North Fork Land Health Assessment
2006-2007

Uncompahgre Field Office - B.L.M.

Land Health Assessment
North Fork Area, 2006-2007

SUMMARY

This land health assessment evaluated over 65,000 acres of public land. The evaluation resulted in a determination of the acreage meeting Colorado BLM's Rangeland Health Standards, the acreage not meeting, and the nature and location of the problems on the landscape. A small amount of the landscape 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 and chart show 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 Or N/A**
44,730 (68%)	16,974 (26%)	4,421 (6%)
Stream Miles Meeting Standards 2&5	**Stream Miles Not Meeting Standards 2&5**	**Stream Miles Unknown or N/A**
52.4 (89%)	4.5 (8%)	2.1 (3%)

In order to make the above determination, the North Fork 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 or N/A**
Standard 1-Soils (acres)	31,833 (48%)	28,399(43%)	1,472 (2%)	4,421 (7%)
Standard 2-Riparian (miles)	39.1 (79%)	5.9 (12%)	2.6 (5%)	2.1 (4%)
Standard 3-Healthy Communities (acres)	18,905 (29%)	27,200 (41%)	15,598 (24%)	4,421 (6%)
Standard 4-T&E Species (acres)	55,562 (84%)	3,744 (6%)	6,819 (10%)	521 (<1%)
Standard 5-Water Quality (miles)	43.2 (74%)	13.8 (23%)	1.9 (3%)	0 (0%)

The North Fork Land Health Assessment should serve as BLM's foundation for managing lands in the unit so that health standards are met. To this end, the results of this assessment will be used in the livestock grazing permit renewal process, for Resource Management Plan revision, and as a basis for Budget and Planning System projects ranging from travel management to weed control, to prairie dog colony mapping.

Major Land Health Problems

Standard 1 Soils: Soils across a large part of the area met Standard 1 with no problems. A slightly smaller area had some soil problems, but still met Standard 1, while less than 2% of the area did not meet this standard. Soil erosion was clearly accelerated above natural levels in only a few areas. However, many areas were vulnerable to soil erosion because of low cover of plant litter protecting the soil surface, and high amounts of bare soil. Low plant basal area—which is another important factor for stabilizing soils-- showed localized problems.

Standard 2 Riparian Areas: The majority of stream miles fully met this standard, and exhibited healthy riparian vegetation, and normal channel morphology and hydrologic processes. Around 17% of streams had some riparian vegetation or channel problems ranging from minor to significant, and mostly related to altered flow stemming from the North Fork Valley's extensive water management systems.

Standard 3 Healthy Native Communities: A minority of areas fully met this standard. A little over 40% of the unit had minor problems, and about 24% of the unit had significant problems. The most common problems involved prevalence of exotic plant species and noxious weeds throughout much of the area. Cheat grass was a particularly widespread exotic species in the LHA area. Other significant problems included a lack of perennial forbs, and low levels of cool season grasses. Problems with the existing vegetation mosaic are present in many parts of the unit as well.

Standard 4 Special Status Species: The majority of upland areas met this standard with no problems identified. There were several problem areas for sensitive plant species identified, mostly at lower elevations and in riparian habitat. There was inadequate data for some sensitive species—particularly animals--and recommendations are made to address this data gap.

Standard 5 Water Quality: The majority of streams in the unit and the watersheds they drain met this standard. However, some stream segments failed to meet this standard because the surrounding watersheds had multiple problems with soil erosion, high levels of bare soil and poor vegetation cover. Such watersheds are vulnerable to accelerated erosion and associated sedimentation of waterways.

Recommendations (note that these are paraphrased from the detailed recommendations made at the end of this report.)

Standard 1 Soils

Implement grazing practices that leave more litter on the soil surface, prevent grazing on regrowth by limiting time of use to 2 weeks or less, and minimize instances where livestock graze the same areas in both the spring and fall seasons. Provide for occasional, year-long rest.

Develop complete road map, use GIS to identify road-caused soil loss, and use to direct road maintenance and rehab areas so that road and travel related erosion is reduced. Enforce travel on existing routes as identified in the North Fork Travel Plan, pursue route designation to further limit road-related damage to soils.

Reduce erosion by identifying and maintaining or decommissioning eroding range projects.

Re-introduce fire or simulate its effects on some sites that are losing herbaceous vegetation cover so that communities with more herbaceous plants and higher plant basal area can be established.

Reseed erosion-prone disturbances such as natural fires.

Investigate cheatgrass control options, experiment with different methods, use the Stucker Mesa burn as a study site.

Implement monitoring system that will address trends in soils indicators.

Ensure mitigation to reduce mine-related soil impacts is fully implemented.

Standard 2 Riparian

Acquire updated instream flow and water rights map. Identify stream segments still needing protection. Develop instream flow recommendations to ensure all perennial and intermittent streams have some flow protected.

Continue and increase weed management in riparian zones, work in coordination the counties and Forest Service. Establish and follow strategic weed management plans for efficient use of weed control resources.

Reduce grazing use on native riparian woody species to 30%. Limit livestock utilization of woody riparian plant communities during the fall and winter periods.

Implement a monitoring system that will address trends in riparian indicators.

Standard 3 Native Plant and Animal Communities

Implement grazing practices that improve perennial grass, cool season grass and forb cover by limiting time of use to 2 weeks during the active growing season, minimize instances where livestock graze the same areas in both spring and fall seasons, and provide for occasional, year-long rest.

Continue support of the native seed development project. Whenever possible, use seeds from this project to reseed fires and similar disturbances with native, adapted species where threat of weed invasion is likely, or the native community is depleted.

Improve perennial grass, cool season grass and forb cover, shrub vigor and vegetation mosaic by reintroducing fire, or simulating its effect consistent with the mosaic objectives in the UFO Fire Management Plan.

Increase knowledge of small mammals, herptiles, birds, and predators, their habitat needs and the existing condition of their habitats.

Support neotropical migratory birds by improving and maintaining riparian and oakbrush habitat, supporting the Breeding Bird Survey, and following best management practices.

Work with the Colorado Division of Wildlife through their Habitat Partnership Program and private landowners (individually and through Natural Resource Conservation Service) to

encourage participation in habitat improvement programs.

Increase weed management activities across the unit; work in coordination with the counties and Forest Service to develop and follow strategic plans.

Restore seriously degraded plant communities.

Consider amending the Uncompahgre Basin Resource Management Plan to evaluate special designations for CNHP, TNC or SREP Potential Conservation Areas, biodiversity conservation areas or wildlife movement corridors.

Develop complete road map, use GIS to identify road-related habitat and weed problems, and use to direct road maintenance and rehab areas. Enforce travel on existing routes as identified in the North Fork Travel Plan, pursue route designation to further limit road-related damage to native communities.

Implement a monitoring system that will address trends in native community indicators.

Standard 4 Special Status Species:
Improve monitoring and inventory data for prairie dog colonies, yellow-billed cuckoo, Rocky Mountain thistle, Colorado desert parsley, and Uintah Basin hookless cactus.

Work with partners to develop improved monitoring methodologies and best management practices for sensitive species in the LHA area.

Continue to assess the potential for increasing the amount of suitable habitat within the unit for reintroduction and expansion of Gunnison sage grouse populations.

Consider amending the Uncompahgre Basin Resource Management Plan to evaluate special designations for CNHP, TNC or SREP Potential Conservation Areas, biodiversity conservation areas or wildlife movement corridors.

Enhance the management of those streams that are functioning at risk in order to improve habitat conditions for sensitive fish species (see recommendations for Standard 2.)

Standard 5 Water Quality:
Improve upland plant basal cover and reduce levels of bare soil through improving management of grazing, travel, etc.

Perform road maintenance and/or closures on roads, trails and range projects identified with drainage or erosion problems.

Assess identified incised channel systems as to their stage of development and causal factors, and implement corrective actions, if appropriate.

Reseed burns and consider mulching, rollerchopping, or hydroaxing of burned areas that are prone to accelerated sediment production where existing vegetation or rock is unlikely to stabilize the site, or if the invasion of cheatgrass is a threat.

Continue to assess the condition of stream and riverine environments to identify potential impacts to water quality. Additionally, pursue instream flow recommendations to the state of Colorado on streams needing flow protection to sustain flow-related resource values.

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Land Health Assessment
North Fork Area, 2006-2007

INTRODUCTION

Overview

The North Fork Land Health Assessment (LHA) area is located in Delta and eastern Gunnison Counties in west-central Colorado (Figure 1.1). The LHA area is primarily centered around the North Fork Valley and the North Fork of the Gunnison River. It extends from the Muddy Creek Drainage along Colorado Highway 133 south and west to Redlands Mesa and the Surface Creek Drainage. At higher elevations, the LHA area is bounded on the north and west by the Grand Mesa National Forest, and on the east by the White River and Gunnison National Forests. To the west, the unit is bounded by Colorado Highway 65, and to the south, by the Smith Fork Drainage (see Figure 1.2). Towns in the area include Paonia, Hotchkiss and Crawford. The unit encompasses nearly 275,000 acres within its boundary, and is made up of parts of eight Level 5 watersheds: Anthracite Creek, East Muddy Creek, West Muddy Creek, Hubbard Creek, North Fork Gunnison River, Leroux/Cottonwood Creeks, Tongue/Currant Creeks, and Smith Fork/Crawford Reservoir. The unit was identified in 1998, prior to the directive to base units on fifth order watershed boundaries. However, it is centered in the northeastern part of the Uncompahgre Field office, and largely fits within the North Fork of the Gunnison Watershed--thereby forming a large and cohesive landscape "chunk".

Land Ownership Pattern

The North Fork Land Health Assessment boundary encompasses about 275,000 acres of which 66,124 acres are public land. These public lands are distributed across the area in dispersed blocks and several isolated parcels. The BLM is broken up by large areas of private land which are mainly concentrated where soils and topography are suitable for agriculture or ranching. National Forest Lands occupy most of the higher elevation areas (see Fig.1.2).

BLM Resource Management Plan Guidance

All public lands in the unit are covered by the Uncompahgre Basin Resource Management Plan (RMP), as shown in Figure. 1.3. The area falls into seven main RMP management emphasis units. The largest emphasis unit in the LHA area is mule deer and elk winter habitat. Coal development is the primary emphasis behind much of the BLM land in the north central part of the LHA area. Many of the isolated BLM tracts which are difficult to access fall into the general management unit. There are smaller, specific areas set aside for management to reduce salinity on Mancos shale between Hotchkiss and Crawford; the area around Young's Peak is identified as a forestry emphasis (firewood) unit; and three major drainages coming off Grand Mesa are singled out as riparian emphasis units. The small area around Needle Rock—an ancient volcanic plug—is identified as the Needle Rock Outstanding Natural Area.

Grazing Allotments

There are 39 grazing allotments in the unit that contain public land (See Figure 1.4, and Table 1.1). Fifteen of these are almost entirely made up of public land: Dry Creek, West Roatcap, Juniper Knob, Stingley Gulch, East Roatcap Individual, Young's Peak, Milk Creek, Wilbanks, Oak Ridge Common, Fire Mountain Canal, Coal Gulch, Reynolds/McDonald, Aspen Ditch, McDonald Creek, and Leroux. Seventeen allotments have significant proportions of public land but also contain more than 10% private land: Hubbard Creek, Jumbo Mountain, Stevens Gulch Common, Leroux Creek, South Dry Creek, Roatcap/Jay Creek, Upper Terror

Figure 1.1 North Fork LHA general location map.

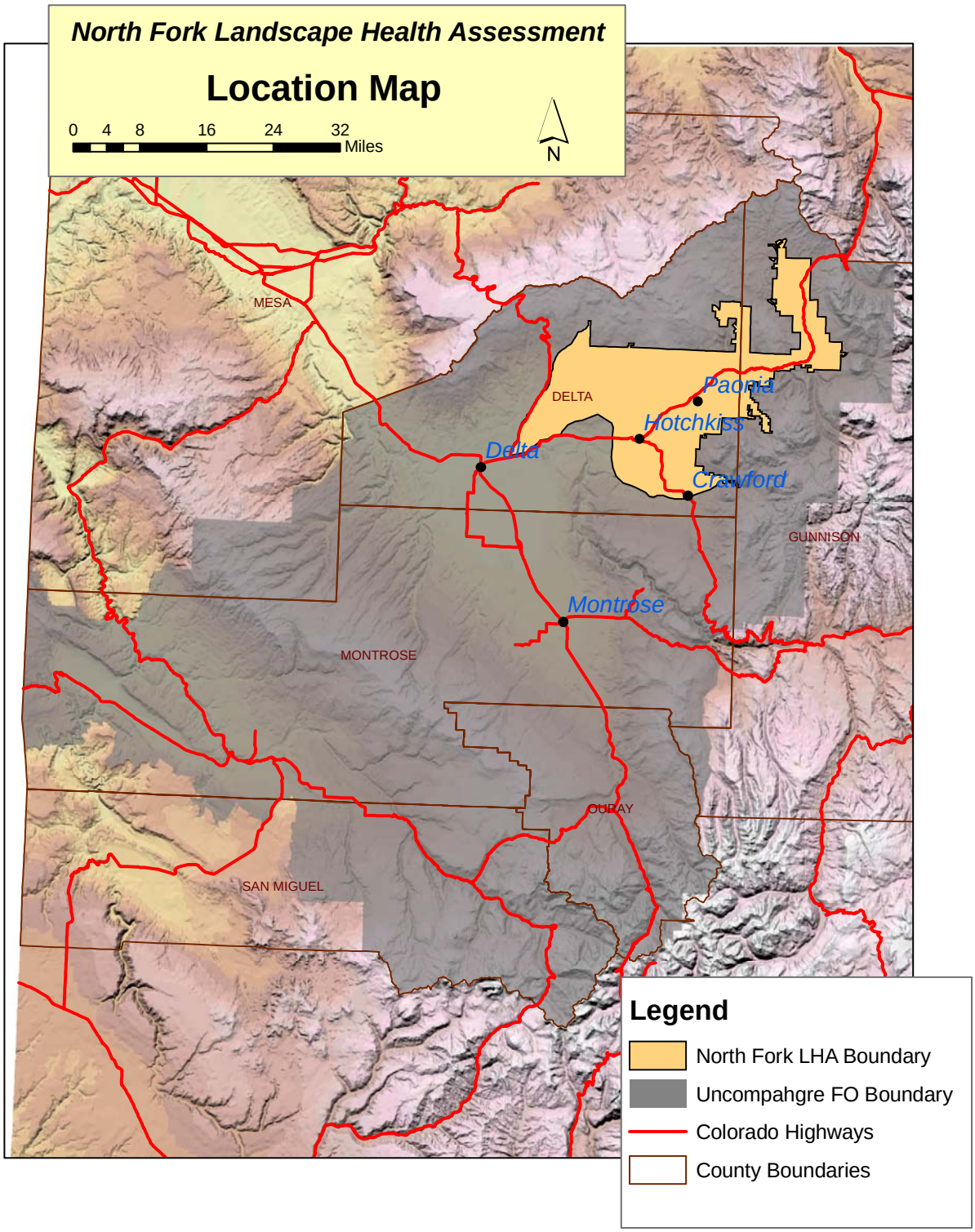


Figure1.2 North Fork LHA land ownership.

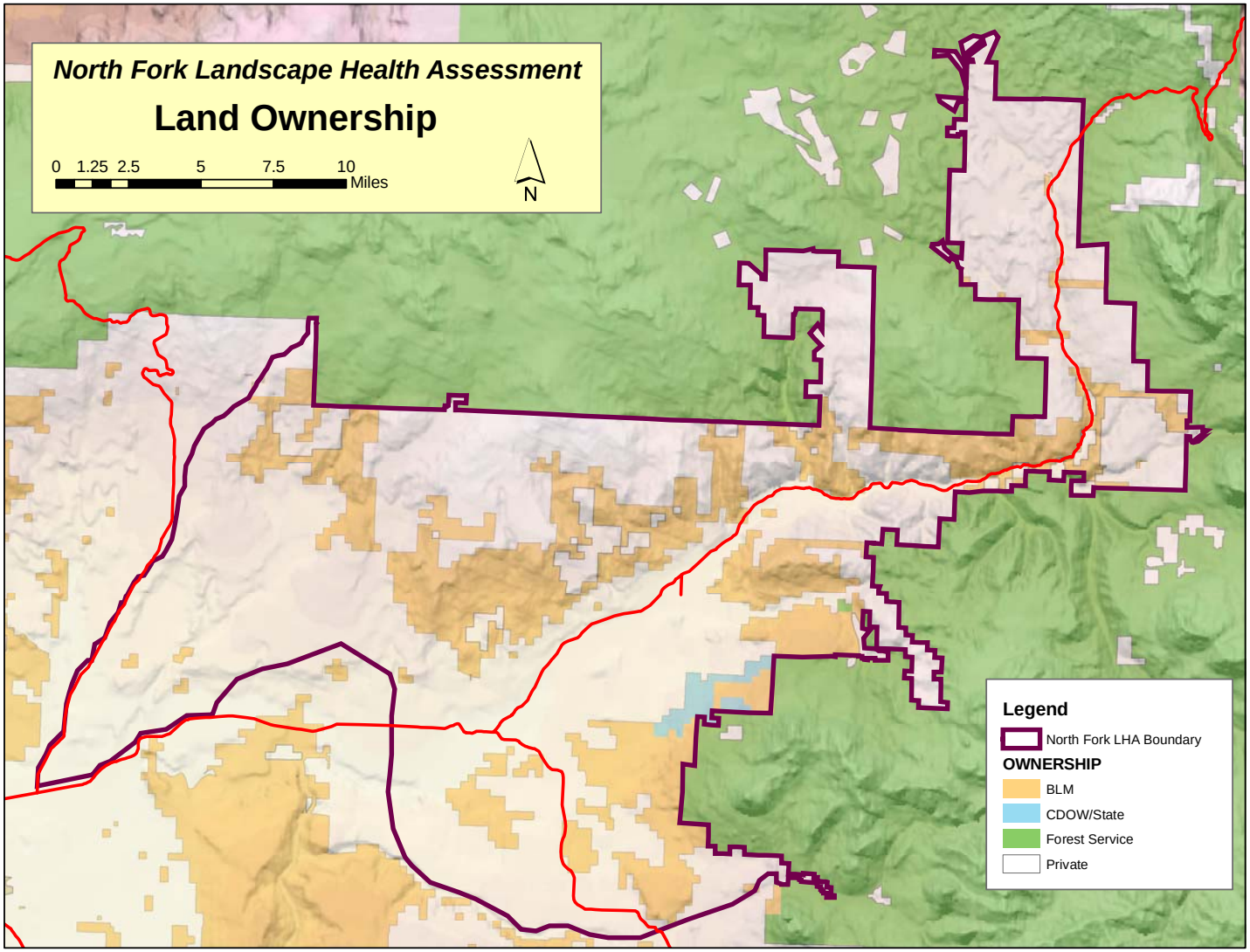


Figure 1.3 North Fork LHA land management designations from the Uncompahgre Basin Resource Management Plan.

