species that was fairly common although not considered noxious was horehound. Many of the ephemeral washes were found to be infested with tamarisk. And many of the roads had Russian knapweed infestations. The Lower Gunnison River has especially heavy infestations of these two species, in addition to limited incidences of Russian olive.

Figure 4.4 North Delta Area perennial forb cover. In this map, only sites having perennial forb canopy cover values of less than 10% below the average perennial forb cover value for the site type are characterized as having low perennial forb cover.

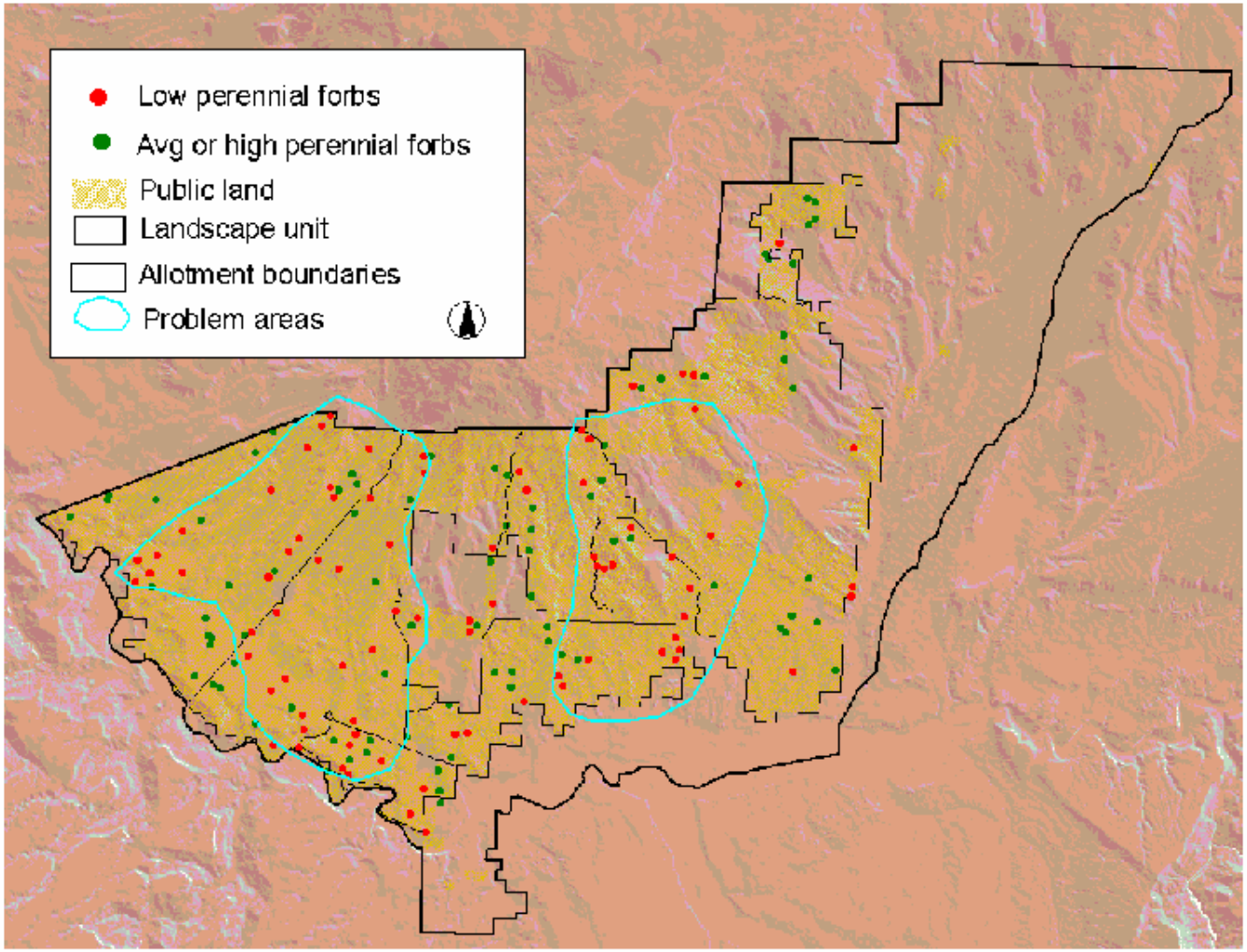


Figure 4.5 North Delta Area pinyon-juniper invasion. This map shows sites where young age classes of either pinyon or juniper were the dominant age classes of these species on the site.

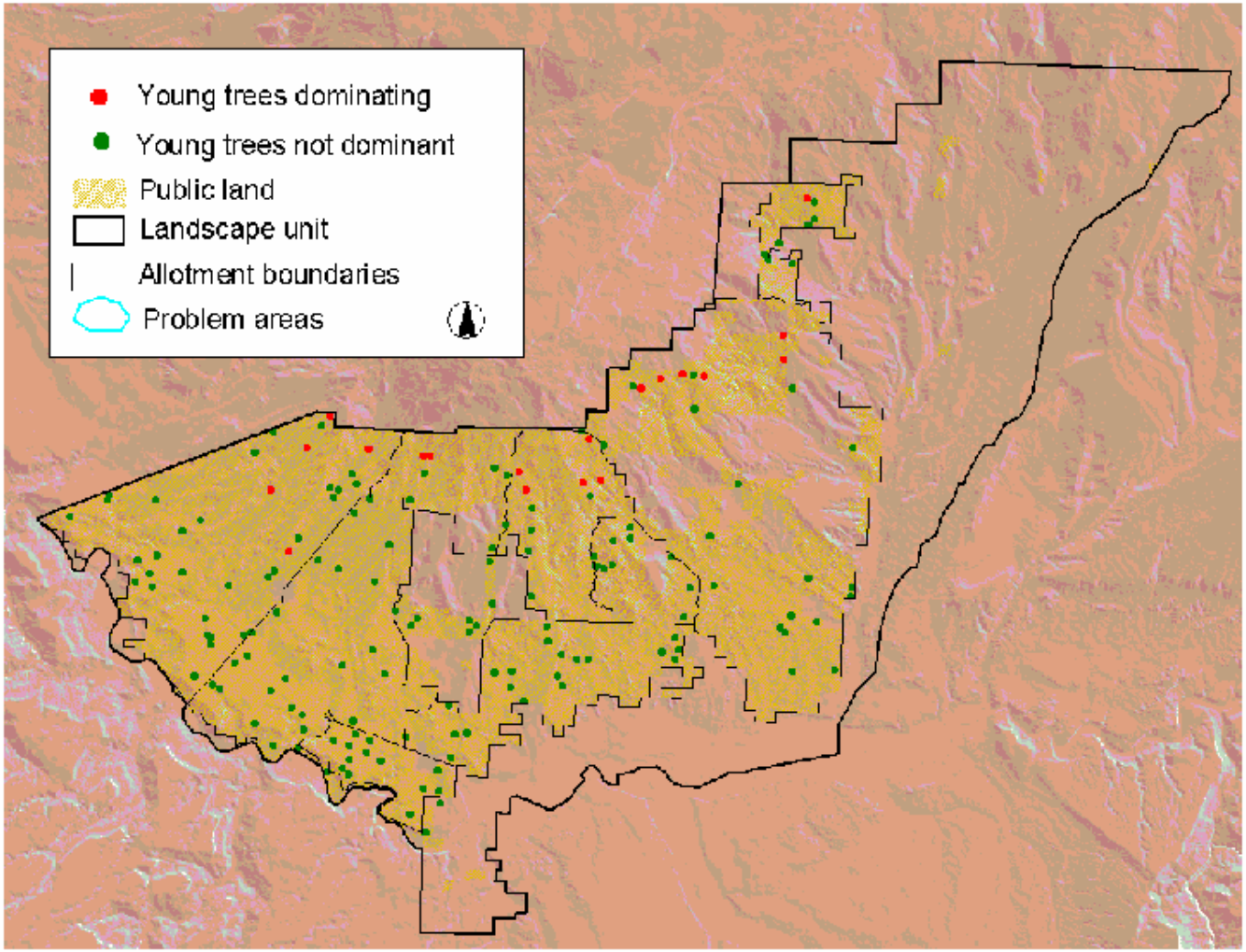


Figure 4.6 North Delta Area exotic plants. This map shows sites with Rangeland Health Sheet scores of 1 or 2 as exotics dominating, scores of 3 as exotics present, and scores of 4 or 5 as exotics minor or absent.