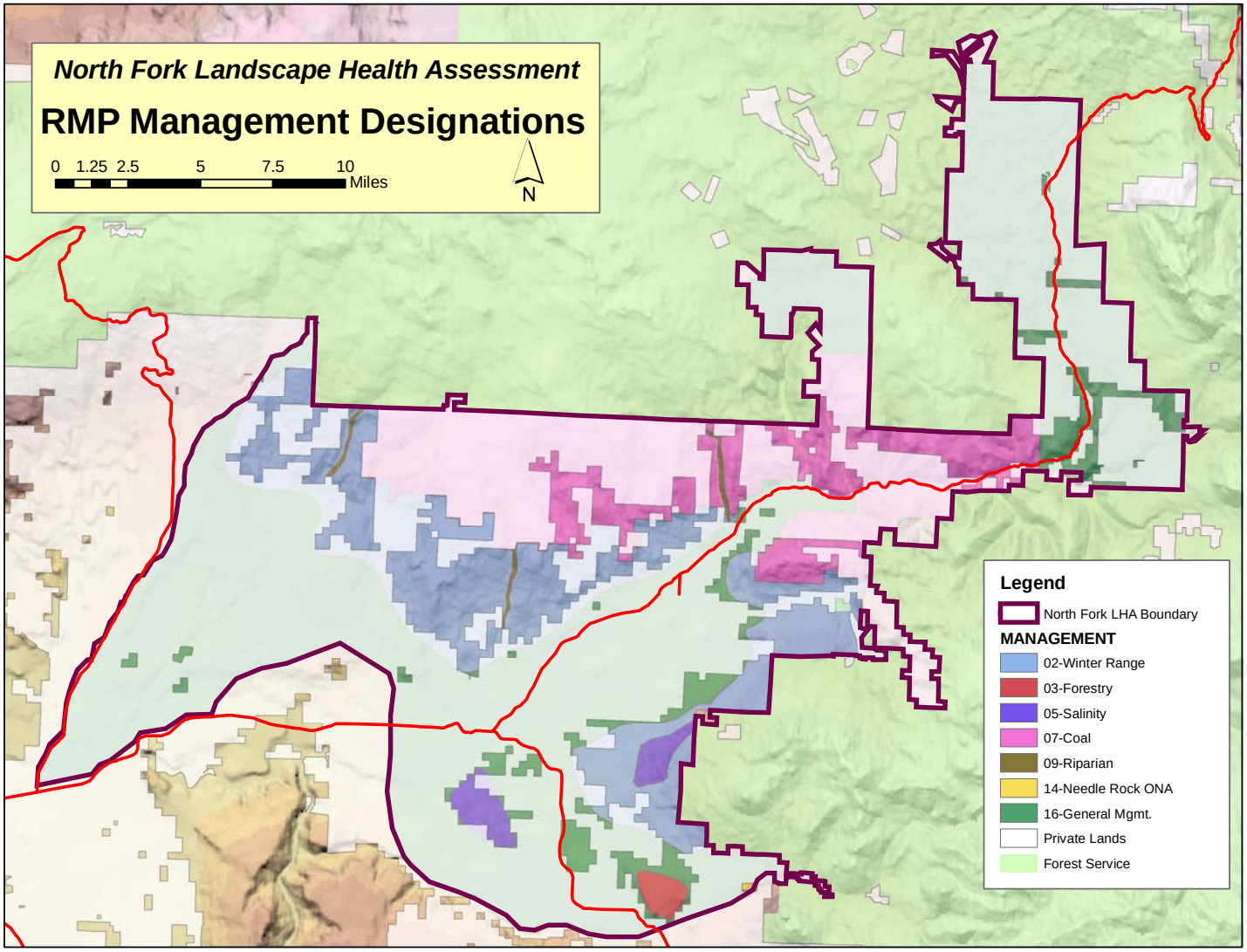
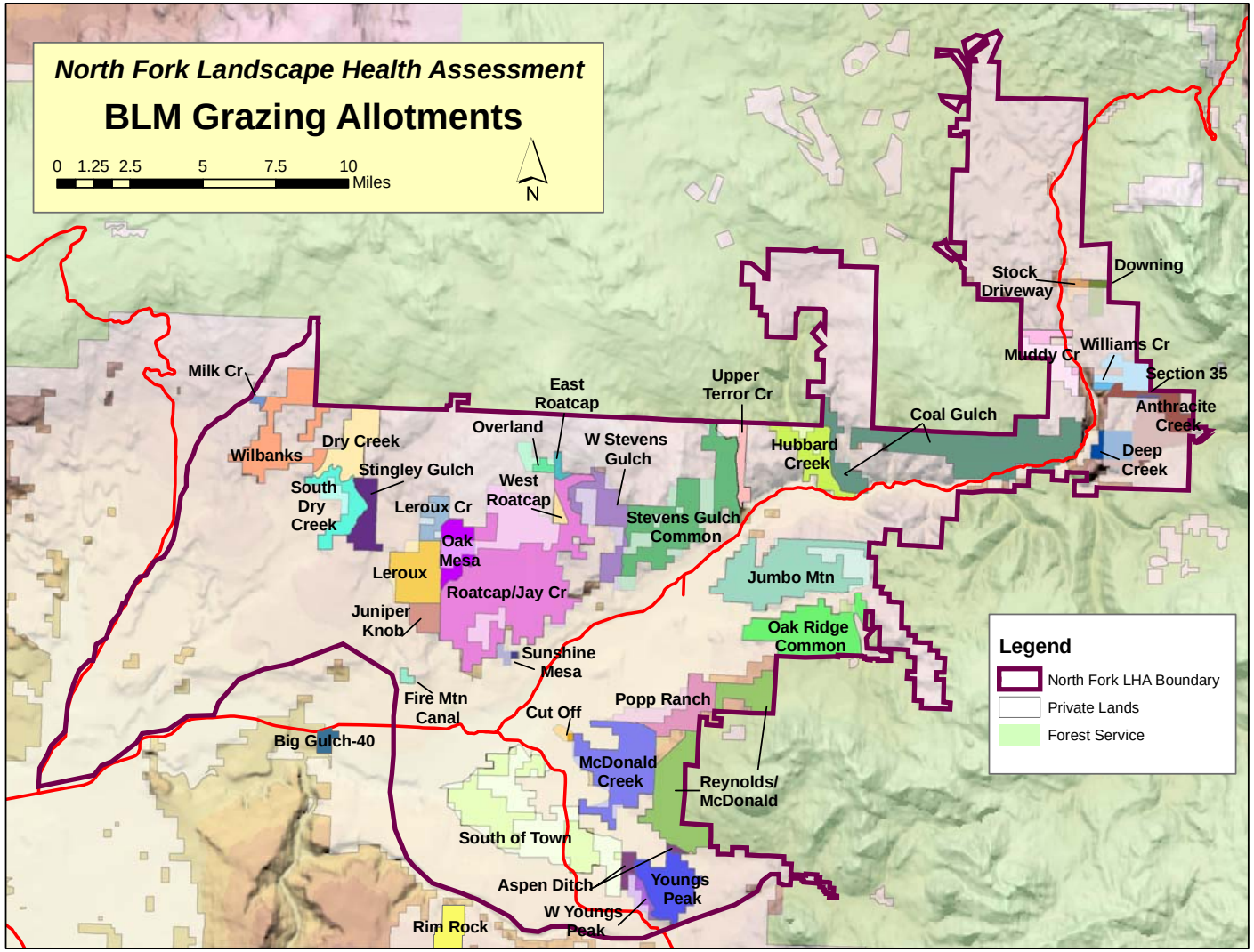


Figure 1.4 North Fork LHA Area grazing allotment boundaries. Private portions of allotments appear as tinted white, unalloted BLM as brown.



Creek, West Stevens Gulch, Oak Mesa, Section 35, South of Town, West Young's Peak, Anthracite Creek, Stock Driveway, Overland, Muddy Creek, and Downing. The remaining allotments have less than 25% public land in them. These include Deep Creek, Cut Off, Sunshine Mesa, and Williams Creek. Two additional allotments are included in this LHA write-up, although they are located within the Gunnison Gorge LHA boundary. These are Rim Rock and Big Gulch-40. Both of these are made up of more than 75% private land. The allotments are grazed by cattle or sheep.

Table 1.1 Grazing Allotments and Management.

Allotment Name and Number	**Class**	**Season**	**Comments**
Jumbo Mountain #14527	Cattle	Summer	MOU with USFS for grazing management
Aspen Ditch #14551	Sheep	Fall	
Hubbard Creek #14516	Sheep	Spring	
McDonald Creek #14532	Sheep	Winter	
South of Town #14534	Sheep	Spring	Range Readiness required on permit due to soil instability and salinity
Big Gulch–40 #05036	Sheep	Spring	
Juniper Knob #14505	Cattle	Spring	
Fire Mountain Canal #14508	Cattle	Spring & Fall	
Williams Creek #14523	Cattle	Summer	
Reynolds – McDonald #14530	Cattle	Summer	MOU with USFS for grazing management
Cut Off #05052	Cattle	Spring	
Wilbanks #14502	Cattle	Spring	Fire rehabilitation-seeding in 2004
Stevens Gulch Common #14513	Cattle	Spring	Proposed WUI Fuels Treatments
Upper Terror Creek #14514	Cattle	Summer	Proposed WUI Fuels Treatments
Coal Gulch #14517	Sheep	Spring – Summer	
Muddy Creek #14519	Sheep	Spring – Summer	
West Stevens Gulch #14515	Cattle	Summer	Partial use of permit under Voluntary Non-use Agreement
Oak Ridge Common #14528	Cattle	Summer	MOU with USFS for grazing management
Deep Creek #14524	Cattle	Summer	
Anthracite Creek #14525	Cattle	Summer	

Allotment Name and Number	Class	Season	Comments
Section 35 #14547	Cattle	Summer	
Milk Creek #14544	Cattle	Spring	
Sunshine Mesa #14541	Cattle	Spring	Permittee has been taking non-use for 10 or more years. Livestock fence and suitability issues.
Stingley Gulch #14503	Cattle	Spring	Only periodic use due to access, water, and suitability problems.
Roatcap-Jay Creek #14507	Cattle	Spring & Fall	Large allotment with livestock distribution problems and limited water. Contains a portion of Wake Fire.
Oak Mesa #14506	Cattle	Summer	Multi-pasture rotational grazing
Stock Driveway #14521	Cattle	Summer	
Popp Ranch #14531	Cattle	Spring	Management Agreement with CDOW for grazing
West Roatcap #14510	Cattle	Summer	
West Youngs Peak #14536	Cattle	Spring	
Youngs Peak #14537	Cattle	Spring	
Overland #14511	Cattle	Summer	
East Roatcap #14512	Cattle	Summer	
Leroux Creek #14504	Cattle	Spring	
Leroux #14550	Cattle	Spring	
Dry Creek #14549	Cattle	Summer	
South Dry Creek #14548	Cattle	Spring	
Downing #05541	Cattle	Summer	
Rim Rock #05051	Cattle	Spring	Current non-use in this allotment

Landform and Topography

Elevations range between 5,500 feet in the western part of the unit near the town of Eckert to 8,400 feet at the north central part of the unit (Figure 1.5). The North Fork of the Gunnison River has carved the large North Fork Valley which characterizes this unit. The valley is located between the southeastern part of Grand Mesa to the north, and the Raggeds and West Elk Mountains to the East. Smaller mesas, including Oak, Redlands, Cedar and Buck Mesa tier off of Grand Mesa and make up significant parts of the LHA area (Figure 1.6). Jumbo Mountain, Bone Mesa, Lamborn Mesa and Young's Peak are major landforms south of the North Fork River.

Geology

The LHA is located on the northeastern part of the Colorado Plateau physiographic province and is at the southern edge of the Piceance Basin, an intermountain basin that was formed in the Late Cretaceous through Tertiary time. The basin is bounded on the south and southwest by the Uncompahgre Uplift. The area is typical of Colorado Plateau geology: gently dipping sedimentary rocks, altitudes exceeding 5,000 feet, the climate is semi-arid to arid,

erosion has produced innumerable escarpments and structural benches and relief is the result of the incision of deep canyons below moderately flat terrain.

The primary formations that outcrop in the area are Tertiary and Cretaceous sedimentary formations. The formations dip 4 to 6 degrees to the north into Piceance Basin. Overlying the formations are surficial deposits consisting of quaternary alluvium, colluvium, mudflow and landslide deposits. The Cretaceous rocks consist of the Mancos Shale and the Mesaverde Formations. The Tertiary rocks consist of the Wasatch formation and intrusive dikes, sills and laccoliths. The Cretaceous rocks were deposited in marine and continental depositional environments. The coal-bearing rocks of the Mesaverde Formation largely were deposited in a coastal plain – deltaic setting. The Tertiary sedimentary rocks were deposited in fluvial (stream) and lacustrine (lake) settings. The Quaternary unconsolidated deposits include material deposited by streams, including material that was eroded and transported through mass wasting by landslides and debris flows. These deposits are composed of clay, silt, sand, gravel, and boulders including basalt boulders from the Grand Mesa. There are also gravel deposits of glacial outwash materials that were deposited by Pleistocene (Ice Age) glaciers.

Geologic hazards include landslides, rock falls, debris flows, soil creep, and slumping of large blocks of material. Areas susceptible to landslides include steep slopes, saturated soils and mesas that are capped with resistant rock that overlie weaker, more easily erodible rocks.

A portion of the LHA lies in the Paonia-Somerset coal field which contains deposits of high quality coal and three operating coal mines. The main coal beds within this area are found in the Upper Cretaceous Mesa Verde Formation. Natural gas has been found in the Tertiary Wasatch, Mesaverde, and Mancos Shale formations. Other mineral resources in the LHA are sand and gravel, dimension stone and clay.

Soils

Soils on public lands in the LHA area reflect the diverse geology and climate of the area. The soils are described in detail in the Paonia Soil Survey (UDSA, SCS 1981). The soil units in the LHA area are listed and briefly described in Table 1.2 and are shown in Figure 1.8. The soils at the lower elevations of the LHA area are primarily those classified in the orders of Aridisols and Entisols. These soils have limited development from their parent material due to low climatic intensity, and have a limited potential for plant establishment and growth. At the higher elevations of the LHA area the soils are in the orders of Mollisols and Alfisols. These soils have a higher degree of development with distinct horizons in the soil profile. Surface soil horizons are typically darkened by accumulations of organic matter. The potential for vegetation production on these higher elevation soils is much greater than the lower elevation soils.

Prior to the LHA evaluation, the soil issues UFO resource staff were aware of included: some areas where plant cover and composition were insufficient to protect the soil surface from accelerated erosion, the occurrence of incised drainages which often result from accelerated upland runoff, poorly located and maintained roads that are commonly a source of erosion and concentrated runoff, and large and intense fires which are a threat to soils across much of the LHA area, as indicated by the Wake and McGruder fires which burned thousands of acres over the past 13 years.

Figure 1.5 North Fork LHA Area elevations, from 30 meter Digital Elevation Model (US Geological Survey).

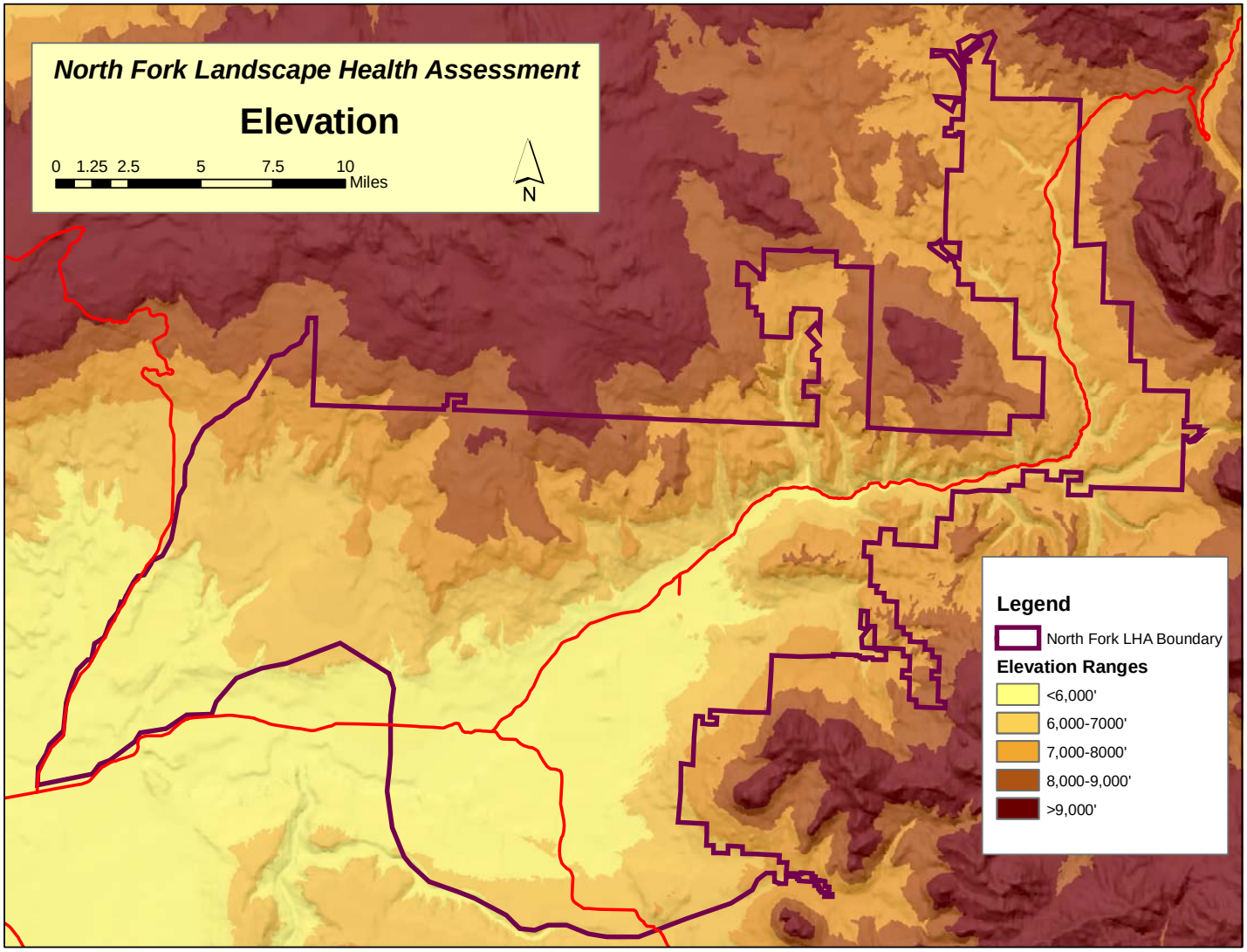


Figure 1.6 North Fork LHA Area slopes and landforms. From 30 meter Digital Elevation Model, US Geological Survey).

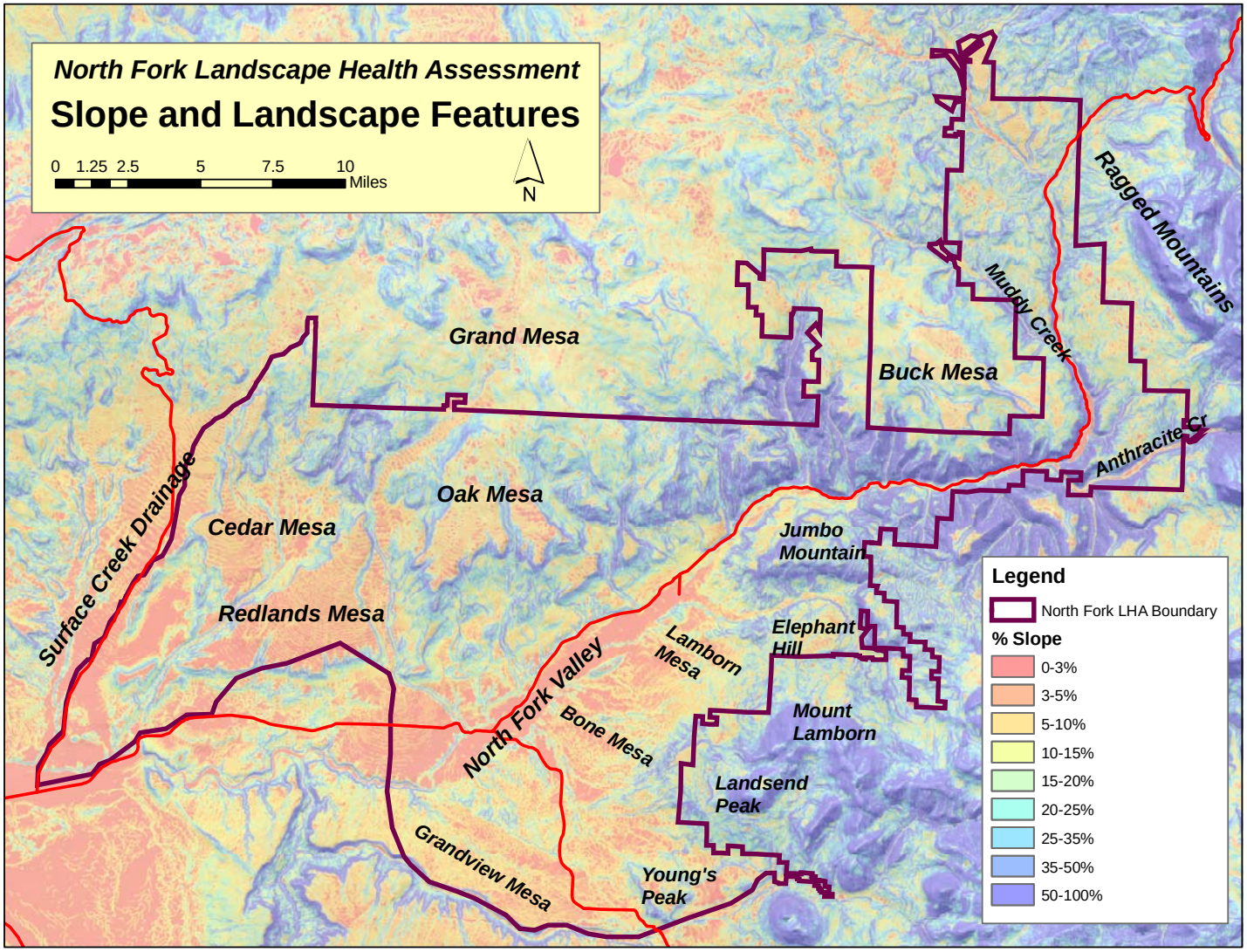


Figure 1.7 Surficial geology of the North Fork LHA area.

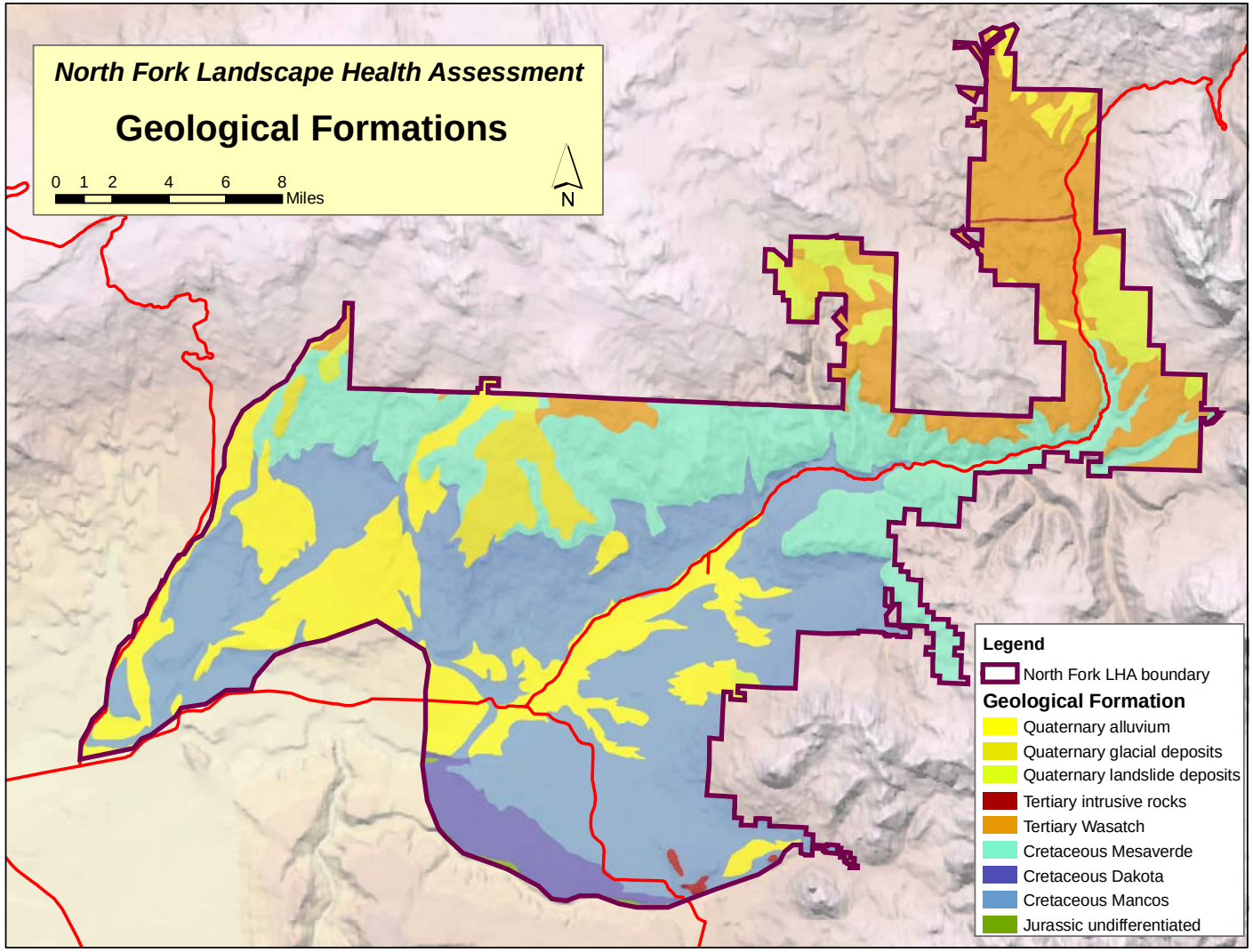


Figure 1.8 Soils of the North Fork LHA Area (From Paonia Soil Survey NRCS 1981).

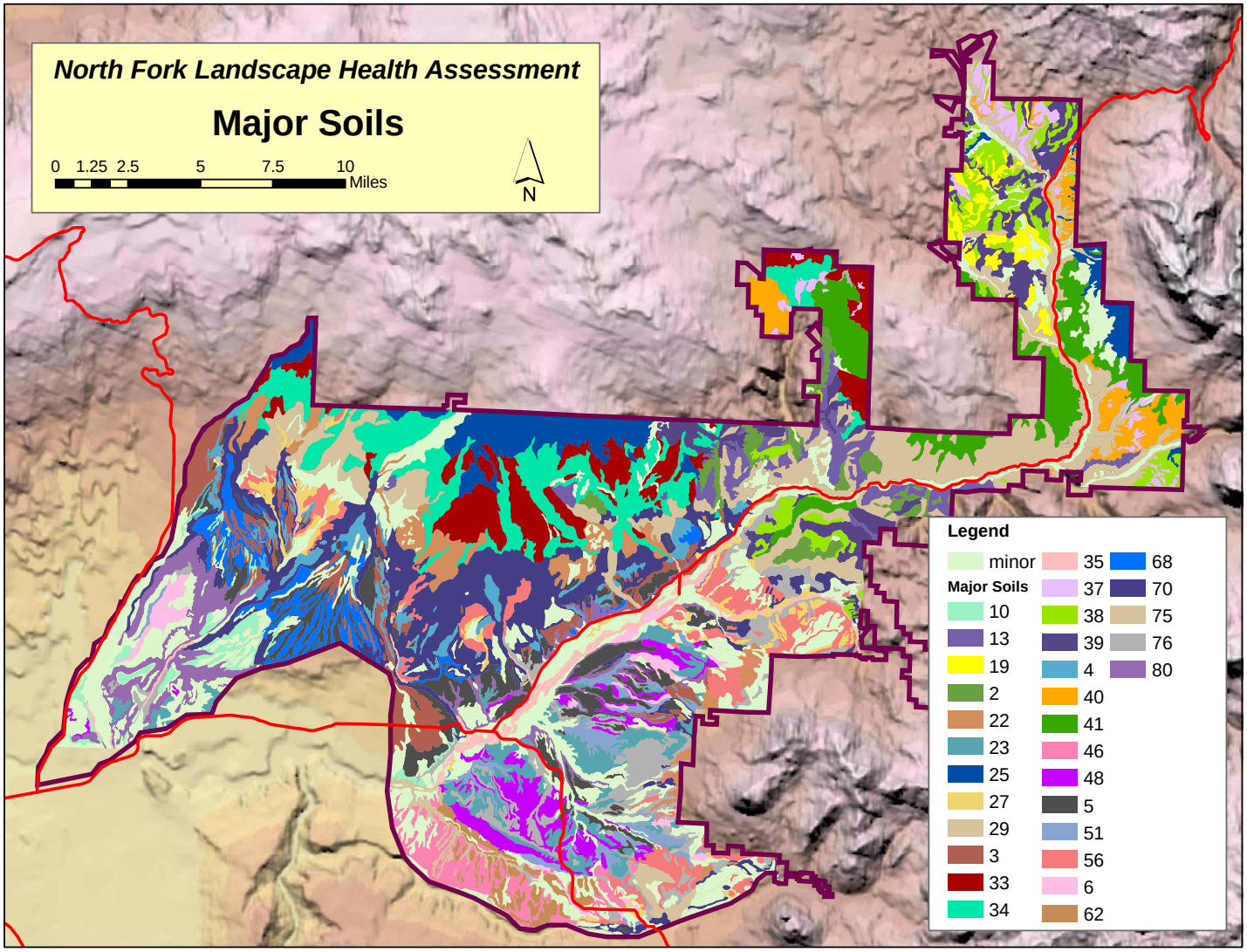


Table 1.2 Important soil map units in the North Fork LHA area and descriptions of their characteristics.

Soil Map Unit	Name	BLM Acreage	Characteristics
75	Torriorthents-Rock outcrop, sandstone, complex	11,698	This broadly defined soil unit has moderately steep to very steep slopes and rock outcrop on mountainsides and foot slopes. Torriorthents are most common on the less sloping areas and make up about 60% of the unit. Torriorthents are well drained, and vary in depth from 10-60 inches. They have very stony surface horizons, which reduces the potential for soil erosion. Torriorthents experience high runoff rates and mass wasting is common.
70	Saraton-Agua Fria complex, 20 to 50% slopes	11,244	These moderately steep to very steep soils are on side slopes of mesas, benches, and terraces, at elevations ranging from 5,800 to 7,000 feet. The Saraton and Agua-Fria each make up about 40% of the unit. They are both moderately deep to deep, well drained, and cobbly, being derived from outwash alluvium derived from basalt. The Saraton soil has a low water capacity and surface runoff is rapid. The hazard of erosion from wind is slight (wind erodibility group = 8) and from water is moderate to high depending on land slope (K factor = 0.10). These soils support a pinon- juniper plant community on a Loamy Foothills, Range Site.
76	Torriorthents-Rock outcrop, shale complex	5,621	This broadly defined soil unit has moderately steep to very steep slopes and rock outcrop on uplands, pediments, and sideslopes of mesas. Torriorthents make up 55% of the unit and shale and rock outcrop make up 35%. Torriorthents are well drained, and vary in depth from 10-60 inches. Available water capacity of Torriorthents varies with soil depth. Surface runoff is rapid and the hazard of erosion is high. Torriorthents experience high runoff rates and mass wasting is common.
34	Delson very stony loam, 20 to 60 % slopes	4,999	The Delson soil is a deep, well drained soil that formed in stony alluvium and colluvium on mountain side slopes. It ranges in elevation between 6,800 to 8,400 feet. Available water capacity is high and surface runoff is rapid. The hazard of erosion from wind is slight (wind erodibility group = 8) and from water is moderate (K factor = 0.15). The Delson soil supports a native mountain shrub community, on a Deep Clay Loam, Range Site.

Soil Map Unit	Name	BLM Acreage	Characteristics
56	Midway-Gaynor silty clay loams, 10-40% slopes	4,522	These soils are strongly sloping, hilly, and steep. They range in elevation from 5,800 to 7,200 feet. Both the Midway and Gaynor soils make up about 40% of this unit each. The Midway soil is on the upper part of slopes and on ridge tops. The Gaynor soil is found on the lower portion of slopes and less steep areas. The Midway soil is shallow (10-20 inches) and well drained. It formed in weathered, silty, calcareous shale. The Gaynor soil is deep (20-40 inches) and well drained. Both soils have low available water capacity, and a rapid potential for surface runoff. For both soils, the hazard of erosion from wind is slight (wind erodibility group = 8), and from water is high (K factor (Midway = 0.43, Gaynor = 0.24)). Both soils support pinon-juniper plant communities.
23	Chipeta silty clay, 3-30 % slopes	3,459	This soil is shallow and well drained, overlying Mancos shale at a depth of 10-20 inches. The soil is typically located on upland sites at an elevation of between 4,800 to 6,000 feet. The available water capacity is low and surface runoff is medium to rapid. The hazard of erosion from wind is slight (wind erodibility group = 4l), and from water is high (K factor = 0.43). The soil is classified in a Clayey Salt Desert range site.
41	Fughes-Curecanti stony loam, 10-40% slopes	2,298	These soils formed on steep slopes of glacial outwash, landslide deposits, and old alluvial fans, at an elevation range between 6,500 to 8,500 feet. The Fughes soil makes up about 40% of the complex and is commonly located in swales, depressions, and drainage ways. The Curecante soil makes up 40% of the complex and is found on small ridges and convex side slopes. The available water capacity for Fughes is high and for Curecante moderate. For both soils, the hazard of erosion from wind is slight (wind erodibility group = 8), and from water is moderate to high (K factor (Fughes = 0.17, Curecante = 0.28)). Both soils support pinon-juniper plant communities. The Fughes and Curecante soils are classified by range site as Deep Clay loam and Brushy Loam, respectively.
22	Cerro stony loam, 10-35% slopes	2,255	The Cerro soil is a deep well drained soil that formed in old landslide deposits and glacial outwash at elevations between 6,200 to 8,000 feet. The available water capacity is high and surface runoff is medium to rapid. The hazard of erosion from wind is slight (wind erodibility group = 4), and from water is moderate to high (K factor = 0.17) depending on slope. The soil is classified by range site as Deep Clay loam.
33	Delson Stony Loam, 3-20% slopes	1,964	The Delson soil is deep and well drained, formed in stony alluvium, and is located on fans and mesas at elevations between 6,800 and 8,400 feet. The available water capacity is high and the surface runoff is medium to rapid. The hazard of erosion from wind is slight (wind erodibility group = 5), and from water is moderate (K factor = 0.2). The soil is classified by range site as Deep Clay loam.

Soil Map Unit	Name	BLM Acreage	Characteristics
13	Beenom-Absarokee association, 20-60% slopes	1,875	These soils are found on steep slopes at elevations between 6,800 to 8,300 feet. The Beenom soil makes up about 50% of the unit and is found on the upper slopes and ridge tops. The Absarokee soil makes up about 30% of the unit and is found on toe and back slopes, and swales. Both soils have low available water capacity, and a rapid potential for surface runoff. Both soils have a slight hazard of erosion from wind (wind erodibility group = 5), and high water hazard (K factor (Beenom = 0.37, Absarokee = 0.32)). The soil is classified by range site as Deep Clay loam.

Vegetation

At least 18 distinct vegetation classes occur on BLM land in the landscape unit. These are tied to soil type as well as elevation and precipitation (Figure 1.9). Of the 18 classes, 13 cover substantial acreage, or are otherwise notable within the LHA unit.