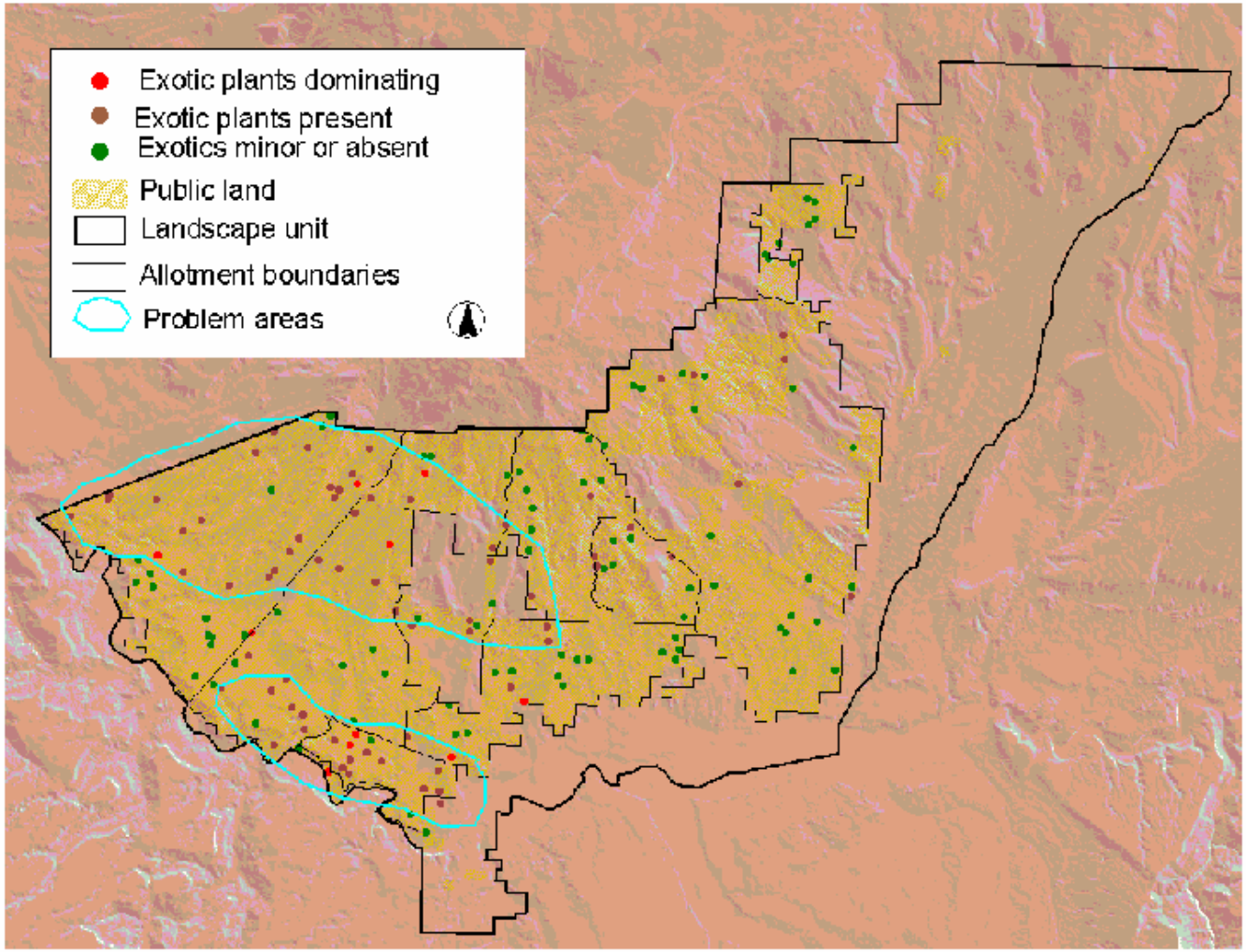
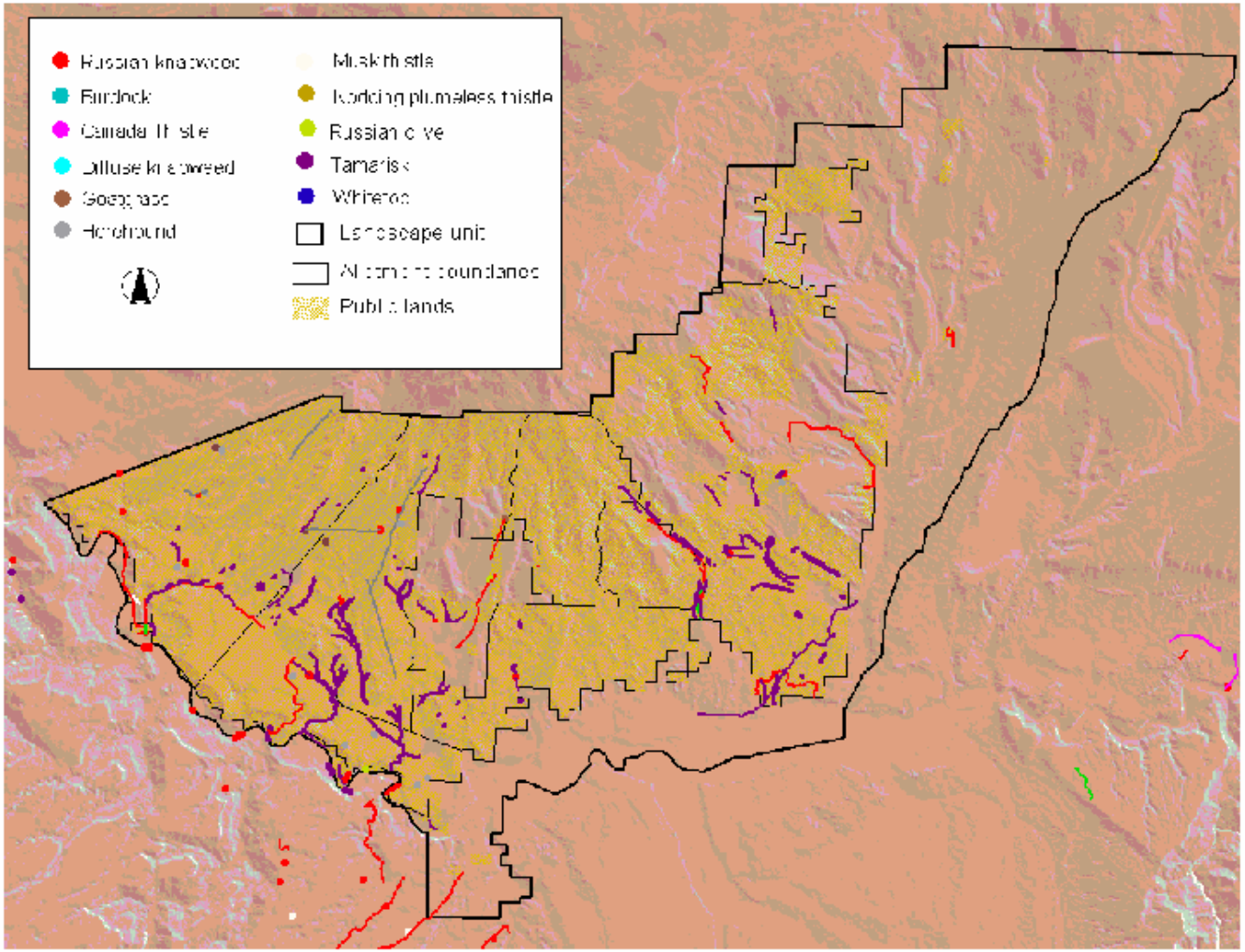


Figure 4.7 North Delta Area noxious weed occurrence.



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. Problems with shrub hedging were found to be fairly few and isolated in the unit (Figure 4.8). Small areas having some problems with shrub hedging were found in the north west, northeast and south-central parts of the unit.

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 wildife. Problems with low shrub vigor were widespread across the unit (Figure 4.9). Shadscale was the shrub species to have the greatest problems with vigor in the unit. It was found to be in low vigor at 38 of the 67 sites where it was a significant part of the plant community. Five of 12 four-wing saltbush sites were in low vigor. Although sagebrush is limited in extent in the unit, plants were in low vigor at 3 of the 7 sites it occurred at. Large areas having shrub vigor problems were found in the western, and upper elevation central parts of the unit.

Standard 3 Landscape Scale Indicators

Healthy Wildlife Community

The wildlife community health assessment in the North Delta 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 to fully assess this standard. 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 quickly 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 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 North Delta 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

Figure 4.8 North Delta Area shrub utilization and hedging. This map shows only sites having at least 2.5% shrub canopy cover. Sites with shrubs falling in hedge classes 3 or 6 depicted as seriously hedged, sites with shrubs in hedge class 2 or 5 are moderately hedged, and sites with shrubs in hedge class 1 or 4 are not hedged.