The drainages with intermittent or perennial water contain riparian vegetation. Riparian vegetation is most prevalent along the streams and drainages with reliable or augmented flow. On BLM these include the North Fork of the Gunnison River, Dry, Jay, Roatcap, Steven's, Terror, Hubbard, Hawksnest and Muddy Creeks. Small pockets of riparian vegetation are also present along some of the ephemeral drainages.

Within the broad category of riparian vegetation are many distinct, interwoven plant communities. Among the most widespread are communities dominated by narrowleaf cottonwood (*Populus angustifolia*) and distinguished by various associated shrubs and trees including thinleaf alder (*Alnus tenuifolia*), blue spruce (*Picea pungens*), Douglas fir (*Pseudotsuga menziesii*), river hawthorn (*Crataegus rivularis*), box elder maple (*Acer negundo*), sandbar willow (*Salix exigua*), skunkbush sumac (*Rhus trilobata*), and red osier dogwood (*Cornus sericea*). Some willow dominated communities are also present, with sandbar willow occurring alone or in combination with strapleaf willow (*Salix ligulifolia*) or Pacific willow (*Salix lucida*). Thinleaf alder forms a somewhat common community alongside the water's edge along many streams. On some of the higher stream terraces shrub-dominated communities including skunkbush sumac and silver buffaloberry are found. Small pockets of saltmarsh bulrush community (*Scirpus maritimus*), and narrowleaf cattail (*Typha angustifolia*)-broadleaf cattail (*Typha latifolia*) can also be found at lower elevations. Ephemeral and lower elevation drainages are often dominated by the alien tamarisk (*Tamarix chinensis*). Detailed descriptions of these communities can be found in the Field Guide to the Wetland and Riparian Plant Associations of Colorado (Colorado Natural Heritage Program 2003).

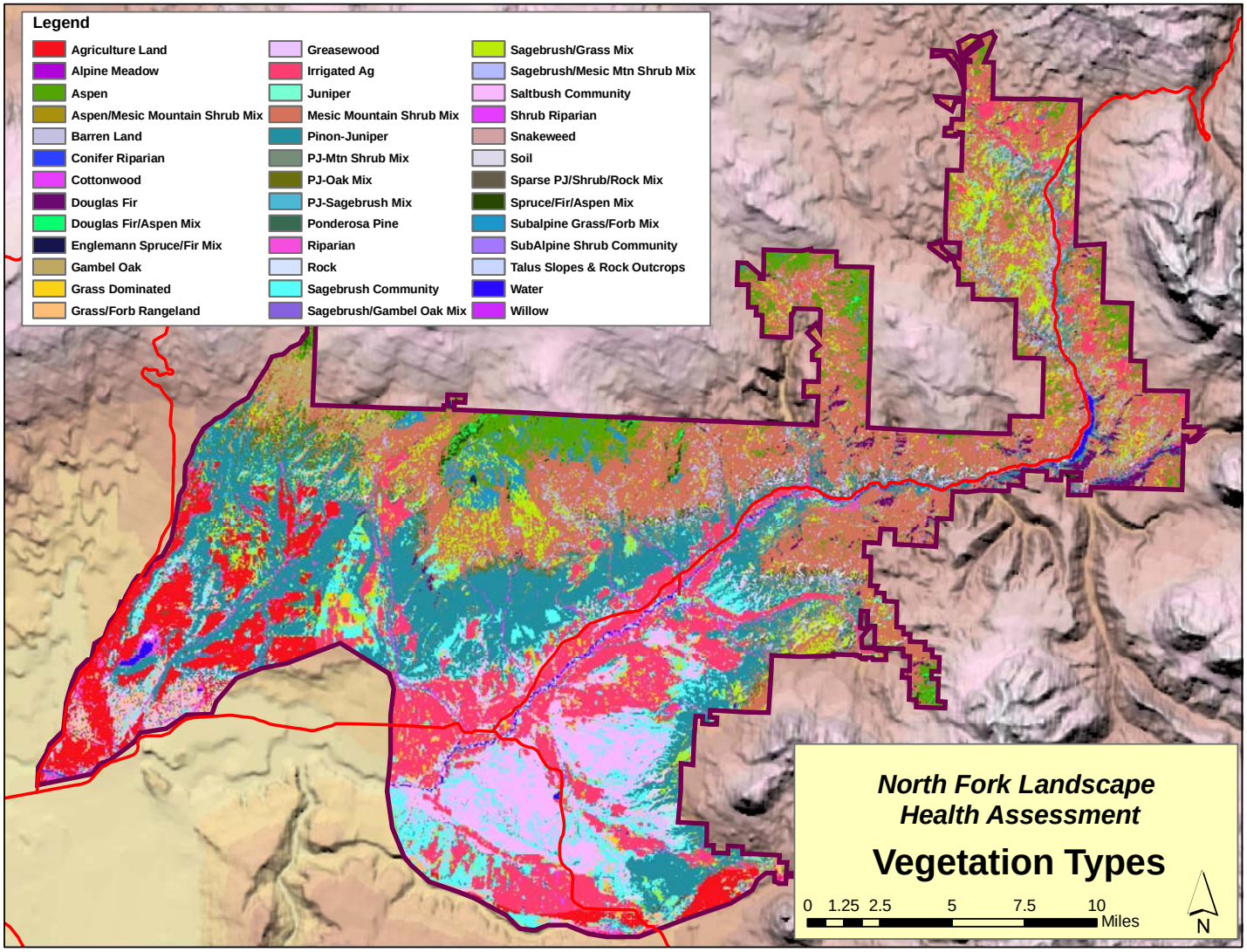
The drought tolerant vegetation class described as saltbush community occurs at the lowest elevations of the LHA unit, and is broadly distributed across saline soils. The saltbush community includes the following shrubs: shadscale (*Atriplex confertifolia*), Gardner saltbush (*Atriplex gardneri*), mat saltbush (*Atriplex corrugata*), cottonthorn horsebrush (*Tetradymia spinosa*), black greasewood (*Sarcobatus vermiculatis*), four-wing saltbush (*Atriplex canescens*), snakeweed (*Gutierrezia sarothrae*) and prickly pear cactus (*Opuntia polycantha*) in varying amounts. Some grasses including western wheatgrass (*Pascopyrum smithii*), galleta grass

(*Pleuraphis jamesii*), bottlebrush squirreltail (*Elymus elymoides*), and Indian ricegrass (*Achnatherum hymenoides*) are found on better condition sites. Many different forbs occur, but some of the most common are wild buckwheats (*Eriogonum* spp.), death camas (*Zigadenus venenosus*), and biscuitroots (*Lomatium* and *Cymopterus* spp.) Frequently, weedy exotic species are also present. Clasping pepperweed (*Lepidium perfoliatum*), filaree (*Erodium cicutarium*), burr buttercup (*Ceratocephala testiculata*), cheatgrass (*Bromus tectorum*), and European madwort (*Alyssum simplex*) are among the most common.

With increasing elevation and precipitation, the saltbush community class grades into the pinyon-juniper woodland class on rocky, steeper soils and the pinyon-juniper/sagebrush mix, sagebrush community, and sagebrush/grass mix classes on less rocky soils. The pinyon-juniper woodland is dominated by Utah juniper (*Juniperus osteosperma*), with some Colorado pinyon (*Pinus edulis*) in some areas. There is typically a sparse and variable understory that may contain remnant shrubs like Wyoming big sagebrush (*Artemesia tridentata wyomingensis*), birchleaf mountain mahogany (*Cercocarpus montanus*), bitterbrush (*Purshia stansburiana*), siltbush (*Zuckia brandegeei*), snakeweed, potato cactus (*Opuntia fragilis*), muttongrass (*Poa fendleriana*), and bottlebrush squirreltail. The sagebrush community is dominated by Wyoming big sagebrush with isolated occurrences of Basin big sagebrush (*Artemesia tridentata tridentata*). Frequently snakeweed or four-wing saltbush is a secondary shrub in these communities, and there is an understory of the same native grasses found in the saltdesert shrub zone, with the addition of Sandberg bluegrass (*Poa secunda*). The primary forb in the area is western tansymustard (*Descurainia pinnata*), with isolated occurrances of native species including death camas, biscuitroot, and scarlet globemallow (*Sphaeralcea coccinea*). Nonnative forbs are more widespread, particularly European madwort and burr buttercup. Nonnative grasses are very common with cheatgrass almost ubiquitous, and crested wheatgrass persisting in areas where it has been seeded. In some areas, woodland (mainly juniper) occurs together with sagebrush at a higher level of canopy cover. These may be successional stages that follow fire or other major natural disturbance. Many fire scars of varying ages are evident in parts of the LHA unit.

At higher elevations the PJ/mountain shrub mix, mesic mountain shrub mix, sagebrush-mesic mountain shrub mix, PJ/oak mix, and Gambel oak classes are found. The pinyon-juniper community contains birchleaf mountain mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchior utahensis),* and Gambel oak (*Quercus gambelii*). With increasing elevation, Utah juniper and pinyon trees drop out of the community, and the mountain shrubs dominate the vegetation. In some areas Gambel oak forms almost closed stands. Rocky Mountain juniper (*Juniperus scopulorum*) is present in some areas, while black chokecherry (*Prunus virginiana*) is found on more mesic sites intermixed with the other mountain shrubs. Roundleaf snowberry (*Symphoricarpos rotundifolius*) is common throughout most of these communities. Where there are openings between the typically dense shrub canopies, or in areas where the canopy is significantly above the ground surface, a productive understory of forbs and grasses exists. Commonly found species are elk sedge (*Carex geyeri*), Letterman's needlegrass (*Acnatherum lettermanii*), Kentucky bluegrass (*Poa pratensis*), muttongrass, Sandberg bluegrass, bottlebrush squirreltail, western wheatgrass, and nodding brome (*Bromus anomalus*). Forbs are numerous with many species. The most widespread and dominant include western yarrow (*Achillea millefolium*), lupine (*Lupinus* spp.), western sweetcicily (Osmorhiza occidentalis), southern ligusticum (*Ligusticum porteri*), biscuitroot, and aspen peavine (*Lathyrus lanzwertii*).

Figure 1.9 North Fork LHA Area vegetation classes derived from 1993 Landsat Imagery.



At the highest elevations and in mesic drainages, very small pockets of aspen vegetation and the more prevalent Douglas fir vegetation classes are found on BLM. The understory in the Douglas fir community is typically sparse but contains many of the same grasses and forbs found in the mountain shrub communities. The aspen understory typically contains snowberry and often black chokecherry, with a very productive understory of the grasses and forbs found with the mountain shrubs.

Grass-forb rangeland is a vegetation class that occurs across the range of elevations. In some cases it is related to soil characteristics, in others it is a result of disturbance, and is a successional stage to other vegetation classes. The species are typically those grasses and forbs found in each of the different community types listed above.

In addition to the nonnative species listed above, state listed noxious weeds are scattered in still isolated infestations across the unit. Russian knapweed (*Acroptylon repens*) and hoary cress (*Cardaria draba*) are the most common in disturbed areas at lower elevations. Tamarisk (*Tamarix chinensis*) is present in some of the lower elevation drainages. Houndstongue (*Cynoglossum officinale*) and Canadian thistle (Cirsium arvense) are found in some areas in the mountain shrub vegetation type, and a few small populations of leafy spurge (*Euphorbia esula*) are present near agricultural lands adjoining Jumbo Mountain.

Prior to the land health assessment, the UFO staff considered the extent of noxious weeds and invasive species to be a substantial vegetation problem in the area. Because of this, wildfires are aggressively rehabilitated in this area to establish perennial competition against the nonnative annuals that are so pervasive. BLM has worked with Delta County to control some of its noxious weed infestations as well, but treatment has not been comprehensive. The staff also believes that fire suppression, past fires with poor rehab success, heavy winter wildlife use and historic grazing have impacted the vegetation, leading to age class distribution and browse plant condition problems. Some vegetation treatment projects have taken place in this unit. These have been driven largely by fuels reduction as well as the declining conditions of browse stands. Their objectives have been to reduce tree cover and density in small patches to break up fuel continuity. A secondary outcome is an improvement in overall shrub vigor and productivity. A concern over low levels of desirable grasses and forbs has also been addressed by seeding these habitat projects with native and some nonnative seed.

Wildlife

The North Fork LHA area supports a large variety of upland, riparian, and aquatic wildlife species. Table 1.3 below shows a list of the most common or noted wildlife species, their occurrence, and the basic habitat types in which they are found. Some species are yearlong residents, while others are migrants. 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 great, and is created by diversity in topography, slope, aspect, vegetation, soils, and climate. The description of the existing vegetation in the vegetation section of this report provides a good description of most wildlife habitats that occur in the management area.

Table 1.3. A list of North Fork Area 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, year long, mostly during winter

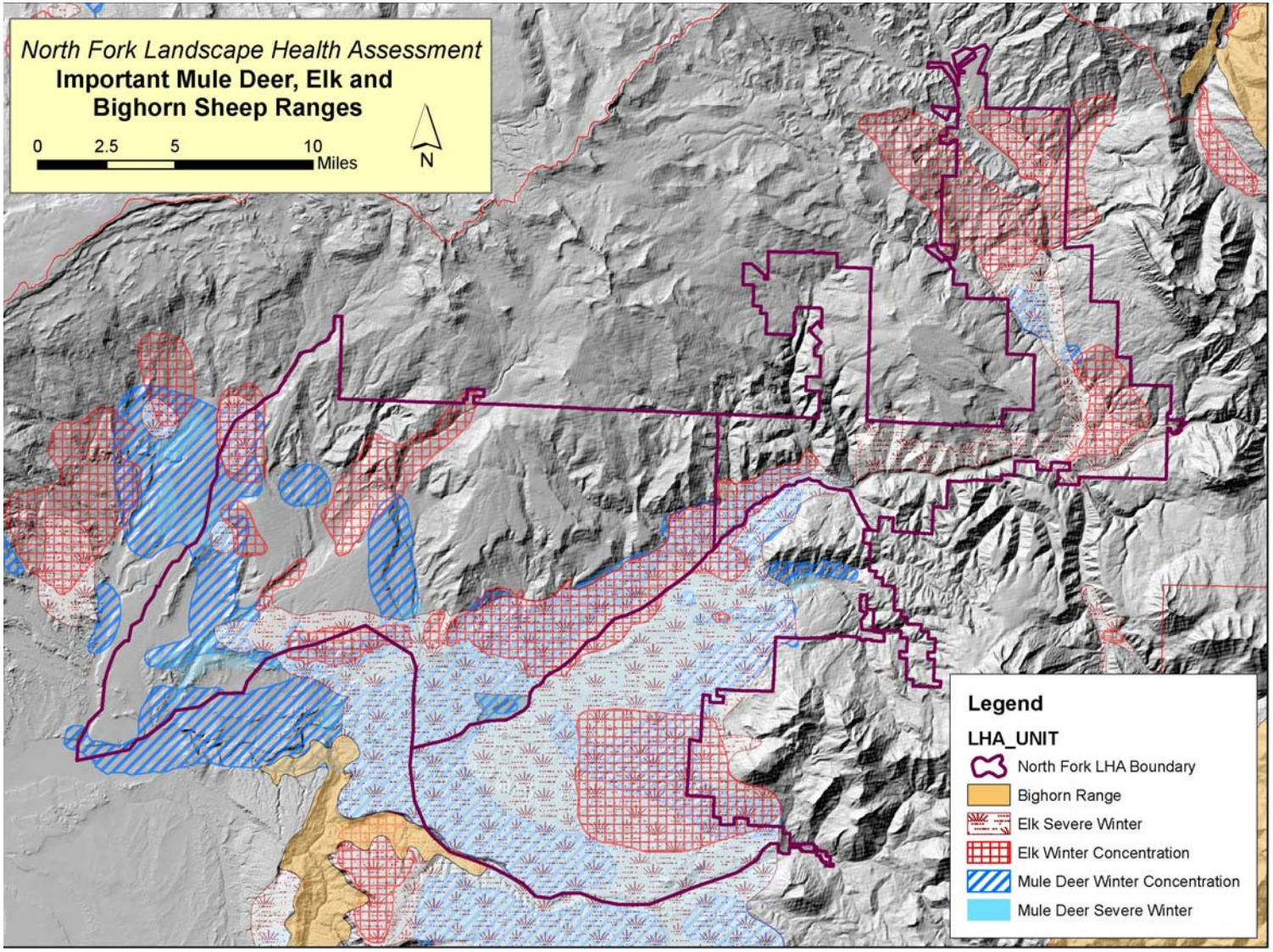
Elk	Pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland.	Common, mostly during winter.
Bighorn Sheep	Canyon benches, mesa tops, and valley bottoms	Uncommon, may be present in the Black Canyon area.
Cougar	All types, mostly along rim-rock areas.	Common, year long
Bobcat	All types	Uncommon, year long
Coyote	All types	Common, year long
Cottontail rabbit	All types	Common, year long
Porcupine	Pinyon-juniper, riparian	Common, year long
Prairie dog (White Tail)	Sagebrush, desert shrub	Common, year long
Raptor; Eagles, Hawks, Falcons.	All types	Common, year long
Merriam's Turkey	Riparian forests, Pinyon-juniper, Oak-mountain shrub	Riparian communities and PJ in the winter and oak-mountain shrub spring and fall.
Blue grouse	Oak/Serviceberry	Common, year long
Chukar	Salt desert	Uncommon, year long
Neo-tropical birds	All types	Common, warm season
Small mammals	All types	Common, year long
Amphibians-Reptiles	All types	Common year long
Bats	All types	Common year long, mostly warm season

Mule deer and elk are probably the most noted wildlife species that occur in the LHA area due to their historic prominence in the ecosystem and their high social and economic value to the area and region. Both species use the area year long, but primarily they use it as winter range, coming from higher elevation summer ranges on the Grand Mesa to the north, and the West Elk Mountains to the east. The intensity of use by each species varies widely from year to year, and is controlled primarily by population size, and the variation in timing and amount of snowfall. During most winters there is a high degree of overlap in mule deer and elk use on winter ranges. In these areas, the elk tend to dominate, leaving the deer to consume what the elk don't want. The Colorado Division of Wildlife has classified most of the south half of the LHA area as elk winter range, with additional smaller areas in the Muddy Creek area to the northeast, and in the Cedar Mesa vicinity near Cedaredge. For deer, the winter range is concentrated more in the western part of the LHA, with small areas near McDonald Mesa (Crawford), Lamborn Mesa (Paonia) and Muddy Creek to the north. The CDOW's mapping of severe winter range, and winter concentration areas for these two species are shown on Figure 1.10.

Winter habitat condition on the LHA area varies depending on the degree of use; in areas where deer and elk winter ranges overlap, the browse and vegetation in general is in poor to fair condition. Areas of concern include McDonald Mesa in the Crawford-Hotchkiss area, Cedar Mesa near Cedaredge, and the Minnesota Creek/Lennox Mesa area northeast of Paonia. Symptoms of overuse include soil loss, low litter cover, lack of vegetative diversity, and weed invasion. Browse hedging and low shrub vigor can also be seen in these areas. The vegetation is in the best condition in the upper North Fork, where precipitation is higher and there is little to no overlap of wildlife winter range.

The age or successional stage of the plant community in the sagebrush, pinyon-juniper and mountain shrub zones influences the abundance of forage and overall habitat quality. The influence of maturing plant communities on productivity and diversity can be demonstrated by

Figure 1.10 North Fork LHA mule deer and elk crucial winter ranges and overall bighorn sheep range.



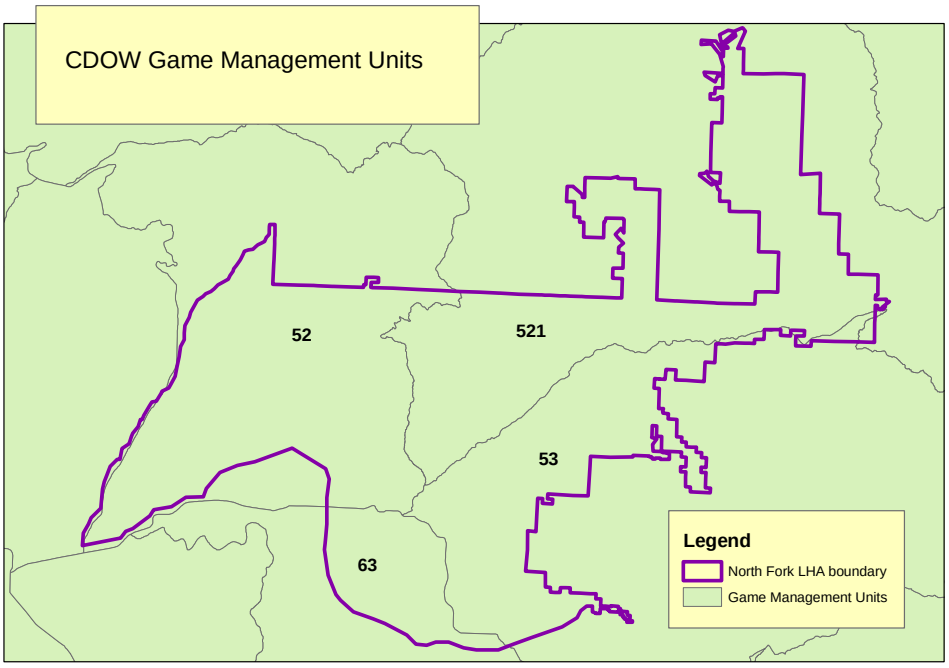
measuring the vegetation on a site before and after disturbance. Fires are the most visible source of natural disturbance in this landscape, with drought and disease also playing important roles. Although BLM has been aggressively controlling fire since the 1940s, it has also been using mechanical methods for 6 decades to treat vegetation, recreate fire's effects, stimulate productivity and increase overall vegetation community diversity. BLM data collected on the Uncompahgre Plateau in 1988 to evaluate vegetative treatments shows a significant increase in browse stand condition, and vegetation composition and productivity after setting back succession (Tables 1.4 & 1.5). Typically the beneficial effects of these treatments on forage and browse production are most evident in the first 3-30 years following treatment, and diminish over time with heavy use and reestablishment of pinyon and juniper trees. BLM records show the following percentages of BLM lands in the North Fork LHA area were affected by vegetation treatments and fire by decade: 1950s—1.3%, 1960s—0.7%, 1970s—1.3%, 1980s—1.7%, 1990s—4%, 2000s—2%.

The Colorado Division of Wildlife manages big game on a herd, or population basis, using Data Analysis Units (DAU), with sub-regions of Game Management Units (GMU) (Figure 1.11). The North Fork LHA area has DAUs D-51 (deer) and E-14 (elk) on the north half (Cedaredge to Kebler Pass north side); these contain GMUs 52 and 521. In the area south of the North Fork River and near Crawford, DAU E-52 (elk) and D-20, D-39 (deer) includes GMUs 53 and 63. DAU E-52 has been managed as an unlimited, over the counter license unit for bull elk with an objective of slightly decreasing the herd in GMUs 53 and 63. There has been a lot of hunting pressure in this area, and that along with increased ORV use has been driving elk to lower elevation private lands and Black Canyon National Park where they are unavailable to hunters. DAU E-14 has also had mostly unlimited bull elk licenses, and placed more emphasis on harvesting antlerless animals with late season and private land licenses to mitigate the amount of damage to local rangelands and agriculture. The 2006 season was expected to bring the herd population close to objective levels (personal communication, Diamond 2007).

Model estimates showed a significant increase in both the E-52 and E-14 elk populations from the late 1980's to the early 1990's. Since 1998, the elk population in this area has been stable to decreasing, and currently estimated at 2500-2700 in the E-52 herd (North Fork), and 11,500 in the E-14 herd, which is the entire Grand Mesa. Management targets for E-52 elk are 2200-2400, and for E-14 elk, 9,000-11,000. Hunter success rates in the area have averaged 19% in the last ten years. Mule deer populations have generally declined over the last 30 years in the North Fork LHA area, with some increases in the last 5 years. In D-51 (south side of Grand Mesa), the estimated deer population is 10,500 and has an objective of 12,500. The main problem in this area is uneven distribution of the herd. They tend to be concentrated in agricultural areas, and return to the same winter range year after year. In D-20 and D-39 (Crawford-Hotchkiss-Paonia), combined deer populations are estimated at 13,300 and have an objective of 12,000 (Duckett 2007, Diamond 2005).

The North Fork LHA area provides some mule deer fawning and elk calving habitat at the higher elevations in the oak/serviceberry vegetation. These mountain shrub areas are north and east of Cedaredge, in the Muddy Creek area northeast of Paonia, and to the southwest in the West Elk Mountains. Management issues include decline in mountain shrub vigor in key winter range areas, increased human development, and noxious weed invasion (personal communication, Diamond 2007).

Figure 1.11 Colorado Division of Wildlife Game Management Units



There is a bighorn sheep herd in the Black Canyon on the edge of the LHA area. The population is reproducing, but is not as vigorous as could be expected. It is suspected that the close proximity of domestic sheep in this area has spread pathogens in the bighorn population. Their habitat is confined to the canyon, and they are not expected farther up the North Fork (personal communication, Homan 2007).

Several transplants of Shiras moose have been introduced to the Grand Mesa in 2005-07. Some of the introductions were in the upper Muddy Creek area northeast of Paonia. Although they are expected to spend most of their time in higher elevations on the Grand Mesa, they can range over a wide area and can be expected to migrate through the BLM lands in the North Fork on occasion. Since moose are mostly solitary animals, there is not expected to be browse damage from group congregation areas (personal communication, Holland 2007).

Merriam turkey habitat within this LHA area is found mostly on the higher mesas with woody habitat, and along the major stream drainages. 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. There were no turkeys to speak of prior to 1990 in this area, but a transplant program was begun in 1989, and since that time approximately 100 birds have been introduced in the Black Mesa and Red Canyon areas near Crawford, also near Muddy Creek, Leroux Creek, Terror Creek, and Smith Fork. The turkeys are doing well, reproducing and spreading throughout the North Fork area and up into the West Elks, and a successful spring hunting season has been evidence of the growing population. There is also a healthy turkey population on the south slope of the Grand Mesa above Cedaredge, where turkeys introduced on the north side of the Mesa have spread over to the south side (personal communication, Homan 2007).

Large predators, such as coyotes, cougars, and black bears use the LHA area regularly as parts of their larger overall ranges. Of the predators, coyotes are the most numerous and widespread, and the population appears to be stable or increasing at this time. Black bear primarily use the major drainages with well-developed riparian vegetation, and higher elevation oak/serviceberry areas, especially during spring, late summer, and fall for feeding. Black bear densities and total numbers in the West Elks are among the highest in Colorado. Units 53 and 63 were a research area for black bears from 1976-80, and a hunting season was instituted in 1986. Hunting success has indicated a healthy bear population, and bears are frequently sighted in lower country when food and water conditions are poor in the mountain shrub zone. Cougars probably use nearly all of this area at some time or another while hunting or raising young. They are often sighted by inhabitants of all areas of the county, from Confluence Park in Delta up to the surrounding mesas near Crawford, Hotchkiss, and Paonia. Cougars appear to have a stable population in the area, and the hunting quota of 8 for Units 53 and 63 has been easily met for the past several years (personal communication, Homan 2007). There appears to be suitable denning habitat in the rocky cliffs and drainages that are distributed throughout the LHA unit. While the status of these predator populations has not been officially surveyed, they are all believed to be doing well.

White-tailed prairie dogs are found in the lower elevation areas of the LHA. 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 1980s, but there has been no follow-up mapping, other than required surveys by private contractors for developments in the area. 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.

Aquatic wildlife species and their habitats are found in the perennial streams and some intermittent streams (see Figures 1.15 and 3.1 for locations of perennial streams and more information on functional condition). Native fish species including longnose dace, speckled dace, fathead minnow, and mottled sculpin are known to be present in the North Fork River and its tributaries. The lower part of the North Fork River is in poor condition for native fishes due to water diversion, warm water and non-native fish competition. The upper North Fork is in good condition and supports larger populations of the native fish, particularly bluehead suckers (personal communication, Kowalski 2007). Non-native longnose sucker and white sucker have replaced and hybridized with the native western slope flannelmouth and bluehead suckers in the lower parts of the drainage. The non-native rainbow trout and brown trout are found in the North Fork River and its tributaries. Some upper reaches of North fork tributaries have populations of native cutthroat trout and non-native brook trout. Northern leopard frogs, Great Basin spadefoot toads, and many snake species are also known to be present.

Riparian habitat present along the perennial and intermittent streams (Figure 1.14) is extremely important for many of the wildlife species, especially small birds, mammals, amphibians, and raptors. Most of these species are not officially inventoried and their status is unknown. However, most of the LHA riparian systems are in good condition, with some deleterious effects from flow alterations for irrigation, and scattered patches of noxious weeds including Russian knapweed, tamarisk, Russian olive, and yellow toadflax. More than 90% of the riparian land in the North Fork LHA is under private ownership, but the North Fork River

Improvement Association, a local group, works with landowners all along the North Fork to improve vegetation and hydrology of the river system to maintain riparian health. The upper portion of the North Fork and its tributaries has more public land, and is in good condition with scattered patches of noxious weeds, mostly yellow toadflax and oxeye daisy, that have been treated and are being monitored by Delta County weed personnel (personal communication, Callicutt 2007). The main problem riparian areas with BLM land are in the McDonald Creek and Cottonwood Creek areas north of Crawford, and along Currant Creek and Dry Creek watersheds east of Cedaredge. Whitetop, musk thistle, Canada thistle, tamarisk, Russian knapweed and burdock are found in varying amounts in these drainages. These problem riparian weed areas also coincide with winter wildlife concentrations.

The somewhat limited amount of ponded open water within the analysis area offers limited potential for waterfowl production. Small numbers of waterfowl, including mergansers, Canada geese, mallards, green-winged teal, etc. utilize the area seasonally and some nesting occurs along major streams and in reservoirs and ponds. Fruitgrower's Reservoir—a portion of which falls on BLM-- is the most notable open water area for birds in the North Fork Valley.

Threatened, Endangered and Special Status Species

Within the LHA area there are several species listed as threatened or endangered, as well as species that are candidates for listing under the Endangered Species Act, as amended. For this analysis, the species list for Delta and Gunnison Counties was obtained from the U.S. Fish and Wildlife Service web site (USFWS 2007). Descriptions of these species are found in *TES Species Descriptions for the Uncompahgre Field Office* (VanReyper 2006). Also, based on the inventory data maintained by the UFO, and available from the Colorado Natural Heritage Program, there are other special status species present in the LHA area. Table 1.4 below presents a list of the Threatened, Endangered, and special status species that are found, or potentially found within the LHA area.

Table 1.4 List of potential Threatened, Endangered or Special Status Species for the North Fork LHA.

Common Name	**Scientific name**	***Status***	***May be Present***
ENDANGERED AND THREATENED ANIMALS			
Bald eagle	*Haliaeetus leucocephalus*	T	✓
Black-footed ferret	*Mustela nigripes*	E	
Bonytail	*Gila elegans*	E	
Canada lynx	*Lynx canadensis*	T	
Colorado pikeminnow©	*Ptychocheilus lucius*	E	✓
Humpback chub	*Gila cypha*	E	✓
Razorback sucker©	*Xyrauchen texanus*	E	✓
Yellow-billed cuckoo	*Coccyzus americanus*	C	✓
ENDANGERED AND THREATENED PLANTS			
Clay-loving wild buckwheat	*Eriogonum pelinophilum*	E	✓
Uinta Basin hookless cactus	*Sclerocactus glaucus*	T	✓
SENSITIVE ANIMALS			
Bat, Townsend's big-eared	*Corynorhinus townsendii*	G4/S2, FS	✓
Bat, spotted	*Euderma maculatum*	G4/S2, FS	✓

Chub, Roundtail	*Gila robusta*	G2G3/ S2, SC	✓
Curlew, Long-billed	*Numenius americanus*	G5/S2BSZN, FS, SC	✓
Fox, Kit	*Vulpes macrotis*	SC	✓
Frog, Northern leopard	*Rana pipiens**	G5/ S3, FS, SC	✓
Goshawk, northern	*Accipter gentilis*	G5/S3S3BS2N, FS	✓
Grouse, Gunnison sage	*Centrocercus minimus*	G1/S1, SC	✓
Hawk, ferruginous	*Buteo regalis*	G4/ S3BS4N, FS, SC	✓
Ibis, white-faced	*Plegadis chihi*	G5/S2BSZN, FS	✓
Myotis, fringed	*Myotis thysanodes*	G5/S3	✓
Myotis, Yuma	*Myotis yumanensis*		✓
Otter, River	*Lutra canadensis*	SC	✓
Sucker, bluehead	*Catostomus discobolus*	G4/S4, SC	✓
Sucker, flannelmouth	*Catostomas latipinnis*	G3G4/S3S4, SC	✓
Trout, Colorado River cutthroat	*Oncorhynchus clarki pleuriticus*	G5T3/S3, SC	✓
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	G5T3/SR, FS	✓
SENSITIVE PLANTS			
Rocky Mountain thistle	*Cirsium perplexans*	G3/S1	✓
Montrose bladderpod	*Lesquerella vicina*	G1/S1	✓
Colorado desert parsley	*Lomatium concinnum*	G2/S1	✓
Adobe beardtongue	*Penstemon retrorsus*	G3S3	✓

STATUS: The source used to assign status is from: Colorado's Natural Heritage: Rare and Imperiled Animals ,Plants, and Plant Communities; Vol.3, No.1, 10/1997.;Colorado's Threatened, Endangered, and Special Concern Wildlife; May/98.; Conservation Status Handbook: Colorado's Animals, Plants and Plant Communities of Special Concern Vol. 3, No.2, 5/1999
FEDERAL STATUS: T- Threatened, E-Endangered, C-Candidate
GROUP: Colorado Natural Heritage Program (CNHP)
CNHP - Global Rarity Ranking is based on the range-wide status of a species: G1- Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range); G2-Imperiled globally because of rarity (6 to 20 occurrences), or because of other factors demon-strably making it very vulnerable to extinction throughout its range (Endangered throughout its range);G3-Very rare or local throughout its range or found locally in a restricted range (21 to 100 occurrences) (Threatened throughout its range); G4-Apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery; G5-Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
T- Taxa of subspecies or varieties, ranked on same criteria as G1-G5. CNHP - State Rarity Ranking is based on the status of a species (relative abundance of individuals) in each state. S1- Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state); S2- Imperiled in state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extirpation from the state. (Endangered or threatened in state);S3- Rare in state (21 to 100 occurrences).

Field data collected for this LHA did not include a specific mission to identify new locations of rare plants or animals, or to determine their status. However, if conflicts with rare plants or animals on public land had been detected, they would have been documented, and discussion presented here.

Threatened & Endangered Species

Colorado pikeminnow and razorback sucker are two Endangered fish species known to be present in the Gunnison River below the North Fork confluence in the southwest tip of the LHA area. Altered streamflow regimes and non-native fish are the main threats to these species. Increased spring flows to restore natural floodplains and supply backwater areas for spawning are essential for their survival (Lyon and Williams, 1998).

From early December through early April, wintering bald eagles forage throughout the LHA area. The lower Uncompahgre and Gunnison valleys have an unspecified number of bald eagles (Fig 1.12). In this general area bald eagles concentrate along the North Fork of the Gunnison, upstream of the Paonia/Somerset area (USDI/BLM 1980, 1981-1986, CDOW 2005). The population here is considered to be a migratory winter population. 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 [64FR 36453-36464]).

Yellow-billed cuckoos have been reported in the North Fork area on several occasions during the last 5 years, but breeding has not been confirmed (personal communication, Beason 2007). Potential habitat appears to be present in a few areas along the North Fork of the Gunnison. Surveys of the lower Gunnison and Uncompahgre Rivers did not find any breeding individuals. Breeding bird survey also did not confirm breeding in this area.

Federally-listed black-footed ferrets depend on prairie dog habitat and colonies, which exist in the North Fork LHA area. However, none of the prairie dog sites meet the requirements for suitable ferret habitat, which are a minimum size of 200 acres, and a density of 8 burrows/acre. There is conflicting information about the presence of black-footed ferrets in the area. While it was thought there have been no possible sightings of them in the area for at least 30 years (BIO-LOGIC, 2004), recent review of statewide data indicates there are 2 records of black-footed ferrets from 1974 and 1986, south and east of Hotchkiss in the CNHP database. Further review of this data should be carried out. USFWS states that it is unlikely there are black-footed ferrets in this area at this time based on prairie dog populations and a lack of any recent sightings.

Canada Lynx have been released in the San Juan Mountains and appear to be successfully reproducing. Although there are no lynx populations currently on the Grand Mesa or in the West Elks, there is suitable habitat (Fig. 1.11) near the North Fork LHA area, and a potential for this species to appear in the future.