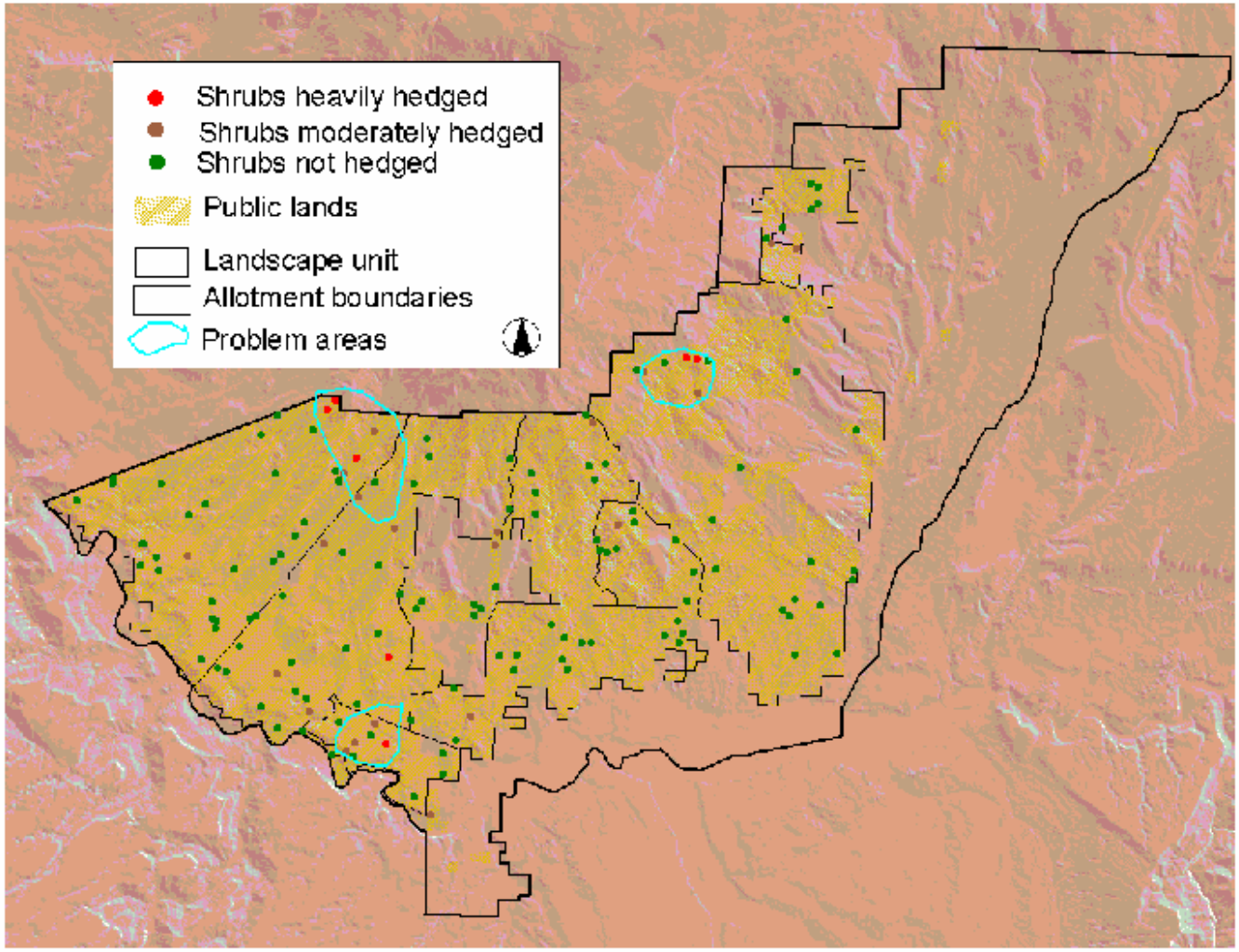
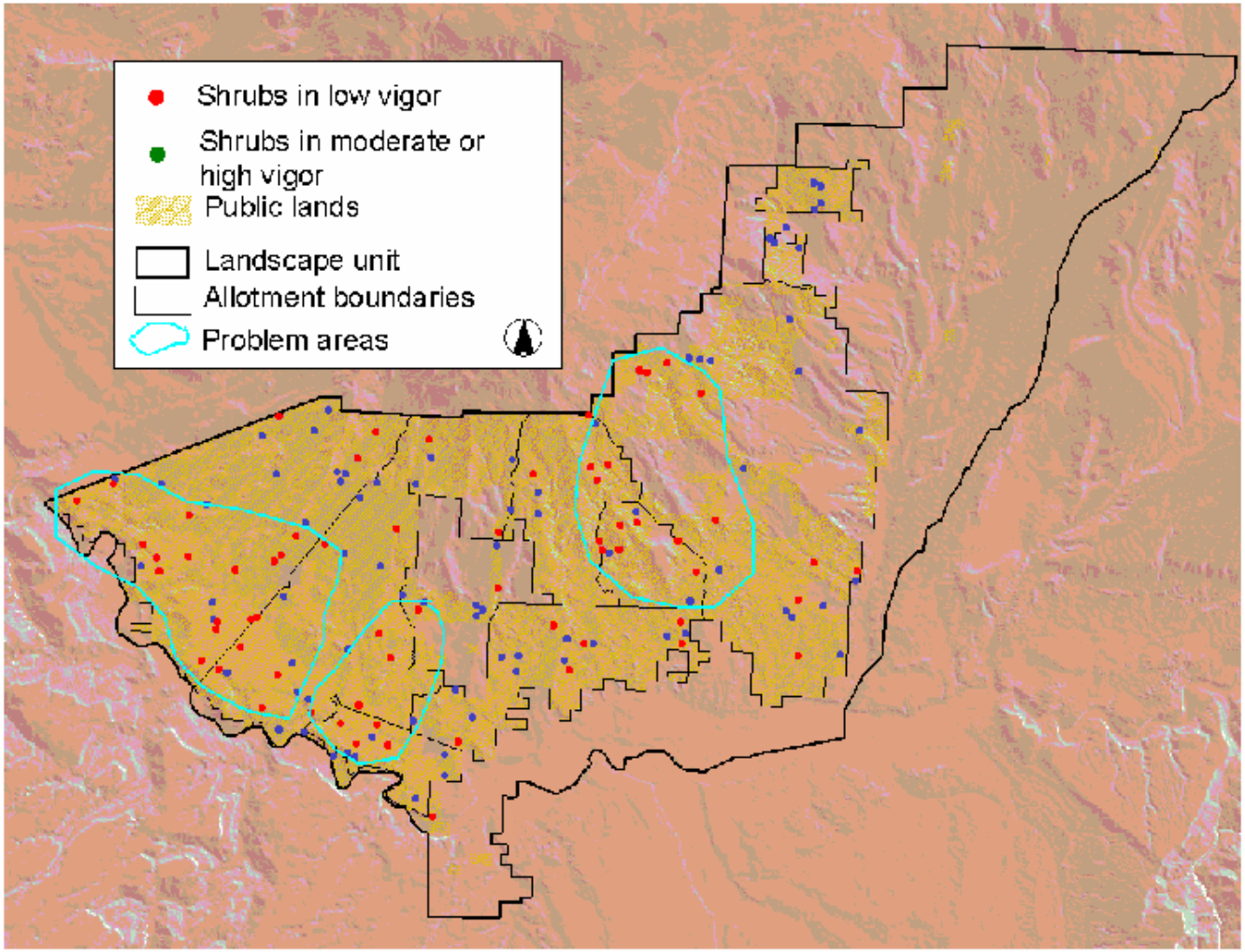


Figure 4.9 North Delta Area shrub vigor. This map only shows sites that have at least 2.5% shrub cover. Sites with low shrub vigor have at least one major shrub species that is in predominantly low vigor across the site.



above in the Healthy Plant Community section are indicators of changes occurring to habitat structure, condition, and arrangement of components in the North Delta 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), 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 W1). (Figures based on DAU's 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 North Delta 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 North Delta 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 North Delta 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. 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 North Delta unit.

Thirteen species (Table 4.1) show 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 4.2) 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 North Delta 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 4.1: 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
NTMB SPECIES	HABITAT	26 year Population Trend Ranking (PT26)	10 year Population Trend Ranking (PT10)	Abundance Ranking (AB)	Importance of Area Ranking (IA)
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 Gunnsion Gorge area based on Breeding Bird Atlas information.

Table 4.2. 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 North Delta area based on Breeding Bird Atlas information.

Plant Distribution

Plants: 76 different plant species were found to occur in the unit. This does not reflect all of the species seen, only those which occurred in significant amounts on at least one site. The very inconspicuous or sparsely scattered species are not reflected in this list. Galleta grass, a native warm season grass was the most widespread species found on 105 out of a total of 165 sites where data was collected. Shadscale was the second most widespread species occurring on 67 sites, with the exotic annual cheatgrass the third most common on 49 sites. Indian ricegrass, a native cool season grass was the most common cool season grass occurring as a significant part of the plant community on 40 sites. The most common perennial forb was scarlet globemallow that was significant on 21 of the sites. 21 species occurred at substantial levels

on only one site, and another 36 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 substantially different plant species than the sandy and loamy soils found in the eastern, upper elevations in the assessment unit. The basalt pediments on Mancos shales support many species that are found both on the Mancos shale and coarser soils. 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 and Dispersal Agents:

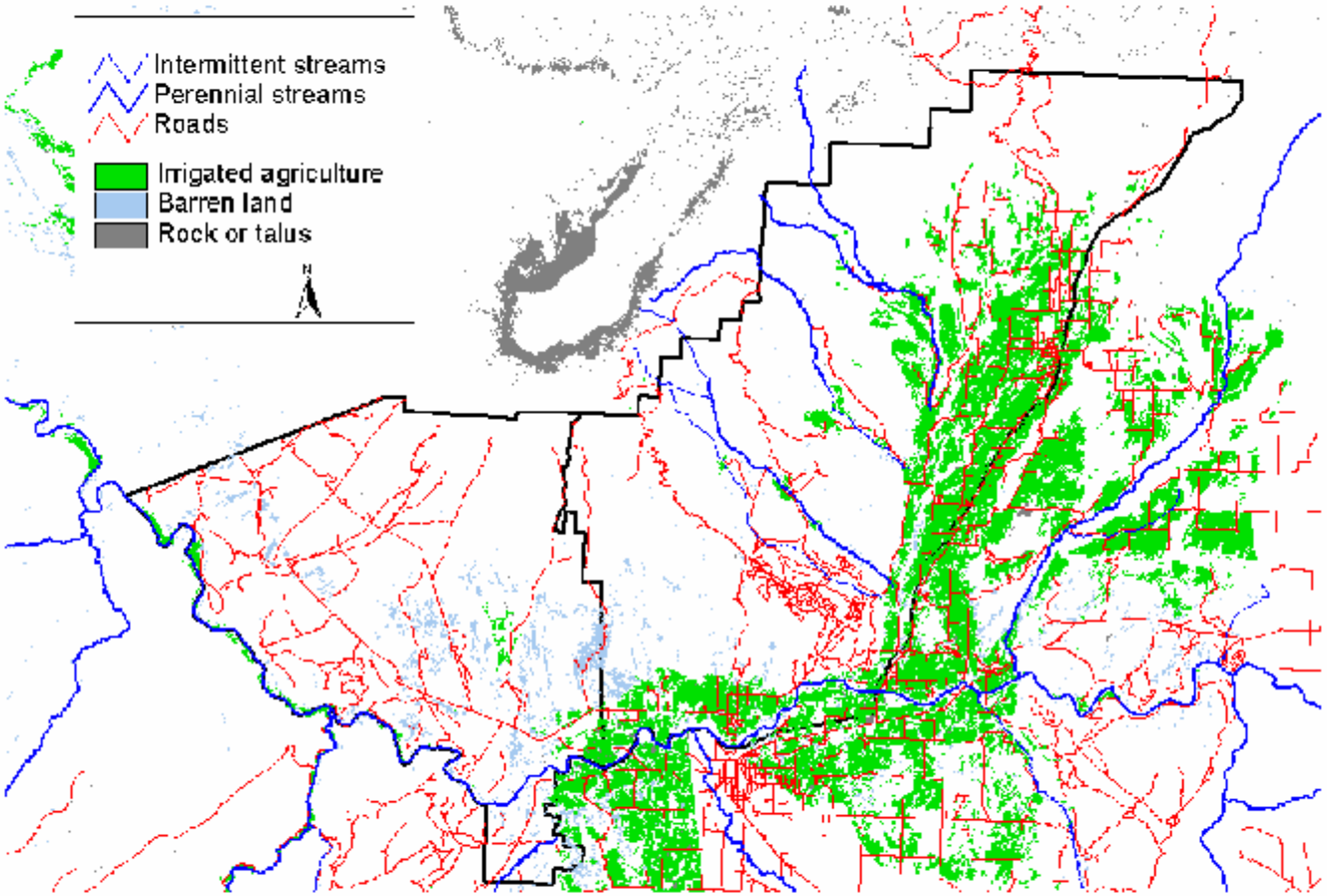
Impassible topographic features like rock walls, talus fields, and very steep slopes: Steep rocky areas are limited to the edge of Grand Mesa on National Forest lands just north of the unit. This rocky area probably cuts off direct access to the verdant mesa top from the drier landscape unit below. This rocky slope is probably an effective barrier to nearly all terrestrial species. It probably affects use of the unit by deer and elk in two ways: lower use of the western and central part of the unit than would be expected, and concentrated use and movement along the few passages up through the rock.

Expanses of barren land: The Mancos shale badlands have many areas that are nearly devoid of vegetation. These bare areas probably represent barriers to movement by animals that need hiding cover for movement, or those that are not able to travel long distances between food sources. These barren areas are widely scattered across the central part of the unit, and certainly impact the unit's usability for wintering mule deer and elk.

Rivers, streams, and dams: The Lower Gunnison River acts as a barrier to passage for animals unable to cross the 100' wide channels. The river forms the southern boundary of the unit, and probably restricts movement by some animals out of or into the unit from the south. The Hartland Diversion, just upstream of Delta, serves as a barrier to upstream movement of fish in the lower Gunnison River. The Redlands fish ladder, approximately 10 miles downstream of the western part of the unit has been effective in allowing movement of the endangered Colorado River Fish upstream along the Gunnison River and into the unit. Streams and canals act as dispersal and movement corridors, for both plant and animal species. Weed species often move along streams because water transports their seeds, and because they find a similar habitat to irrigated cropland in the riparian zone.

Agriculture or intensive human land uses: Agriculture and residential use of land can act as a barrier to movement by species that don't use the nonnative vegetation, tolerate the presence of humans and domesticated animals like dogs, need hiding cover, or that cannot travel long distances in unsuitable habitat. The kit fox, a state endangered species, is a good example of a species that does not easily traverse subdivisions, agricultural fields, roads, and other human developments. Agriculture and residential development can also act as corridors for other species. For example, species that thrive in disturbed areas, those that are transported by domestic species, others that benefit from the irrigation

Figure 4.10 North Delta Area landscape and habitat connectivity. Map shows potential barriers and corridors to plant and animal movement (roads, barren areas, rock, rivers or streams, and irrigated agriculture)



systems and more abundant moisture, or those that use crop species are able to move through agricultural lands and populate the areas adjacent to agricultural lands. Such species as the European starling, the raccoon, cats, burdock and Siberian elm are probably spreading and utilizing parts of the unit as a result of agricultural
and human land uses adjacent to the unit. Irrigated agriculture is the dominant land use along the south-central and eastern parts of the unit, so the adjacent areas would be the most affected locations of the native plant and animal communities in the unit.

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. In the case of heavily traveled roads, they can be a significant cause of mortality for animals trying to cross. The most significant road in the unit is Colorado Highway 50, which cuts through the central part of the unit, from northwest to southeast. It is being converted to a four-lane highway in 2002. Passage under the road is only possible in a few areas where the road passes over drainages. Some animals, such as pronghorn antelope may not use these passages because of their locations, distance between them, or aversion to going into tight, sight-constrained areas. The crossings are too far for other animals, such as prairie dogs to reach. Most roads in the unit are infrequently traveled, dirt roads. These probably do not act as a barrier in this ecosystem. Instead, they probably facilitate spread of some species, such as elk in the pinyon-juniper woodland, and weed species, which spread along the disturbed ground.

Livestock, people, vehicles, and pets: Livestock provide a mechanism for dispersal of seeds, insects, and disease. They are a principal source of weeds in native communities because they can transport seeds in their fur or digestive tracts, and because they typically move between heavily disturbed or agricultural private lands, up into native rangelands. They can also reduce the competitive capabilities of native plant species through grazing, and are a source of soil disturbance. To a lesser extent, people, their vehicles and their pets transport weed seeds in the same way. Livestock graze on nearly all the lands in the unit. All of these (sheep and cattle) spend some time on irrigated ground, or at home ranches during the year.

Vegetation Mosaic

Vegetation diversity in the North Delta Area arises from geology, soils and elevation diversity, as well as from disturbance (like fire) and the vegetation successional processes that follow. The successional processes are the vegetation stages that the plant community passes through following the disturbance. The arrangement of the variety of vegetation types across the area is also called the vegetation mosaic. The vegetation mosaic is a dynamic characteristic that changes over time. It is important chiefly in determining what types and amounts of wildlife and plant species can survive in an area. Some aspects of the mosaic are more fixed than others, for example, trees will not grow below a certain elevation. Others are more fluid, for example grass dominated vegetation can occur at nearly any location in the area. Many of the vegetation types in the area can transition from one to another over time, or with disturbance.

It is commonly thought that disruptions in the amounts and types of disturbances in the landscape have changed the vegetation mosaic from what existed prior to European settlement. The general trend is suspected to be toward more mature vegetation. As a result, many vegetation treatment projects are being done to create earlier-seral vegetation. Objectives for how the vegetation mosaic should look have been developed for the Uncompahgre Field Office (Uncompaghre Field Office Fire Management Plan, 2000)

Figure 4.11 North Delta Area vegetation mosaic in the Wells Gulch unit.