Clay-loving wild buckwheat **(***Eriogonum pelinophilum*) is found in whitish alkaline clay soils only in Montrose and Delta Counties, and populations of this plant have been found adjacent to the LHA boundaries between Delta and Hotchkiss (Fig. 1.13). There is suitable habitat for it within the LHA, but to date no populations have been noted.

Uinta Basin hookless cactus **(***Sclerocactus glaucus*) generally occurs on gravelly or rocky surfaces on river terrace deposits and lower mesa slopes. Populations of it have been inventoried Ewithin the LHA at the base of Redlands Mesa between Delta and Hotchkiss (Fig. 1.13). Protection of habitat from development and ORV use is needed to maintain these populations.

Figure 1.12. Important habitat in the North Fork LHA area for Federally listed Bald Eagle and Canada Lynx.

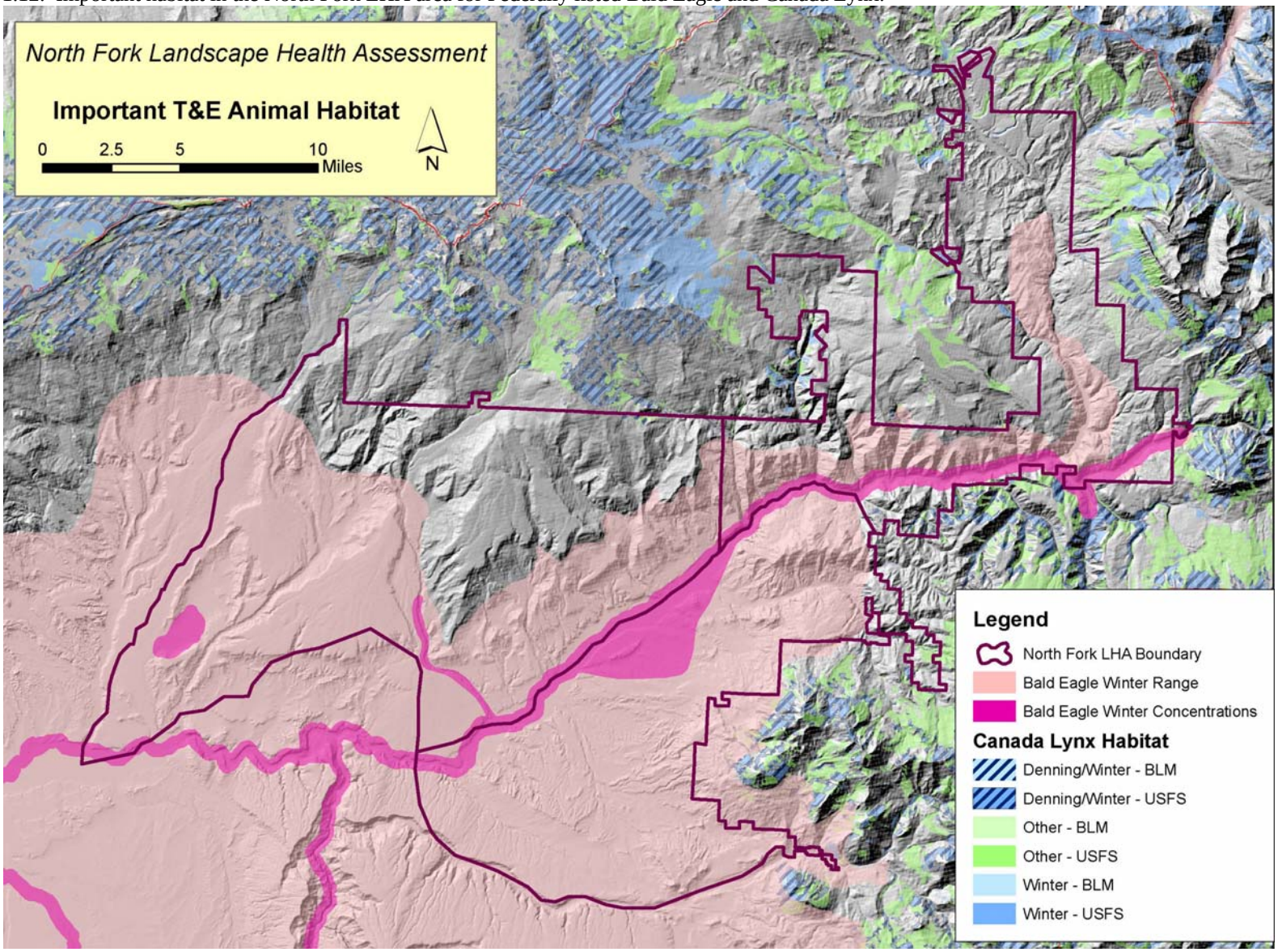
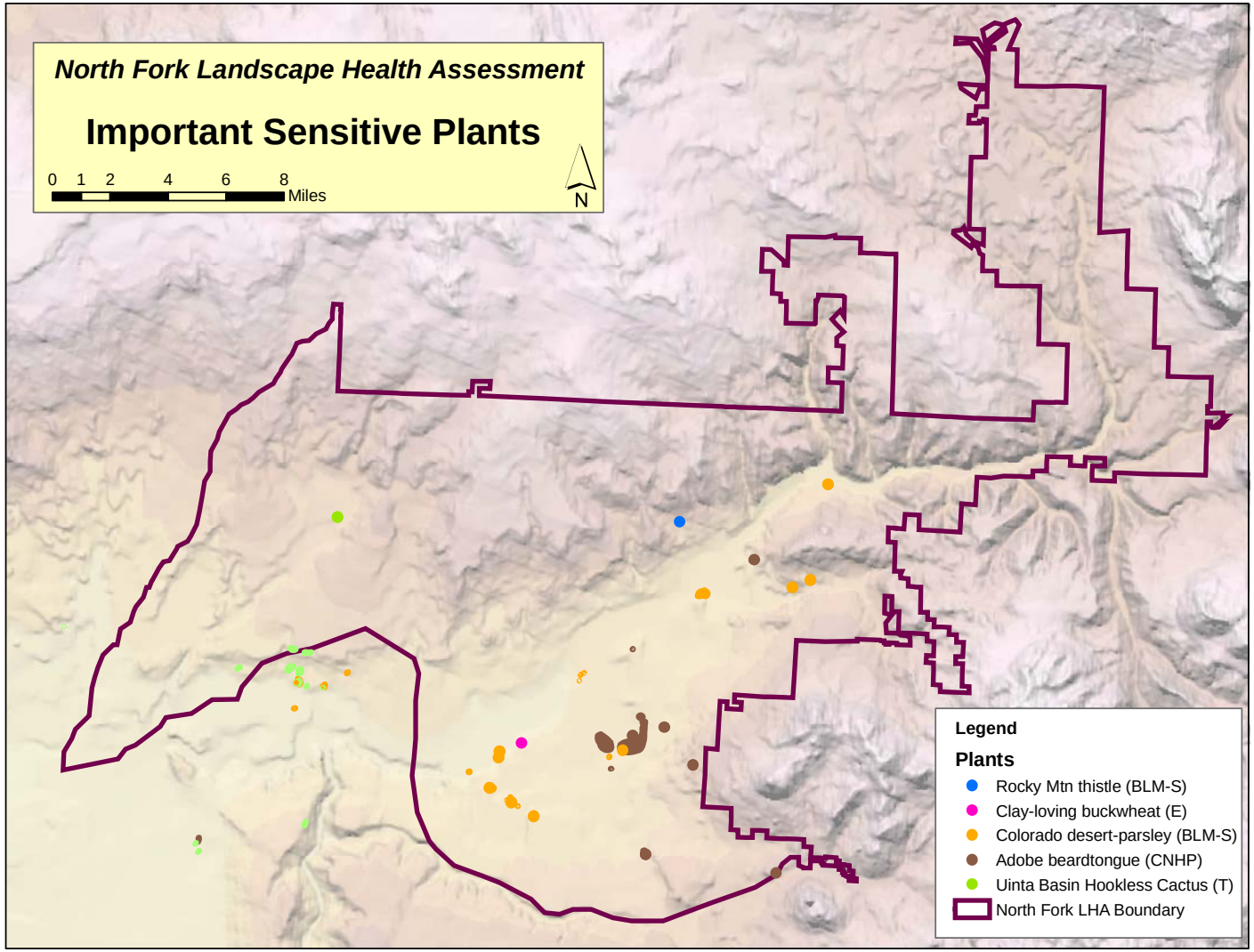


Figure 1.13 Sensitive plants for the North Fork LHA area.



Sensitive Species

Roundtail chub and flannelmouth sucker might be found in the Gunnison River below the North Fork confluence. As with the endangered fish species mentioned above, restoring natural river flow regimes is important for the survival of these two species. Non-native fish populations also have a deleterious effect with competitive advantages in low-water years.

Northern leopard frogs inhabit springs, slow-moving streams, marshes, reservoirs, and lakes. They appear to be faring better in Delta County than in many areas of Colorado, and have been documented in several North Fork sites by CNHP, including Dry Creek, Little Coal Creek, and the North Fork River (Lyon and Williams, 1998). Populations have declined overall due to habitat loss and degradation, interactions with non-native species, and unknown causes.

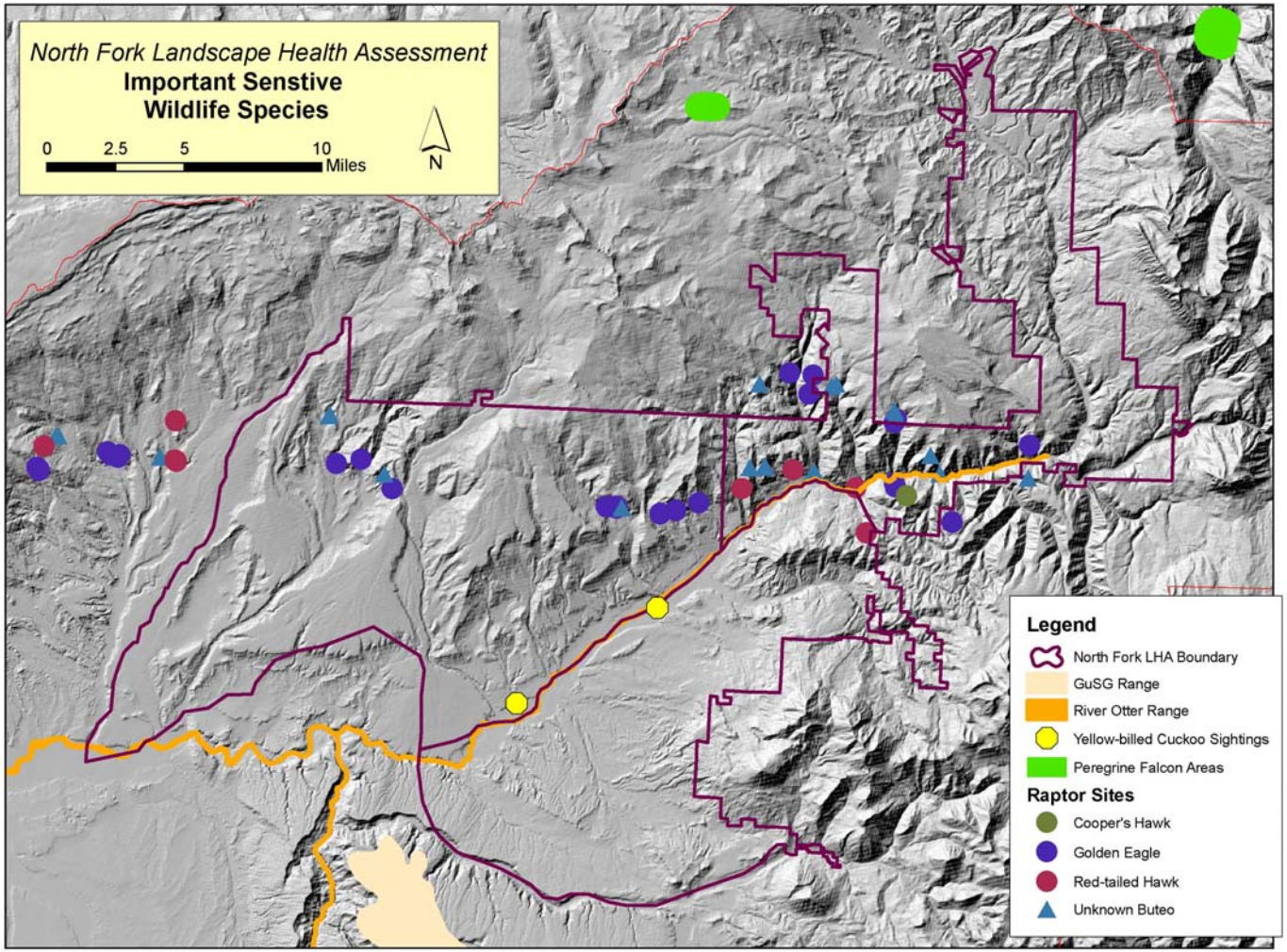
Several sensitive bat species may be present in the North Fork LHA area. These include the fringed myotis, Yuma myotis, spotted bat, and Townsend's big-eared bat. Foraging habitat for Townsend's big-eared bat includes juniper woodlands, sagebrush steppe, and mountain shrub areas, which are found throughout the North Fork and Cedaredge areas. Gunnison Gorge surveys in 2001 and 2003 did not capture Townsend's big-eared bats, but they could be present there and in other portions of the North Fork area. Roosting habitat includes caves, mines, and buildings. Spotted bats were documented through call identification during surveys in the Gunnison Gorge and Black Canyon National Monument (Navo, 2003). They can also be expected to forage in pinyon-juniper woodland, canyon bottoms, open pasture, and hayfields throughout the LHA's western half. Roosting habitat is typically rock crevices in cliffs. Yuma myotis have been captured in the Smith Fork near Gunnison Gorge during bat surveys in 2001 and 2003 (Navo, 2003). They are closely associated with water, and also prefer to inhabit buildings, bridges, cliff crevices and trees. Fringed myotis foraging habitat in the area includes ponderosa pine, pinyon/juniper, greasewood, saltbush, and scrub oak. They roost in caves, mines, rock crevices, buildings, and other protected sites.

River otters were released into the Gunnison in 1977; these populations appear to be surviving (Homan 2007). They are found in the Gunnison River and North Fork of the Gunnison today, and are monitored periodically with CDOW surveys (Fig. 1.14).

Kit foxes occupy sparsely-covered, semi-desert shrublands of saltbrush, shadscale and greasewood. Trapping surveys have confirmed the presence of kit fox in the adobe hills of Peach Valley near Delta (Meaney et al 2006). Populations are threatened by ORV use and development in these areas. Although they have not been confirmed within the LHA area, there is potential habitat for them.

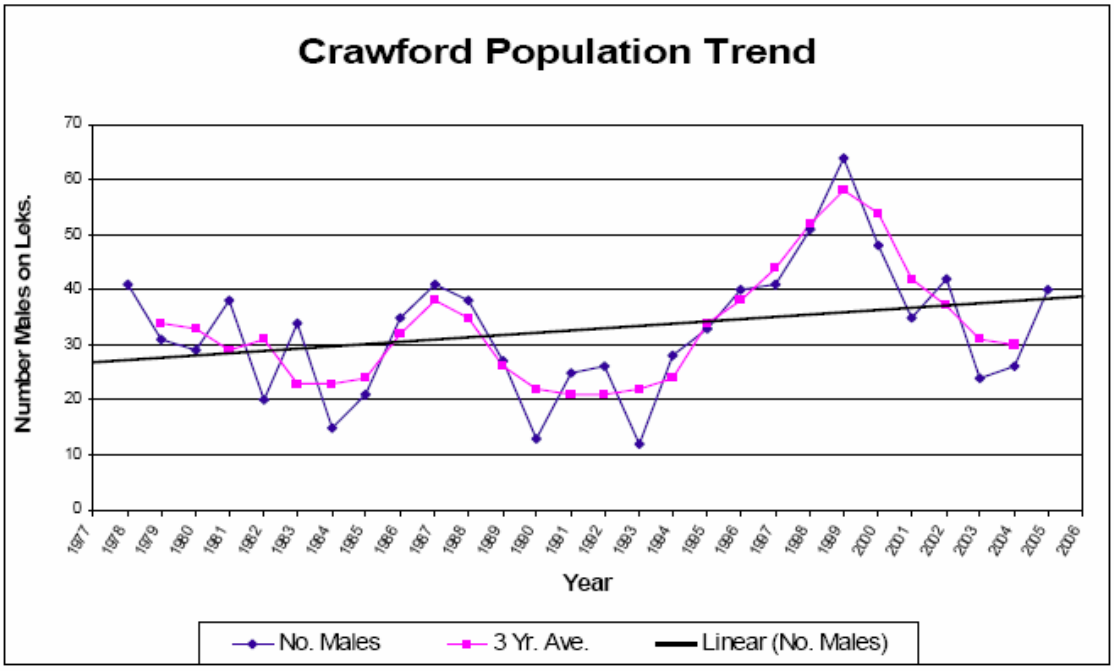
The Gunnison sage grouse has an existing population near Crawford on Fruitland Mesa (Fig. 1.14). A management area was delineated using historical use and observances, and potential habitat as criteria. It has the Gunnison River as its west boundary, and the North Fork along the northeast up to Minnesota Creek near Paonia, then south along the Gunnison National Forest boundary (Figure 1.2). Land status of sage grouse habitat in the LHA area is mixed private and BLM; of a total of 200,000 acres, about 60% is public, and 40% private. All known active leks are on BLM land near Black Canyon Road between Poison Spring Gulch and Green Mountain, which is the largest strip of contiguous sagebrush-dominated area near Crawford. There have been reported sightings recently in other locations near Crawford and in the North Fork Valley, but not evidence of long-term occupation. Fig. 1.15 shows population trends for the Crawford area sage grouse. The number of males attending leks in spring is the normal procedure to determine population size for sage grouse. Given the variable terrain and lack of

Fig. 1.14 Sensitive species in the North Fork LHA area.



early spring access to the area, it is probable that not all lek areas were found and counted, so this estimate is conservative. Lek counts indicate the trend for this population appears stable or slightly increasing through this time frame. However, it is believed that the current population level is much lower than in historic times. For greater detail see the *Crawford Sage Grouse Population: Habitat Improvement Projects and Conservation Plan Progress Evaluation* (BLM, 2006). Decline of the Crawford area sage grouse is related to the larger decline in the health of the natural landscape. Factors include management activities such as fire suppression and livestock grazing which have allowed encroachment of trees into sagebrush areas, fragmentation of habitat, and poor vegetative diversity. Livestock grazing also reduces nesting success and brood survival. The genetic effects of population isolation may eventually result in demographic problems including reduced fertility and hatching success (USDI/BLM, et. al. 2005).