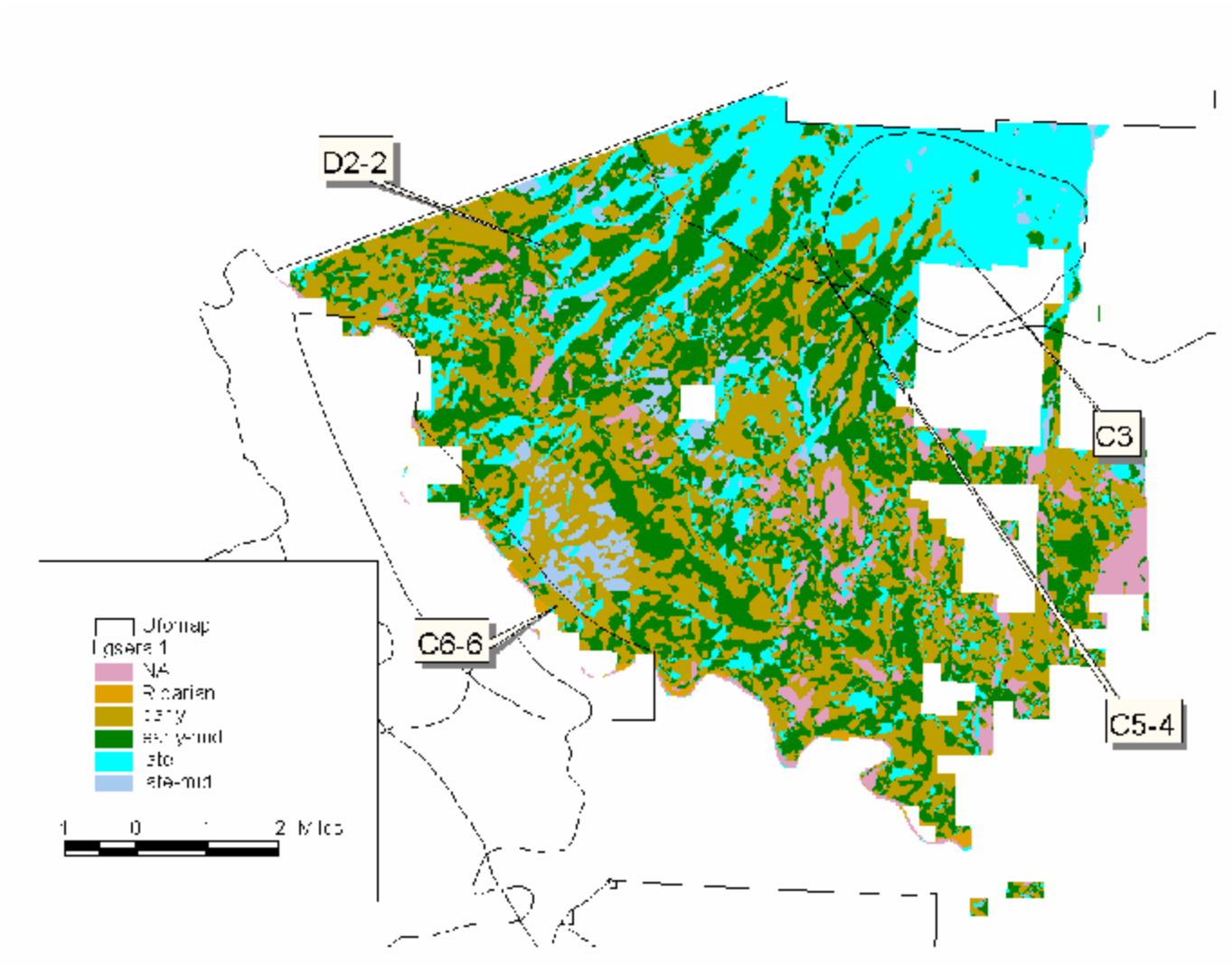
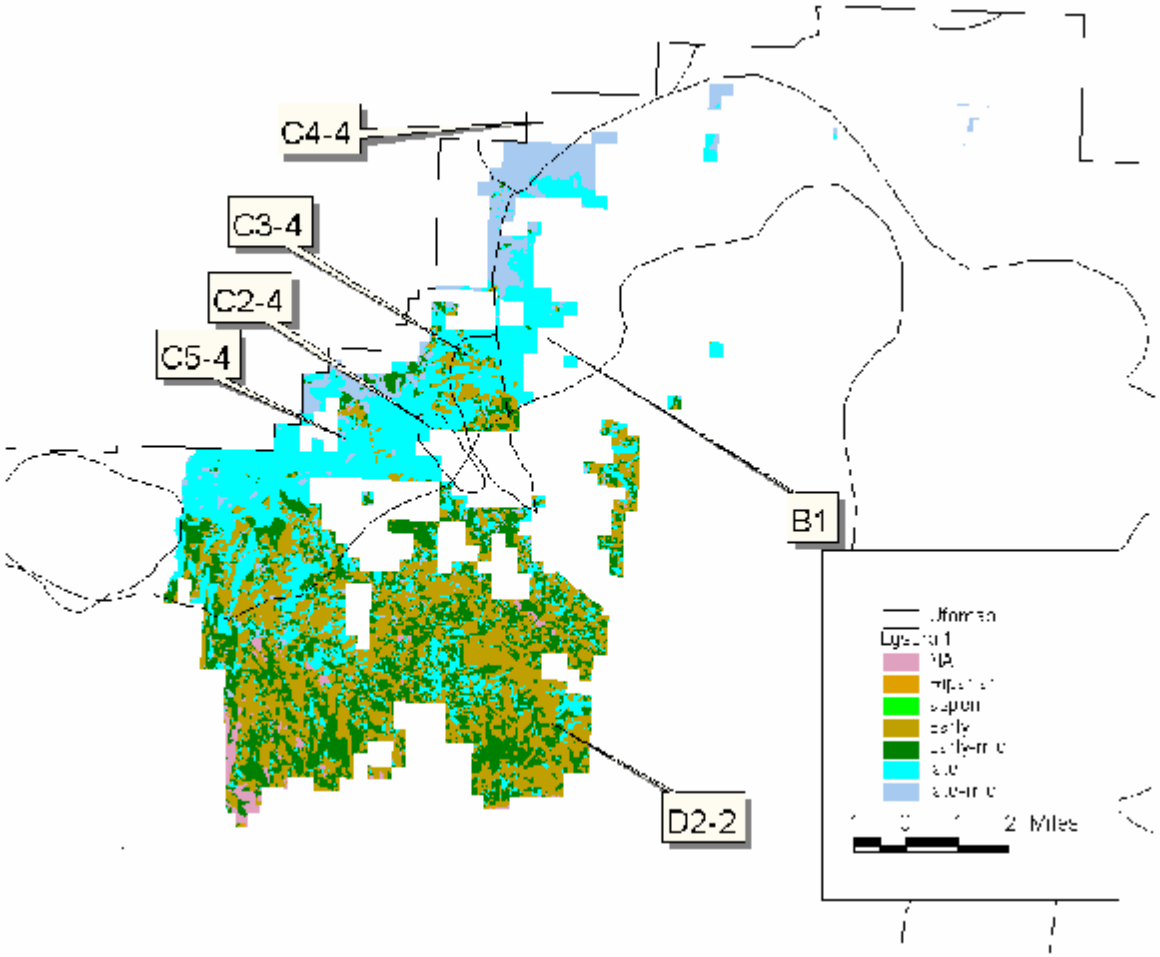


Figure 4.12 North Delta Area vegetation mosaic in the Devil's Thumb unit.



The assessment area is broken into 2 vegetation mosaic units: Well's Gulch for the western half, and Devil's Thumb for the eastern half (Figures 4.11 and 4.12). Each of these is further subdivided into polygons, each representing different landscape mosaic objectives. Table 4.3 below shows the desired proportions and patch sizes for each of the landscape units in the North Delta Area that have significant
BLM acreage.

Table 4.3 Existing vegetation mosaic versus desired vegetation mosaic as outlined in the Uncompahgre Field Office Fire Management Plan (FMP)

Vegetation Mosaic Unit **Total Acres in unit** **Other Polygons that have minor amounts of land in unit, and % of unit they comprise**	**UFO FMP polygon type**	**% of unit**	**% desired vegetation stage** **e=early (herbaceous)** **e-m=early mid (shrub/grass)** **l-m=late-mid (shrub-tree; tall shrub)** **l=late (tree)**				**% estimated vegetation stage** **e=early (herbaceous)** **e-m=early mid (shrub/grass)** **l-m=late-mid (shrub-tree; tall shrub)** **l=late (tree)**				
			e	**e-m**	**l-m**	**l**	**e**	**e-m**	**l-m**	**l**	**other**
Well's Gulch **Total Acres: 42,084** **Others: Bs 0.001%; C6 2%;**	**C3**	**9**	**30**	**10**	**20**	**40**	**9**	**11**	**2**	**78**	**0**
	C5	**10**	**25**	**20**	**10**	**45**	**16**	**23**	**2**	**59**	**0**
	D2	**79**	**20**	**80**	**0**	**0**	**40**	**35**	**4**	**13**	**7**
Devil's Thumb **Total Acres: 33,056** **Others: C2 0.4%; C3 3%; C4 2%;**	**B1**	**8**	**20**	**55**	**15**	**10**	**1**	**1**	**38**	**59**	**0**
	C5	**29**	**25**	**20**	**10**	**45**	**15**	**13**	**13**	**59**	**0.1**
	D2	**58**	**20**	**80**	**0**	**0**	**45**	**36**	**2**	**15**	**3**

The great majority of the Well's Gulch unit is made up of the D2 polygon type, which is located in the valley bottoms and lower elevation saltdesert country. Most of it is not capable of producing trees or mountain shrubs, except in drainages. Most of the existing vegetation is in the early and early-mid stages, as specified in the D2 vegetation mosaic objective, although there is not enough mature shrub vegetation. Distribution of patch sizes looks appropriate, as well. The objective for this polygon is to have about half the patches less than 20 acres, half larger, resulting in a fine-grain mosaic.

Both the C3 and C5 polygons are on the upper slopes of the unit. Both have too high a percentage of the mature stage, relative to the C3 and C5 vegetation objectives. Both need increases in the early and late-mid stages as well. In the C3 polygon, existing patch sizes look appropriate, however the large expanse of pinyon-juniper woodland needs to be broken up more with more large patches of early stages. Patch size distribution in the C5 polygon looks in line with the objectives.

The Devil's Thumb unit is also mainly made up of the D2 polygon. As with the Well's Gulch unit, it has too much early and too little early-mid vegetation, although the patch size and distribution appears appropriate. The B1 polygon which represents urban interface, is very far from meeting the vegetation mosaic objective. It is almost entirely late-mid and late seral, while the vegetation mosaic objective calls for the majority to be in the earlier seral stages. To be effective at slowing the spread of

wildfire, the mosaic should be much more fine-grained. The C5 polygon is fairly close to meeting the mosaic objective. It needs a little more of the early and early-mid stages, but in general the proportions are close to the objectives. Patch sizes are appropriate for the polygon.

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		
74,583	0	0	0

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.

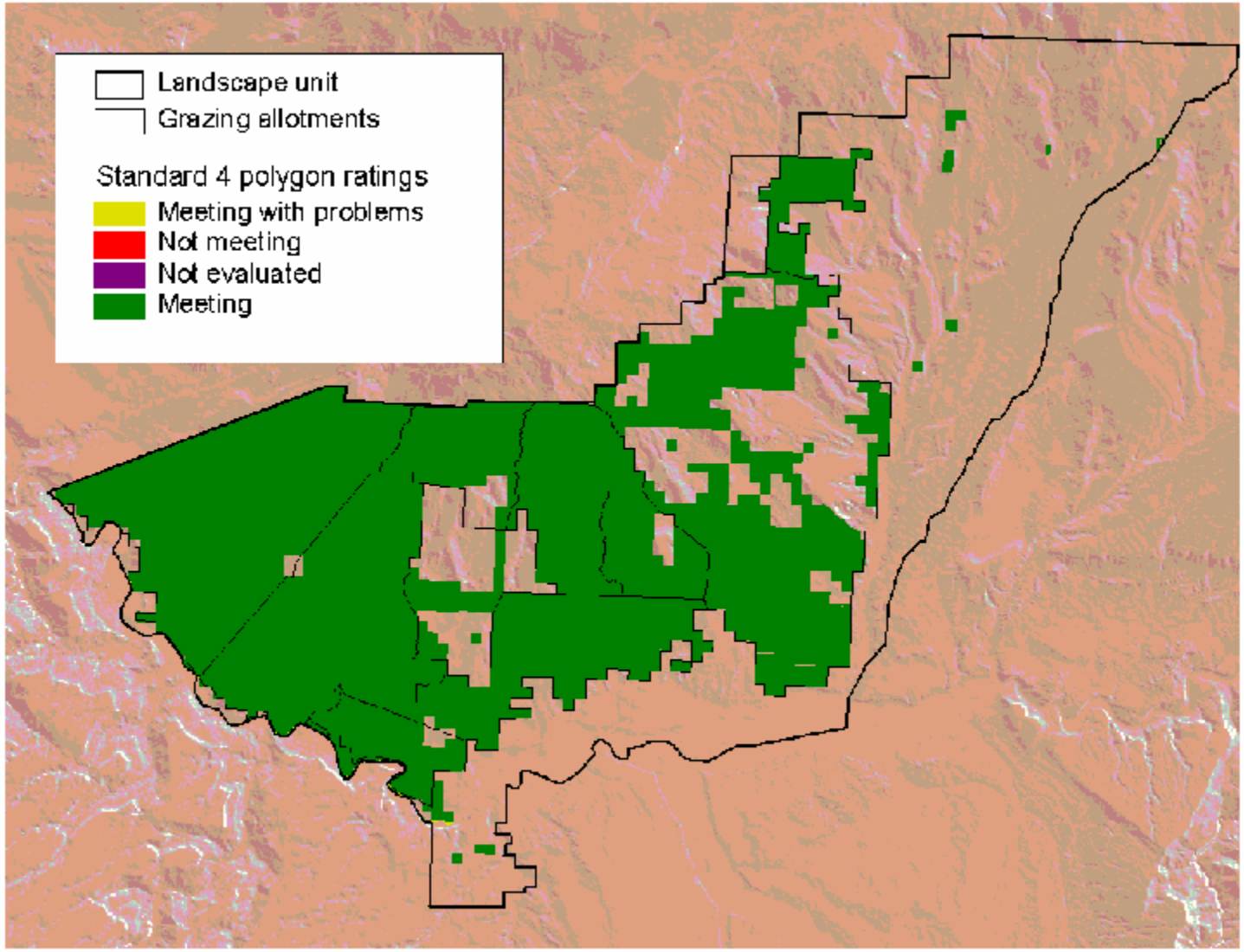
Analysis of indicators:

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, and southwestern willow flycatcher 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. In the case of the Uinta Basin hookless cactus and the endangered fish, changes to habitat within this LHA could have major impacts on the health of the species.

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 (BLM, 2001), and there is not sufficient data to determine if this species was ever present in greater numbers. We do not believe that current management of public lands is having any negative impacts on the potential for this species to occur within the LHA area.

Figure 5.1 North Delta Area Standard 4 ratings.



Although there are a number of rare plants in surrounding areas that could potentially occur within this LHA unit, there are no populations of any BLM sensitive plants known at this time. This LHA unit is very important to the health of the Uinta Basin hookless cactus population in the Gunnison River area. Identified impacts to this species from activities on BLM lands are rare, and the population seems to be doing quite well. Exceptions are those instances where activities that are not specifically authorized by BLM or which are secondary to a permitted activity (sheep bed grounds) may impact local occurrences of this species. USFWS has indicated that the species has met the recovery goals in the recovery plan, and potentially could be delisted. 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. Ample suitable habitat is available for the southwestern willow flycatcher, but we do not know why these sites are not occupied by breeding pairs.

The Colorado pikeminnow and razorback sucker habitat on the lower Gunnison is not optimal for either species. The incision of the channel, stable flows (as a result of upstream dams) and lack of backwater areas and readily flooded floodplain areas all contribute to a reduction in habitat quality for these species. Much of the focus to date on improving the situation for these fish has been on changing the flows in the lower river by management of the flows from the Curecanti project. In addition, BLM should consider some project work to remove depositional levees from backwater areas, and improve the floodplain accessibility for the fish. The Uinta Basin hookless cactus is found reliably on most sites which offer a suitable substrate for them. There are vacant habitats available for this species.

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, it is doubtful that there is any effect from this on flycatcher distribution in the area.

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.

Flow management issues in the lower Gunnison River have contributed to a lack of replacement for the cottonwood galleries along the river. The age of the remaining trees and natural mortality will slowly result in reduced roosting site availability for wintering bald eagles. At this point, BLM management actions have little or no impact on the lack of cottonwood regeneration in the river corridor.

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. 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 proposed sites were identified after being managed for many years 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. Population fluctuations for the Uinta Basin hookless cactus are much more rapid than originally expected, and in some cases significant recruitment events, such as the one in the early nineties near Escalante Creek, result in substantial increases in the number of individuals in the population. Cactus borers and other mortality factors seem to keep this species' populations in a constant state of change. At this time nothing indicates that there are survival or recruitment problems for any of the species considered under Standard #4, except perhaps kit fox. The kit fox genetic isolation from the larger western Colorado/eastern Utah population would require intervention from CDOW to resolve, perhaps by transplanting new individuals into this area from the larger population.

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. Additional factors hindering recovery, include soil compaction, and destruction of the cryptbiotic soil crust, which helps fix nitrogen, bind the soil particles together, and increase surface roughness. The general local perception of the adobes is that there is nothing living there, and its highest use is for a vehicle playground, 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. At the present time, there is no indication that this situation is causing any of the acres in the LHA to fail to meet Standard 4 for listed and sensitive 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. 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. The exception to this is the lack of replacement in the cottonwood galleries along the Gunnison River. In the long term, this will result in a loss of roosting sites along the river and reduction in its value for wintering bald eagles. 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.

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 macroinvertbrates, 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.

Acreage Figures: Stream Miles Evaluated Against Standard 5

	Meeting Standard 5			
Stream Type	**Miles Meeting**	**Miles Meeting but Problem Areas**	**Miles Not Meeting**	**Unknown**
Perennial	**7.0**	**7.9**	**0**	**0**
Intermittent	**9.2**	**0.6**	**0**	**0**
Ephemeral	**34.0**	**11.2**	**0**	**0**
Total	**50.2**	**19.7**	**0**	**0**

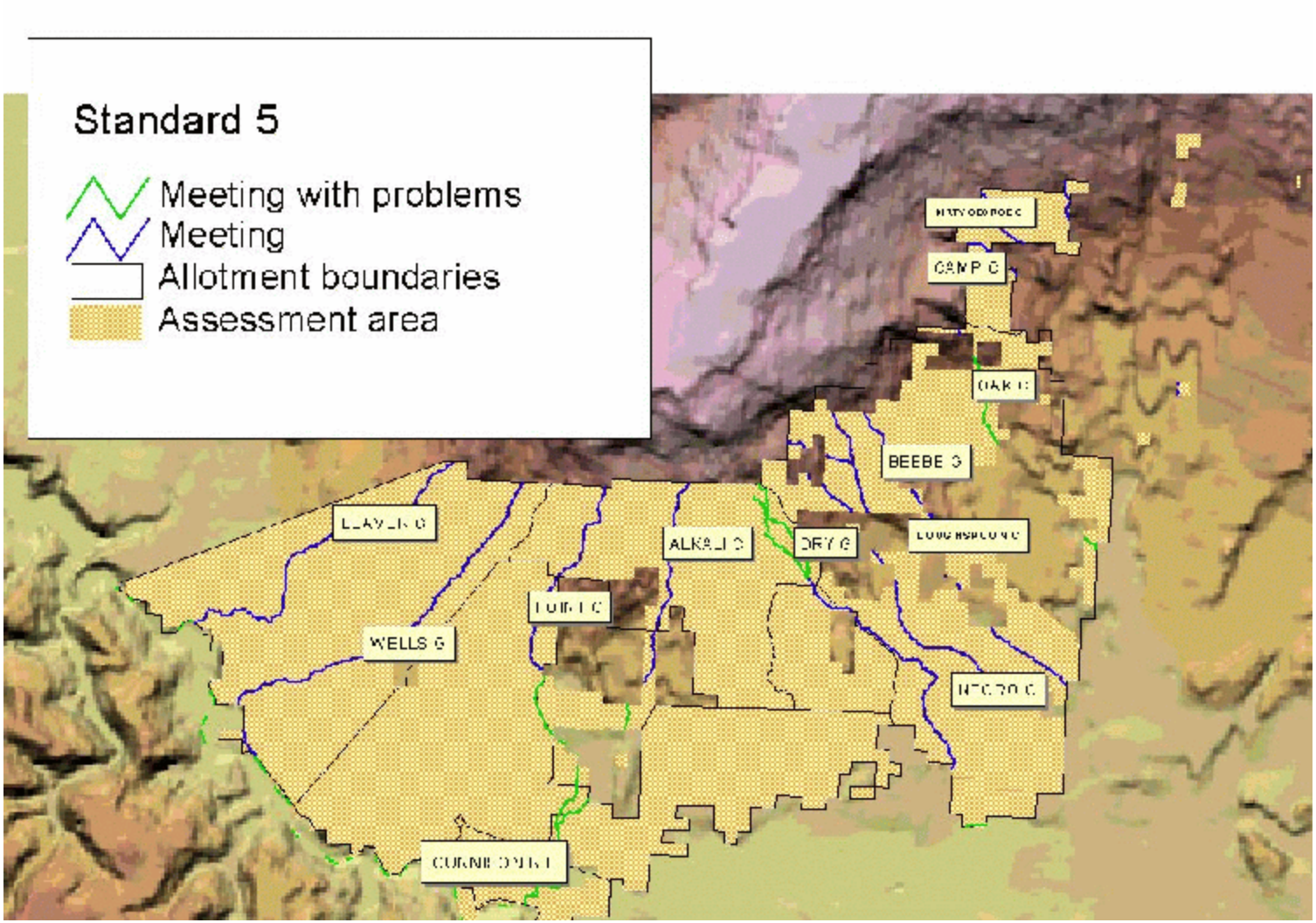
See Figure 6.1

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 that lack protective vegetation and litter cover typically have higher rates of erosion, sediment and salinity production. OHV use on the eastern portion of the landscape unit 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 lower portions of both the Negro and Doughspoon Creek drainages.

Field visits during the year 2001 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. Gunnison River). Because significant runoff events needed to transport sediment and salinity are fairly infrequent, any sediment and salinity conveyed to downstream drainages from the landscape unit would be very episodic. The primary areas exhibiting upland watershed problems that contribute to accelerated sediment and/or salinity production include:

Figure 6.1 North Delta Area Standard 5 ratings.



low basal cover in the southwest and northeast, high bare ground in the southwest and south central, low densities of litter in the south central and east, and areas exhibiting signs of accelerated runoff in the southeast and west central areas. The stream or drainage reaches that pass through these areas were rated as Meeting Standard 5 With Problems, and include the Gunnison River, Alkali Creek, Oak Creek, Point Creek, and Dry Gulch.

Some of the drainages in the east and west-central portions of the landscape unit are incised and have the potential to increase sediment loading to local surface waters (see Figure 6.2). Additionally, some of the same drainages (Beaver Gulch, Point Creek, Alkali Creek, Negro Creek and the lower reaches of Oak Creek) show evidence of excessive salinity yields (Figure 6.3).

The groundwater seepage from golf course operations in the Dry Gulch area, at least in part, appears to be perennial. The drainages surrounding the golf course that receive the groundwater discharge, will fail to meet state water quality standards when the temporary modification ends in 2006, if the condition is not abated. Dry Fork Reservoir north of the golf course is also resulting in some accelerated leaching of salinity and Selenium which could add to the problem of failing to meet water quality standards. In addition to water quality standards, allowing or promoting activities on public land that result in accelerated yields of salinity, fails to meet the intent of the Colorado River Basin Salinity Control Act, which directs the BLM to develop and implement strategies to reduce salinity yields from public lands.

Nutrient and biological pollution from livestock grazing varies considerably with site specific conditions and is highly dependent on the frequency, magnitude and timing of runoff events, watershed condition, number and class of livestock, proximity of livestock to surface water systems, duration of grazing and season of use. Because of the few perennial surface waters in the landscape unit, livestock use was not observed to be causing excessive nutrient loading. The “Recreation 2" Designation on all tributaries to the Gunnison River allows for Fecal coliform concentrations up to 2000 colonies/100 ml, which would be difficult to exceed with the winter sheep grazing, commonly experienced in the landscape unit**.**

Figure 6.2 North Delta Area sedimentation problems and streamflow type.

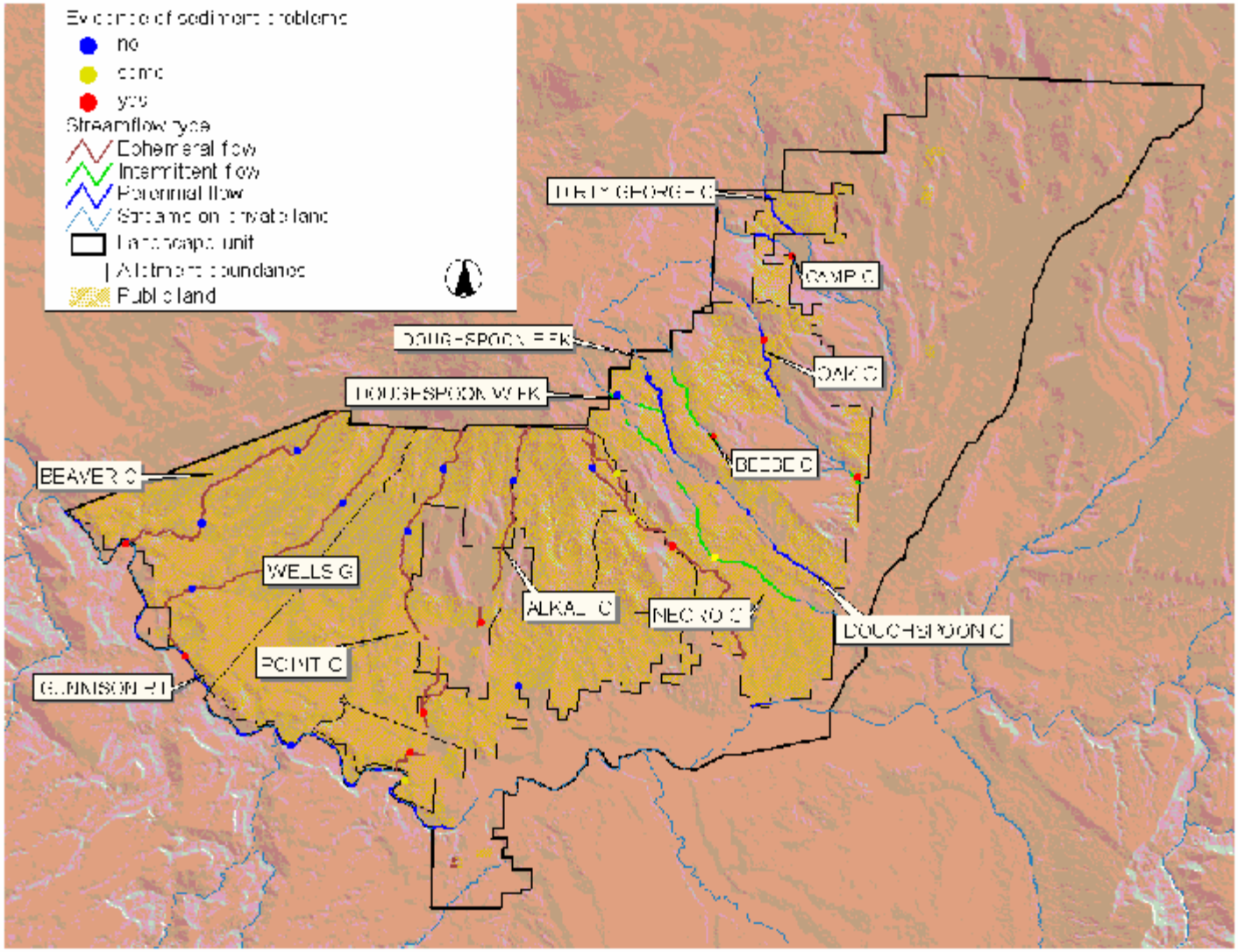
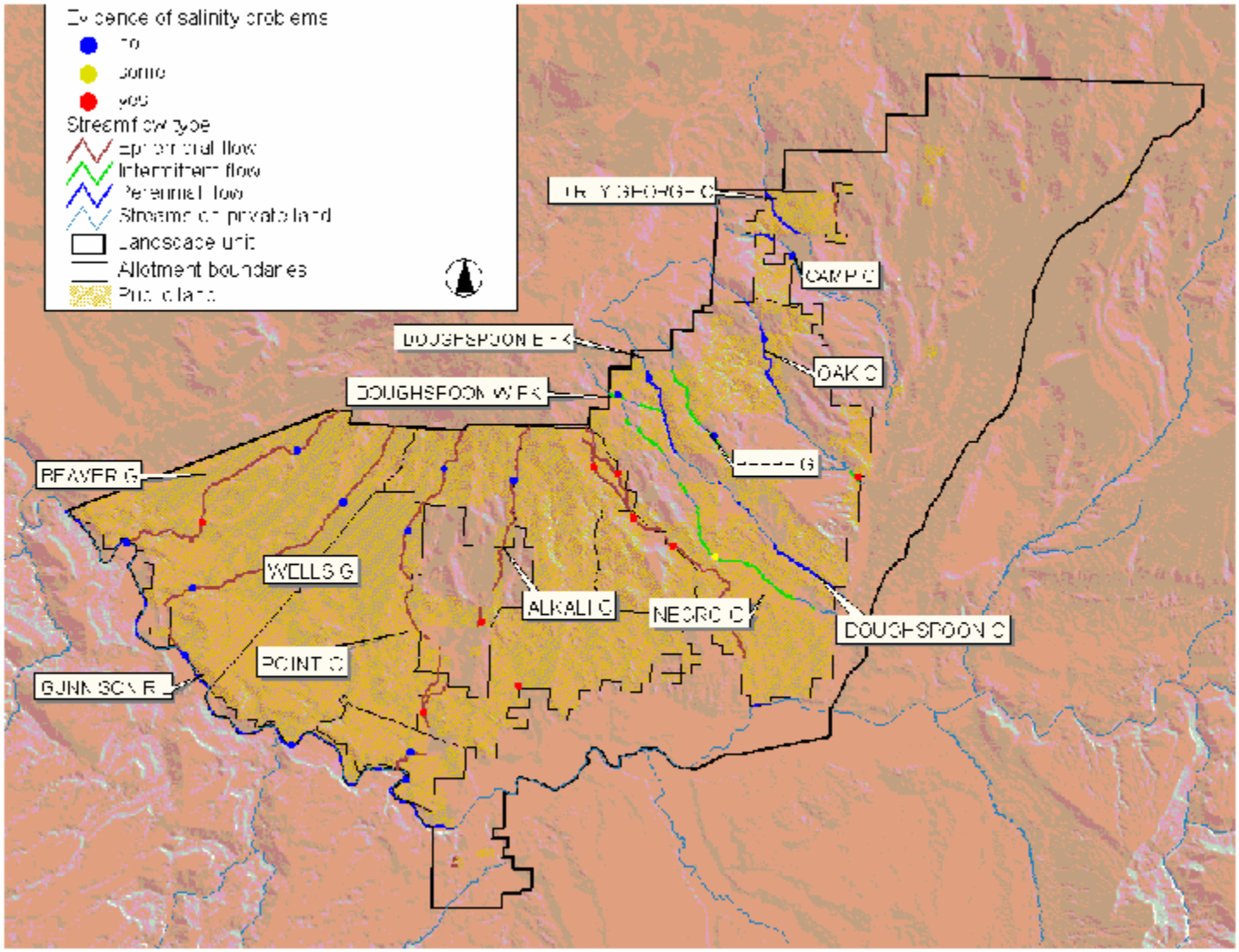


Figure 6.3 North Delta Area salinity problems and streamflow type.



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: The removal of the Ute Indians in the early 1880s' opened the way for large unregulated livestock operations to graze the area. Ranchers had free and unlimited use of unreserved, unappropirated public lands until the Taylor grazing act of 1934. The primary purpose of this act was "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for their orderly use, improvement, and development, to stabilize the livestock industry dependent upon the public range, and for other purposes." Congressman Taylor was a Representative from Grand Junction and he represented the area covered by the assessment. It was no doubt that his first observations of the impact of unregulated livestock grazing on the livestock industry and the vegetation of the area that led to his sponsoring this legislation.