Fig. 1.15 Population Trends for the Crawford Population of Gunnison Sage Grouse.



Northern goshawk habitat can be found in upper elevations of the North Fork, in aspen and coniferous forests. Active nests were documented in the Little Alder Creek and Overland Reservoir areas, close to the Hubbard Creek drainage near Paonia. Although the species is widespread, nesting sites are uncommon in Colorado (Lyon, 1998.)

Ferruginous hawks are considered a migrant in this area, with potential habitat in open country with sagebrush, saltbush-greasewood shrubland, and the periphery of pinyon-juniper. They generally avoid areas of intensive agriculture or human activity.

The long-billed curlew and white-faced ibis are sensitive water bird species that are also considered migrants in the North Fork. Potential stopping areas are the Gunnison River valleys, Fruitgrower's Reservoir in the Surface Creek drainage, and agricultural and wetland areas during the spring migration.

Rocky Mountain thistle (*Cirsium perplexans*) is a sensitive plant found in several North Fork locations. It has been seen near Dry Creek in the Cedaredge area, near Cedar Hill, Lands

End Mountain, Stevens Gulch, and Jumbo Mountain in the Paonia area, and also in the Crawford area. Some of these occurrences are on non-BLM land, where management is a concern. This species appears to prefer disturbed areas, however, non-native plant invasion, improper grazing, and proximity to roads may threaten these occurrences. This plant is often mistaken for a non-native thistle and killed (Lyon, 1998).

Montrose bladderpod (*Lesquerella* vicina) has potential habitat in the North Fork LHA area consisting of sandy-gravel soil mostly of sandstone fragments over Mancos shale clay. These are mainly in pinyon-juniper woodlands or in the ecotone between it and salt desert scrub. It is often found in disturbed areas, including old road beds and cattle trails (NatureServe, 2006). Populations of it have been located on the rim of the Gunnison Gorge, outside the boundaries of this study area. Development, grazing and ORV use are the main threats to this plant.

Colorado desert parsley (*Lomatium concinnum*) has several populations in the study area. They prefer barren adobe soils derived from shales of the Mancos Formation in shrub communities dominated by sagebrush, shadscale, greasewood, or scrub oak at 4300-7300 feet elevation. Documented locations include hills south of Hotchkiss, Lazear area, Cedar Hill and Jumbo Mountain near Paonia. Development, sheep grazing and ORV use are potential problems where the plants are not protected. They are located on both BLM and private lands.

Adobe beardtongue (*Penstemon retrorsus*) is a small subshrub found in adobe hills near Crawford and Hotchkiss. It has limited distribution, and land development and off-road vehicles are the main threat to this species; sheep apparently do not graze on this plant (Lyon, 1998).

Reference for all the above species information from the *TES Species Descriptions for the Uncompahgre Field Office* (Van Reyper, 2006).

Migratory Birds

The following table lists the migratory birds that may be present in the North Fork LHA area (Table 1.6). For the purposes of this analysis, the U.S. Fish and Wildlife Service list of Birds of Conservation Concern was used as a tool to complete this analysis (USFWS 2002, Table 16, pg 39 BCR 16 [Southern Rockies/Colorado Plateau]). The table below contains the bird species used for this analysis, their habitat within the North Fork LHA area, and whether they are expected within the project area.

Table 1.6. USFWS list of Birds of Conservation Concern for the Uncompahgre Field Office and the North Fork LHA area.

Common Name	*Scientific Name*	*Habitat*	*May be Present*
[Gunnison Sage-Grouse]	*Centrocercus minimus*	Resident	✓
Black-throated Gray Warbler	*Dendroica nigrescens*	Breeding, mixed woodland	✓
Burrowing Owl	*Athene cunicularia*	Grassland	✓
Chestnut-collared Longspur	*Calcarius ornatus*	Annual, grassland	✓
Ferruginous Hawk	*Buteo regalis*	Grassland, shrub-steppe	✓
Flammulated Owl	*Otus flammeolus*	Open ponderosa	✓
Golden Eagle	*Aquila chrysaetos*	Open woodland	✓
Grace's Warbler	*Dendroica graciae*	Breeding, mixed woodland	✓
Gray Vireo	*Vireo vicinior*	Breeding, pinyon juniper	✓

Common Name	*Scientific Name*	*Habitat*	*May be Present*
Lewis's Woodpecker	*Melanerpes lewis*	Open woodland	✓
Marbled Godwit	*Limosa fedoa*	Riparian	✓
Northern Harrier	*Circus cyaneus*	Agriculture, grassland	✓
Peregrine Falcon	*Falco peregrinus*	Generalist	✓
Pinyon Jay	*Gymnorhinus cyanocephalus*	Resident, pinyon juniper	✓
Prairie Falcon	*Falco mexicanus*	Annual, grassland	✓
Sage Sparrow	*Amphispiza belli*	Shrub steppe	✓
Short-eared Owl	*Asio flammeus*	Generalist	✓
Snowy Plover	*Charadrius alexandrinus*	Riparian	✓
Solitary Sandpiper	*Tringa solitaria*	Riparian	✓
Swainson's Hawk	*Buteo swainsoni*	Agriculture, grassland	✓
Virginia's Warbler	*Vermivora virginiae*	Breeding, dry woodland	✓
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Mixed woodland	✓
Wilson's Phalarope	*Phalaropus tricolor*	Riparian	✓
Yellow-billed Cuckoo	*Coccyzus americanus*	Riparian	✓

Biodiversity Focal Areas

Several efforts to identify and conserve regional and global biodiversity have been initiated by non-governmental groups. The Colorado Natural Heritage Program has been inventorying Colorado counties for the past six years to identify sites that contain high quality plant communities, or assemblages of rare plants, and/or animals that they feel warrant protection and management for biodiversity conservation at a statewide level. Delta County was inventoried in 1996 and 1997 (Lyon and Williams, 1998). Each PCA was ranked for its biodiversity values, protection urgency, and management urgency.

The Nature Conservancy (TNC) has sponsored ecoregional assessments to identify areas important for regional biodiversity conservation. The North Fork LHA area falls into two of these assessments, the Southern Rocky Mountains, and the Colorado Plateau (The Nature Conservancy, 2002). While similar to the CNHP effort in many respects, these assessments are broader in scope in that a region-wide network for biodiversity conservation is identified using computer-based optimization models to identify areas which would most efficiently and cost effectively conserve all of an ecoregion's biodiversity. Because the ecoregional assessments are done at a large scale and not ground-truthed, the areas identified provide only loose guidance as to what the targets for conservation in a given area are, and what the actual location on the ground might be.

The Southern Rockies Ecosystem Project (SREP) is focused on preserving and restoring connectivity across the ecoregion, primarily to provide for the safe movement and migration of various wildlife species (Southern Rockies Ecosystem Project, 2005). Using wildlife experts from throughout Colorado, they have put together a map of important corridors and landscape linkages across the state. These linkages are not highly detailed, but indicate the general locations, types of animals using the corridors, the degree of threat and statewide priority for securing or enhancing each of these corridors.

Figure 1.16 shows all 14 PCAs, the TNC recommended conservation areas, and the SREP important landscape linkages displayed on a map of the assessment area. Table 1.7 shows the important resource values in each of the identified areas, and their relative ranking in terms of conservation importance.

At the present time, the Uncompahgre Basin RMP, as amended, does not place any of these areas or linkages into special management categories that directly benefit the specific resources of the PCA, other than the Needle Rock Outstanding Natural Area. This designation limits many activities in an effort to conserve values associated with the geology and scenic quality of the Needle Rock formation. Many areas of BLM land outside of the ONA are open to off highway vehicle use and new road creation, except in areas which were covered under the North Fork Travel Management Plan which limits travel to existing routes. On most of the BLM lands in the LHA area mineral material disposal, locatable mineral activity, location of rights-of-ways, and livestock grazing are allowed to take place.

Figure 1.16 North Fork LHA area locations identified as being important for biodiversity conservation across the ecoregion, as recommended by the Colorado Natural Heritage Program, The Nature Conservancy, and Southern Rockies Ecosystem Project.

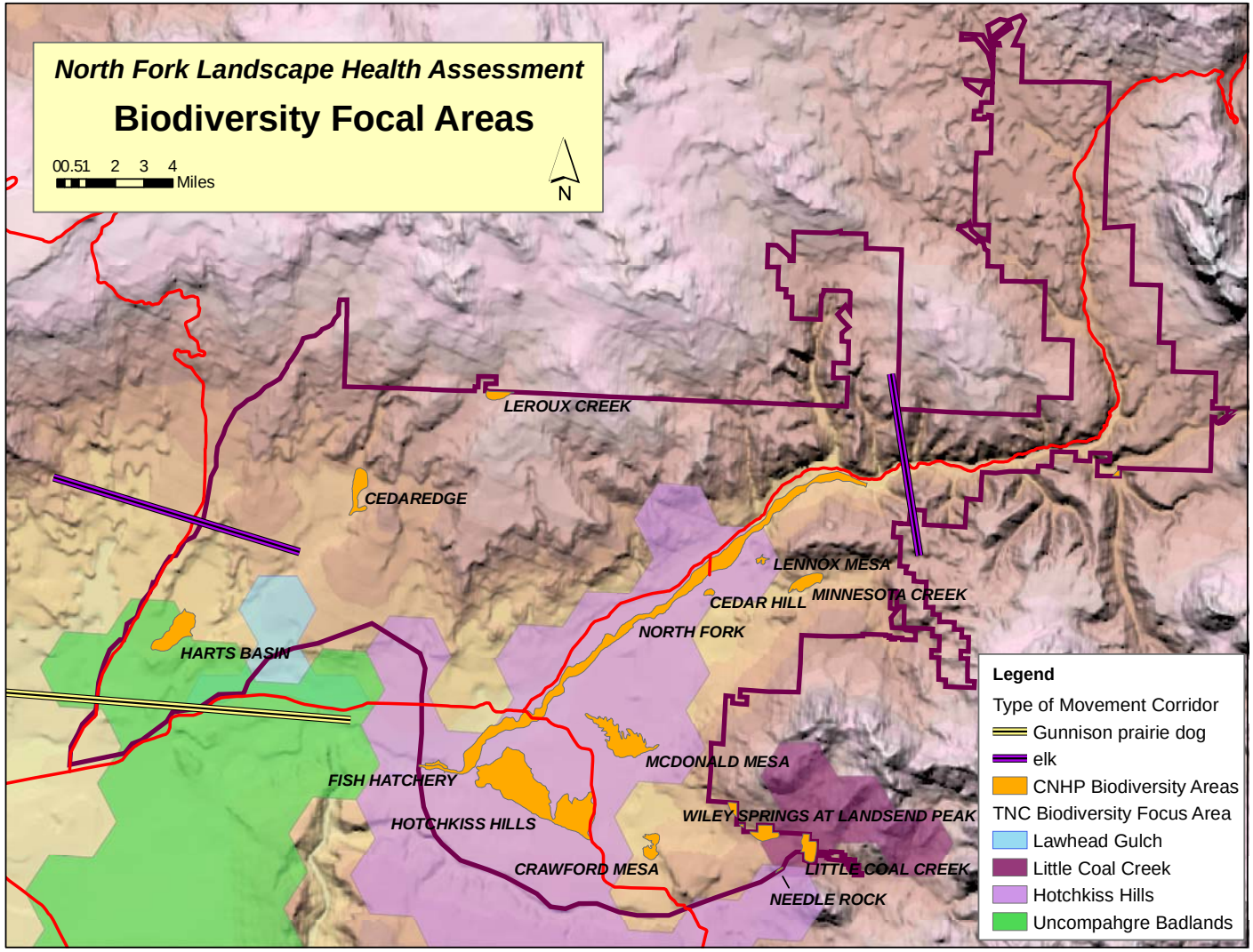


Table 1.7 Recommended conservation areas and linkages in the North Fork LHA area

Site Name	Resource Values	Biodiversity or Conservation Value Rank [1]	Management/ Protection Urgency Rank [2, 3]
CNHP: Cedar Hill	Two fair occurrences of globally imperiled plants: Rocky Mountain thistle *(Cirsium perplexans*) and Colorado desert-parsley (*Lomatium concinnum*)	B3	M4, P4
CNHP: Cederedge	Largest known population of globally imperiled Rocky Mountain thistle; occurrence of state rare amphibian northern leopard frog (*Rana pipiens*)	B3	M2, P5
CNHP: Crawford Mesa	Excellent population of globally restricted adobe beardtongue (*Penstemon retrorsus*)	B3	M3, P3
CNHP: Fish Hatchery	Good quality occurrence of state rare giant helleborine orchid (*Epipactis gigantea*)	B5	M3, P4
CNHP: Harts Basin	Important migratory bird stopover, with concentrations of waterfowl and shorebirds	B3	M1, P2
CNHP: Hotchkiss Hills	Two excellent occurrences of the globally imperiled Colorado desert-parsley	B2	M4, P3
CNHP :Lennox Mesa	An occurrence of globally restricted adobe beardtongue	B4	M4, P5
CNHP: Leroux Creek	A moderately good occurrence of a globally vulnerable plant Grand Mesa penstemon (*Penstemon mensarum*)	B4	M4, P5
CNHP: Little Coal Creek	Good quality examples of two plant communities (aspen wetland forests and lower montane riparian forests), small occurrences of northern leopard frog (State rare amphibian), and globally imperiled plant Rocky Mountain thistle	B4	M4, P5
CNHP: McDonald Mesa	Two good occurrences of globally restricted plant adobe beardtongue, and one of globally imperiled Colorado desert-parsley	B3	M3, P5
CNHP: Minnesota Creek	Two separate populations of globally imperiled Colorado desert-parsley	B3	M5, P5
CNHP: Needle Rock	Scattered population of globally restricted adobe beardtongue, high quality example of mesic pinyon-juniper woodland	B4	M4, P5
CNHP: North Fork	Good to moderate quality examples of narrowleaf cottonwood/skunkbush and Fremont's cottonwood riparian forest communities, a state rare plant Arizona centaury (*Centaurium arizonicum*), two state rare amphibians: northern leopard frog and Great Basin spadefoot (*Spea intermontana*)	B3	M3, P3
CNHP: Wiley Springs at Landsend Peak	Two occurrences of northern leopard frog	B5	M3, P4

TNC: Hotchkiss Hills	Montane, Foothill and Desert Riparian Woodland/Shrublands, Lower Montane Shrubland, Pinyon-Juniper and Juniper Woodland, Sagebrush Shrubland, Semidesert Chaparral, low and high elevation perennial and intermittant headwaters and creeks, small river systems, Black Sagebrush/Salinus Lyme Grass and Narrowleaf Cottonwood-Rocky Mountain Juniper Woodland communities, Narrowleaf Cottonwood/ Skunkbush Sumac Woodland, Eastern Cottonwood/Skunkbush Sumac Woodland, Rocky mountain thistle, Colorado Desert parsley, Gunnison sage grouse, northern leopard frog	Moderate	Overall moderate with high threat from fire regime alteration, habitat loss, and vehicles roads and recreation, moderate threats from energy and mineral development and invasive plants
TNC: Lawhead Gulch	Montane moderate and low gradient large river (granite/volcanic), Montane/foothills moderate and low gradients headwaters, creeks (shales/ sandstones/limestones, Colorado River cutthroat trout, Winterfat shrub steppe	NA	Dam operation, residential development, fire management, invasive plants, mining, recreational vehicles, road/utility corridors, trails
TNC: Little Coal Creek	Alpine/montane steep and very steep gradient headwaters, creeks (granite/volcanic), Colorado River cutthroat trout, Gambel's oak shrubland	NA	Fire management, grazing practices, invasive plants, special spp management, parasites/ pathogens
TNC: Uncompahgre Badlands	Foothill and Desert Riparian Woodland/Shrubland, Lower Montane Shrubland, Mixed Salt Desert Scrub, low and high elevation perennial and intermittant headwaters and creeks, small river systems, Narrowleaf Cottonwood/River Hawthorn Woodland, Narrowleaf Cottonwood/Strapleaf Willow-Silver Buffaloberry Woodland, Clay-loving wild buckwheat, good-neighbor bladderpod, Colorado desert parsley, kit fox, bald eagle, northern leopard frog	Moderate	Moderate overall with high threat from fire regime alteration, habitat loss, and vehicles, roads and recreation, moderate threats from energy and mineral development, and invasive species
SREP: elk	Elk migration from summer to winter ranges and from one herd area to another	NA	Unknown
SREP: Gunnison prairie dog	Movement from one area of colonies to another	NA	Unknown

[1] Biodiversity Rank: B1= Outstanding significance such as the only known site for a globally species. B2= Very high

significance, such as one of the best examples of a community type, or good occurrence of a globally imperiled species or a species with very restricted range. B3= High significance, such as an excellent example of any community type or a good occurrence of any species with very restricted range or a good occurrence of a state rare species.

[2] Management Urgency Rank: M1=Management action required at once to prevent the loss or irreversible degradation of one or more of the species or communities for which the PCA was identified. M2= Management action required within 5 years to prevent the loss of one of the items for which the PCA was identified. M3= Management action needed within 5 years to maintain the current quality of identified resources. M4= Management actions may be needed in the future to maintain the quality of the identified resources. M5= No serious management needs identified. U=Uncategorized.

[3] Protection Urgency Rank: P1: Immediately threatened by severely destructive forces, within 1 year of rank date; protect now or never. P2: Threat expected within 5 years. P3: Definable threat but not in the next 5 years. P4: No threat is known for the foreseeable future. P5 Land protection complete or adequate reasons exist not to protect the site; do not act on this site.

Surface and Ground Water

The North Fork Landscape Unit includes portions of 3rd and 4th field Hydrologic Units (14020004 – North Fork Gunnison, 14020005 – Lower Gunnison, 14020002 – Upper Gunnison). Table 1.8 and Figure 1.17 shows the Hydrologic Unit subdivision of the LHA area to the 5th field watershed level and the associated area included in this assessment.