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 (accounts vary widely ranging from 10-100 times the current number), and that the vegetation changed dramatically following the introduction of livestock. The assessment area was once a major stock driveway for domestic sheep moving from summer range near Lake City, Silverton, and Ouray to winter range west of Grand Junction and into eastern Utah. It was not until the passage of the Taylor Grazing Act that the current system of individual grazing allotments was established and implemented. The large mass migrations of sheep to and from the Utah winter ranges to the high elevation summer ranges began to decline as allotments were established and further declined as trucking became an alternative to moving sheep from winter range to lambing areas and to summer range by herding.

Prior to the Taylor Grazing Act areas close to towns typically had heavy winter, spring and fall use by livestock until the middle of the 20th century mostly by small 'farm flocks and herds". This was because these areas were lower elevation and the milder climate allowed wintering livestock to exist without supplemental feeding at all or very limited feeding.

The assessment area was part of a much larger areas that sheep ranged, most likely because of the type of forage and water availability. Montrose was for many years the largest shipping point for lambs to market in the United States. The Uncompahgre Plateau because of its abundant grass, plentiful water, and relatively low elevation was preferred as cattle range.

The interdisciplinary team identified 8,799 acres where historic grazing impacts had contributed to a polygon failing to meet a standard. An additional 42,522 acres were meeting with problems, and historic grazing was cited as contributing to the 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, crowned grass plants, 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 286 acres where the ID team identified current grazing practices as likely to be causing a polygon to fail to meet a standard. An additional 1,106 acres met standards with problems that were related to current grazing.

Roads: Poor road placement, road maintenance, weeds associated with a road, and the increase in travel on roads during wet periods were not identified as contributing to any areas failing to meet a standard, or to meet with problems. However, the fairly recent road inventory for the area showed about ½ of the road segments have instances of gullying, rutting or braiding along them. It can be concluded that while roads do not appear to be affecting soil erosion on the landscape scale, there are some significant site-specific soil losses occurring.

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 1,422 acres meeting standards with problems. There were no polygons that did not meet standards because of fire suppression. 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.

Noxious Weed Infestation: (this includes cheatgrass). Weed dominance, and the competitive nature of the weeds was considered to have caused 4,939 acres to fail to meet a standard, and another 456 acres to meet with problems. Another 5.8 stream miles failed to meet a standard an additional 5.8 miles met Standard 2 with problems because of weed infestations.

Heavy Browsing on Shrubs: Heavy browse utilization caused by grazing animals (wildlife and livestock) contributed to 567 acres meeting a standard 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 4,467 acres meeting a standard with problems. Recreational OHV use occurs most of the year in many of the adobe soil areas, especially in the eastern portion of the landscape unit. Hunting season is the main time of impact for the other areas.
Flow Regulation: The flow regulations imposed by the Aspenall Unit on the Gunnison River have changed the hydrograph along the Lower Gunnison River. Changes in flow may be responsible for much of the nonnative vegetation including saltcedar that occurs along these rivers, and has also contributed to the lack of cottonwood regeneration along the river. Flow regulations were cited as causing 5.8 miles of riparian area to meet Standard 2 with problems. Flow augmentation, which generally results from irrigation practices was suspected to contribute to 5.2 miles failing to meet a standard.

Transco Pipeline*:* This buried, natural gas pipeline traverses the central portion of the North Delta Area. It was constructed and revegetated in 1999. However, the revegetation appears to have failed along much of its length, and weeds – particularly halogeton dominates. The Transco pipeline contributed to 4,792 acres not meeting a standard.

Land Development*:* The development and subsequent irrigation of land underlain with Mancos shale are resulting in deep groundwater percolation and leaching of very high salinity and Selenium concentrations. Commonly, the groundwater associated with land development discharges to the surface off site. In the case of the Devil's Thumb Golf, impacts are occurring on private, county and federally managed lands.

RECOMMENDATIONS

Standard 1 Soils:
In areas with elevated bare soil levels, leave more plant litter on the soil surface. Limit grazing utilization during the dormant season to 50% use on palatable species.

In areas with low plant basal cover, minimize grazing impacts to plants during periods when the grasses are actively growing. Prevent grazing on regrowth by limiting time of use to 2 weeks or less in a given pasture or grazing area. Minimize instances where livestock graze the same areas in both spring and fall seasons. Provide for occasional, year-long rest.

Finalize the North Delta Area road map. Identify the eroding road segments for the North Delta LHA area. Combine this map with a map of high erosion risk areas to identify and prioritize areas for road maintenance and management. This action should adequately address the recreational impacts observed.

Use the range project inventory information in combination with the map of high erosion risk areas to identify projects contributing to increased erosion. Identify and implement corrective measures for project maintenance, management, or deconstruction.

We need to continue to monitor the rehab effort on the Transco Pipeline, and ensure that follow-up rehab is carried out where needed. In many areas, perennial vegetation has not been adequately established, and the soil is vulnerable to erosion.

We need to re-introduce fire, (or simulate its effects) in the pinyon and juniper upland sites as well as those areas immediately below the pinyon sites. These sites are losing herbaceous vegetation cover, with associated reductions in plant basal cover and long term loss of site stability and maintenance of the soil resource.

In seriously degraded depositional areas in the Mancos shales, implement vegetation restoration activities. Use restoration strategies developed in the Gunnison Gorge NCA Mancos areas.

Standard 2 Riparian:
Continue negotiations with the Park Service on the Upper Gunnison flow and water right. High flows during some years at the time of spring runoff should improve habitat for native riparian vegetation, and reduce some of the tamarisk and knapweed.

Continue to work on the control of tamarisk and knapweed throughout the LHA area, using the weed inventory map to target areas for treatment.

Prevent additional damage to existing native riparian species by limiting grazing use on willows to 30% where grazing is found to exceed that level. Reducing stress on willows should make them more competitive with tamarisk.

Revisit Negro Creek and Oak Creek to determine why they are not functional.

Standard 3 Healthy Native Communities:
Improve perennial grass, cool season grass and forb cover by adjusting livestock grazing where it is a contributing factor. During the growing season, prevent grazing on regrowth through limiting time of use to 2 weeks or less in a given pasture or grazing area. Minimize instances where livestock graze the same areas in both spring and fall seasons. Provide for occasional, year-long rest.

Improve perennial grass, cool season grass and forb cover, shrub vigor and vegetation mosaic by reintroducing fire, or simulating its effect in the pinyon-juniper zone as well as those areas immediately below this zone. The overall zone is losing vegetative and habitat diversity as plant successional stages mature in the absence of fire. Efforts should focus on the C3 and C5 Fire Management Plan polygons, and be planned to meet the objectives for these polygons. Reseed fires and similar disturbances with native, adapted species where threat of weed invasion is likely, or native community is depleted.

Continue to work on the control of tamarisk and other noxious weeds throughout the LHA area using the weed inventory map to target areas for treatment.

Finalize the North Delta Area road map. Use this to identify unnecessary roads for grazing management and recreational access such as hunting, in order to reduce the spread and abundance of halogeton and cheatgrass in Mancos shale soils and those areas affected by saline soils.

Continue to monitor the re-seeding effort on the Transco Pipeline, and ensure that follow-up revegetation is carried out where needed. Currently, it is a continual source of halogeton seed for the area. All uses in the area should be analyzed for their impact on the success of the seeding, and accordingly managed.

Develop a vegetation re-seeding strategy for future surface disturbing activities that would be utilized in future ROW grants. Base this strategy on restoration research plots in the Gunnison Gorge NCA.

In seriously degraded depositional areas in the Mancos shales, implement vegetation restoration activities. Use restoration strategies developed in the Gunnison Gorge NCA Mancos areas.

Investigate shadscale vigor issue. Determine if it is a natural phenomenon which the plant community can accommodate and recover from. If necessary, recommend management actions.

Work with DOW and CDOT to monitor impacts of highway widening and development of private land on pronghorn population. Mitigate impacts where possible via ROW stipulations or habitat improvement.

Standard 4 Special Status Species:
Work with DOW to improve information on status of prairie dog, burrowing owl, and kit fox in the area. If necessary, recommend management actions to improve habitat for these species.

Continue to work with the Bureau of Reclamation, Colorado Division of Wildlife, and U.S. Fish and Wildlife Service to enhance habitat conditions for the listed fish, and replacement of cottonwood galleries on the lower Gunnison River.

Consider amending the Uncompahgre Basin Resource Management Plan to include special designations for the CNHP Potential Conservation Areas.

In order to preclude impacts to Uinta Basin hookless cactus, identify those areas where sheep camps/bed grounds should not be established, and impart that information to the livestock permittees who graze in the cactus habitat areas.

Standard 5 Water Quality:
Abandon and reclaim the Dry Fork Reservoir and all associated diversion structures. Inventory other water structures as to their contribution to selenium and salinity, and make necessary reclamation.

Assess condition of all in-channel structures, primarily the many earthen check dams installed in the 1960and 70's, for possible contribution of sediment and salinity to local drainages, and repair/reclaim as necessary.

Work through the Gunnison Basin Selenium Task Force to promote reducing accelerated yields of Selenium such as that occurring from the deep percolation associated with the Devil’s Thumb Golf Course.

Assess OHV use areas in the eastern portion of the landscape area for causing excessive yields of either erosion or salinity and take corrective action.

Implement management strategies to maintain or increase basal vegetation cover on Mancos shale derived soils to achieve targets appropriate for the range site. Maintaining appropriate densities of basal cover would help to minimize soil surface erosion, reducing the diffuse source yields of salinity, Selenium, and sediment.

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