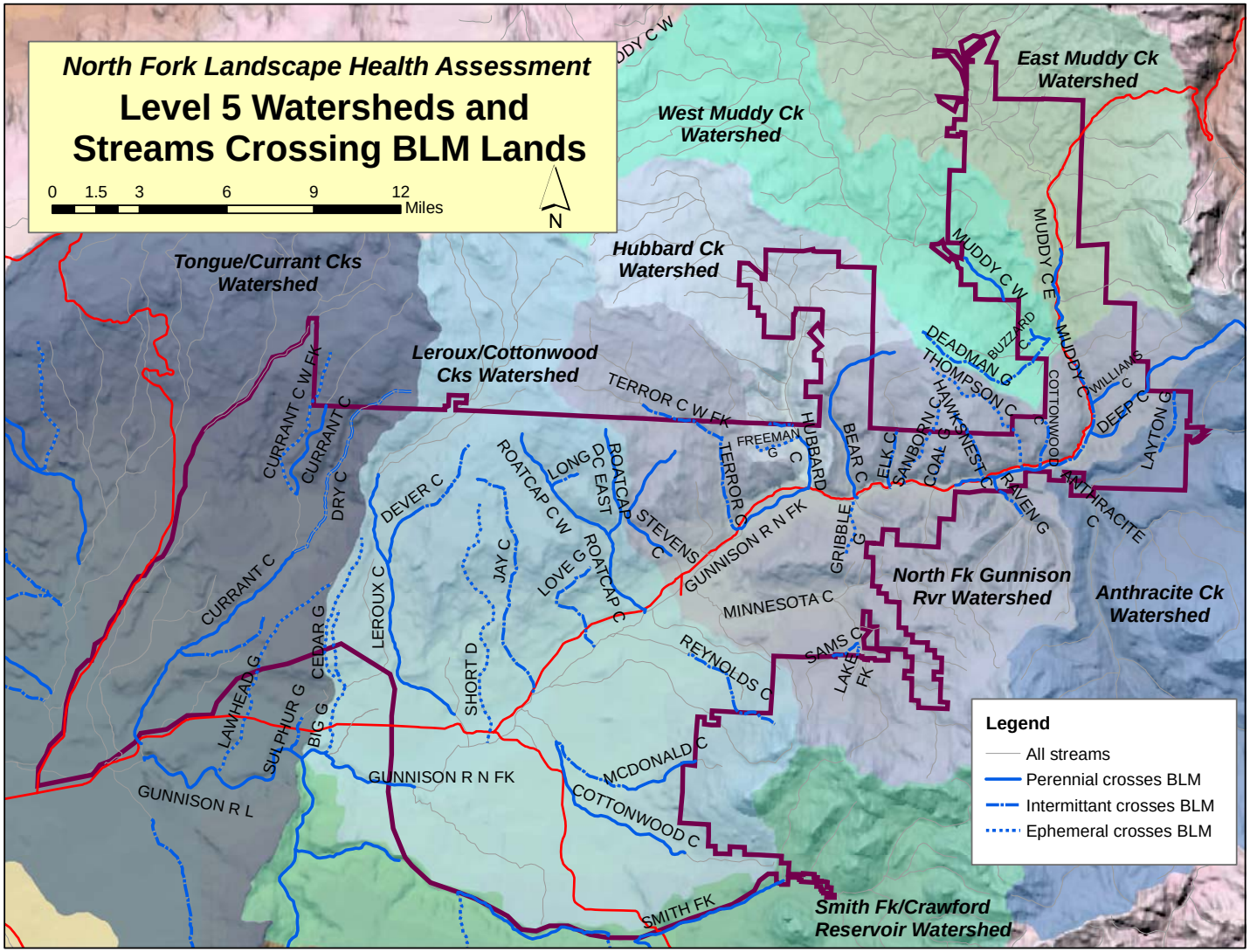
Table 1.8 Watershed Subdivisions (Hydrologic Unit Codes) and Water Quality Classifications, and Standards for the North Fork Landscape Unit.

5th Field Watershed	***Land Status Acres***		***Stream Segment***	***Stream Designation***	***Stream Classification***
	BLM	***Other***			
1402000409 East Muddy Creek	530	16,413	East Muddy Creek and tributaries		Aquatic Life Cold 1 Recreation E Water Supply[4] Agriculture
14002000455 West Muddy Creek	426	7,384	West Muddy Creek and tributaries		Aquatic Life Cold 1 Recreation E Water Supply Agriculture
1402000456 Hubbard Creek	1,563	8,639	Hubbard Creek		Aquatic Life Cold 1 Recreation P Water Supply Agriculture
			Tributaries to Hubbard Creek	Use Protected[5]	Aquatic Life Warm 2 Recreation P Agriculture
1402000513 Tongue/Currant Creeks	6,902	43,524	Tongue Creek		Aquatic Life Cold 2 Recreation P Agriculture
			Tributaries of Tongue Creek, Currant Creek and tributaries	Use Protected	Aquatic Life Warm 2 Recreation N Water Supply Agriculture
1402000458 Leroux/ Cottonwood Creeks	32,310	84,815	Leroux and Jay Creek, Roatcap Creek and tributaries		Aquatic Life Cold 1 Recreation P Water Supply Agriculture
			All other tributaries to the North Fork	Use Protected	Aquatic Life Warm 2 Recreation P Agriculture

5th Field Watershed	Land Status Acres		Stream Segment	Stream Designation	Stream Classification
	BLM	Other			
1402000407 Anthracite Creek	959	4,045	Anthracite Creek and tributaries		Aquatic Life Cold 1[1] Recreation E Water Supply[4] Agriculture[3]
1402000411 North Fork Gunnison River	22,888	39,463	North Fork Gunnison River		Aquatic Life Cold 1 Recreation P Water Supply Agriculture
			Minnesota and Terror Creeks		Aquatic Life Cold 1 Recreation P Water Supply Agriculture
			All other tributaries to the North Fork Gunnison River	Use Protected	Aquatic Life Warm 2[1] Recreation P Agriculture
1402000205 Smith Fork/Crawford Res.	489	3,272	Smith Fork		Aquatic Life Cold 1 Recreation E Agriculture
			Tributaries to the Smith Fork	Use Protected	Aquatic Life Warm 2 Recreation P Agriculture

1 - Waters are designated either warm or cold based on water temperature regime. Class 1 water's are capable of sustaining a wide variety of cold or warm water biota, while class 2 waters are not.
2 -Class E - Existing Primary Contact Use - These surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.
- Class P - Potential Primary Contact Use - These surface waters have the potential to be used for primary contact recreation. This classification shall be assigned to water segments for which no use attainability analysis has been performed demonstrating that a recreation class N classification is appropriate, if a reasonable level of inquiry has failed to identify any existing primary contact uses of the water segment, or where the conclusion of a UAA is that primary contact uses may potentially occur in the segment, but there are no existing primary contact uses.
- Class N - Not Primary Contact Use - These surface waters are not suitable or intended to become suitable for primary contact recreation uses. This classification shall be applied only where a use attainability analysis demonstrates that there is not a reasonable likelihood that primary contact uses will occur in the water segment(s) in question within the next 20-year period.
3 - Waters that are suitable for irrigating crops usually grown in Colorado.
4 - Waters that are suitable or intended to become suitable for potable water supplies.
5 - The Colorado Water Quality Control Commission designates waters of the state, "Use Protected" if they do not warrant special protection provided by the outstanding waters designation or the antidegradation review process.

Figure 1.17 North Fork LHA area streams and 5th level watersheds.



The major waterways in the assessment area include: the North Fork of the Gunnison, the Muddy Creeks, Anthracite Creek, Minnesota Creek, Hubbard Creek and Leroux Creek. The major drainages in the landscape unit experience high flows from both snowmelt and rainfall events. The snowmelt is typically generated from the high elevation headwater areas. Short duration flood flows occur from high intensity precipitation events associated with monsoonal air flow patterns in mid to late summer. Typically, these summer floods are localized and more significant on low order drainages.

Annual precipitation varies from about 10 inches at the lower elevations in the valley bottoms to more than 24 inches at the higher elevations. From 25 to 50% of the annual precipitation falls as snow during the colder months, depending on elevation. Most of the precipitation outside of the mid to late summer season occurs from frontal type storm systems, which are typically regional in size. Precipitation from frontal events occurs over a relatively long duration but at low intensity rates. In contrast, summer precipitation is commonly associated with the southwest monsoon air flow pattern, which can produce localized, short duration, and intense precipitation events.

Table 1.9 shows chemical water quality characteristics of the landscape area's surface waters. Because of the similar geology throughout the LHA area, all waters sampled show the dominant anion/cation as calcium-bicarbonate. Nitrate and phosphate concentrations, being largely responsible for eutrophication of aquatic environments, are in relatively low concentrations in the streams sampled in the LHA area. Data from USGS Open File report 97-233 showed average nitrate and phosphate concentrations average 0.81 mg/l (2,076 samples) and 0.09 mg/l (287 samples), respectively, in the Upper Colorado Basin. All of the stream's sample averages in the LHA are lower than the Upper Colorado Basin average.

Bacterial analyses (E. coli.) of flowing water bodies were collected in the spring of 2005 (see Table 1.10.) The State Recreation Classification of "P" imposes an E.coli limit of 205 Colony Forming Units (CFU)/100 ml of sample. None of the streams sampled exceeded the state limit for E.coli. To make a conclusive determination on these streams' compliance with the state standards for bacteria would require a more intensive sampling regime, because of the temporal variability of bacterial concentrations in natural water bodies. However, with all samples having much lower concentrations of E.coli than the standard, under a variety of flow and use conditions, this limited sample serves as a reasonably reliable indicator that these streams are in compliance with the state standards.

The Colorado's Unified Watershed Assessment (Table 1.11), 12/1998, ranked both the North Fork Gunnison and Lower Gunnison Basin's as Category 1, defined as "Watersheds in Need of Restoration".

Table 1.9 Water quality summary for the major streams in the North Fork LHA area

Stream	Date	Flow Rate (CFS)	EC umhos/cm	Temp. C	Dominant Ions	Selenium mg/l	Nitrate mg/l	Phosphate mg/l
Leroux Creek UTM:258362 430112	8/17/2005	3.3	207	20.4	calcium-bicarbonate	U1	U1	U1
Leroux Creek UTM:258362 430112	6/21/2005	187	3,970	12.8	calcium-bicarbonate	U	U	
Hubbard Creek	8/17/2005	4.5	269	14.6	calcium-bicarbonate	U	U	0.01
Dry Creek UTM:254968 4311755	6/17/2005	9.4	224	14.3	calcium-bicarbonate	U	0.03	
Bear Creek UTM: 284180 4211246	6/8/2005	1.5	200	14.7	calcium-bicarbonate	U		
Williams Creek	8/15/2005	0.5	225	15.1	calcium-bicarbonate	U		0.07
Williams Creek	6/7/2005	0.7	255	12.3	calcium-bicarbonate	U		
Roatcap Creek	8/16/2005	0.2	222	18.3	calcium-bicarbonate	U	0.06	0.01
Minnesota Creek UTM:279520 4304584	8/16/2005	0.06	1470	23.6	calcium-bicarbonate	U	U	
Minnesota Creek UTM:279520 4304584	6/8/2005	110	356	8.7	calcium-bicarbonate	U	0.08	0.04

1- Analyte was analyzed for but not detected

Table 1.10 Bacterial Concentrations in Selected Surface Waters of the North Fork LHA Area.

Date	Water Source	Estimated Water Flow CFS	Evidence of Livestock Grazing	E. Coli CFU/100 ml	Fecal Coli CFU/100 ml	Temp. C	State Stnd. E. Coli CFU/100 ml
8/23/2005	Leroux Creek UTM:258362 430112 NAD 83	3.3	NO	4	4	20	205
8/23/2005	Minnesota Creek UTM:279520 4304584 NAD 83	0.04	YES	112	107	20	205
8/23/2005	Hubbard Creek UTM: 281705 4312411 NAD 83	4.5	NO	80	94	15	205
8/23/2005	Roatcap Creek UTM: 270701 4307106 NAD 83	0.18	NO	170	172	15	205
8/23/2005	Williams Creek UTM: 297713 4316399 NAD 83	0.5	NO	120	128	12	205

Table 1.11 Colorado Unified Watershed Assessment Ranking

4th Field Watershed	Category Rank*	Category Ranking for BLM Portion of Watersheds	Rationale for ranking
14030002 Upper Gunnison	3	BLM - 2	- >50% federally managed - Colorado River cutthroat trout in headwaters
14020005 Lower Gunnison	1	BLM- 4	- mainstem is medium priority segment on the (303)d list. - BLM is major land manager. - warm water habitat for T&E fish species - lower Gunnison Salinity Project - Selenium TMDL
14020004 North Fork Gunnison	1	No specific BLM ranking	- 50% federal land - temporary modification for Selenium (several segments on (303)d list) - Information received from local watershed organization indicates restoration needs

* Unified Watershed Assessment ranking are defined as:

Category 1: Watersheds in need of restoration.
Category 2: Watersheds meeting goals.
Category 3: Watersheds with pristine/sensitive aquatic system conditions on lands administered by federal, state, or tribal governments
Category 4: Watersheds with insufficient data to make an assessment.

Table 1.12 Water Quality Limited Stream Segments Requiring the Implementation of the Total Maximum Daily Load Process (TMDLs) – (303)d List

Segment Description	Portion	Impairment	Priority
Tributaries to Gunnison River, Crystal reservoir to Colorado River	All[1]	Selenium	High
Tributaries to the North Fork Gunnison, USFS boundary to North Fork	Leroux Creek, Jay Creek, Big Creek, Short Draw	Selenium	Low
Tributaries to North Fork Gunnison not on USFS property	Cottonwood Creek[2]	Selenium	High

1 - before any TMDL is developed and implemented in "all tributary" segments, work will be performed to determine the causes and locations of the impairment, such that efforts and controls are not inappropriately directed towards individual tributaries that are not truly of concern, and the Section 303(d) List can be modified accordingly.
2 –The state of Colorado has deemed it appropriate that only that portion of the segment for which non-attainment has been documented be included on the list. The Commission has identified the affected portion of the segment as "Cottonwood Creek".

Table 1.12 contains the streams in the LHA area that are water quality limited, or in violation of state water quality standards. The impairment for all (303)d listed streams is excessive selenium. The excessive selenium has been shown to be impacting the reproductive success of threatened and endangered, warm water fish species in the Lower Gunnison and Colorado Rivers. The primary source of the selenium is the Mancos shale formation, which outcrops over much of the lower elevations of the North Fork Valley. The highest concentrations of selenium are found in streams where selenium leaching from the Mancos shale is accelerated by human related activities such as irrigation practices, septic systems, and unlined canals. Upstream from the major irrigated areas in the Gunnison River Basin, selenium concentrations are generally less than 1 ppb, but downstream from irrigated areas, the selenium concentrations in surface waters often exceed 5 ppb, the state water quality standard. As shown in Table 1.9, selenium was in undetectable quantities in water samples from major tributaries in the North Fork Valley, that drain BLM managed public land. Stream segments listed on the (303)d list are subject to an analysis called the Total Maximum Daily Load (TMDL) process. The TMDL is an estimate of the greatest amount of a specific pollutant, in this case selenium, that a given water body or stream segment can receive without violating water quality standards. As part of the TMDL process, the State must quantify the pollution sources and determine allowable loads to both point and non-point pollution sources.

The Gunnison Basin Selenium Task Force was formed to address the selenium problem in the Gunnison Basin. The task force is a group of private, local, state and federal agencies committed to finding ways to reduce selenium and aid in the development TMDLs.

Table 1.13 Water Bodies Identified By the State of Colorado for Monitoring and Evaluation.

Segment Description	Impairment
Surface Creek not on USFS land	Selenium
Surface Creek not on USFS land	Fe (Total recoverable)

Table 1.13 lists the stream segments in the LHA area that are on Colorado's Monitoring and Evaluation List. This list identifies water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more listing factors, such as the representative nature of the available data. Water bodies that are impaired but whether the cause

of impairment is attributable to pollutants as opposed to pollution is unclear are also included on the M&E List.

Macroinvertebrates:

Aquatic macroinvertebrate population density and composition are commonly evaluated to assess the stream health. Macroinvertbrates are good indicators of stream health, as there are usually many species that are relatively immobile, many invertebrates are sensitive to pollutants and because of their year round presence in the stream environment and they are capable of reacting to intermittent discharges.

Several instream factors control the composition and abundance of stream invertebrates, including: river flow rate and water velocity, channel substrate size and concentration of suspended solids, winter processes such as river icing, the composition and density of aquatic and riparian vegetation, and the chemistry of the river's water.

Table 1.14 shows stream sites within the LHA area that were sampled for aquatic macroinvertebrates. Generally, the abundance of macroinvertebrates in all 5 streams sampled is indicative of less than desirable habitat conditions. All 5 streams sampled show lower invertebrate abundance, and especially lower abundance of preferred species, than the average for the Southern Rockies Ecoregion. The most likely cause for low invertebrate production is water depletion of these streams by diversions, etc., and the resultant higher water temperatures.

Table 1.14 Stream Macroinvertebrates

Stream	Date	Total Abundance[1]	EPT Abundance[2]	Dominant Family[3]	Disturbance Intolerant Abundance[4]	Disturbance Tolerant Abundance[5]
Hubbard Creek	8/17/2005	63	23	Chironomidae	7	0
Leroux Creek	8/17/2005	1999	769	Simuliidae	20	0
Roatcap Creek	8/16/2005	3	0	Elmidae	0	0
Minnesota Creek	8/16/2005	3	0	Chironomidae	16	0
Williams Creek	8/18/05	4148	2208	Baetidae	257	5
Southern Rockies Ecoregion Average (mean of 577 samples at 408 sites)		4,117	2,332		1,091	274

1- The number of aquatic macroinvertebrates per unit area is an indicator of habitat availability and is influenced by flow regime and changes in water quality.
2- The number of aquatic macroinvertebrates among the insect Orders: Ephemeroptera, Plecoptera, and Tricoptera. These insect orders are commonly considered sensitive to water quality degradation.
3- The family of macroinvertebrates with the highest occurring number of individuals.
4- Macroinvertebrates with a Hilsenhoff Biotic Index of between 0-2, which indicates clean water taxa, intolerant of pollution.
5- Macroinvertebrates with a Hilsenhoff Biotic Index of between 9-10, considered pollution tolerant taxa.

Ground water occurrence in the LHA area occurs in bedrock aquifers in the Mesa Verde formation, and in unconsolidated surface deposits of alluvium and colluvium. Ground water in the bedrock aquifers flows in the direction of the geologic dip, approximately 4 degrees to the northeast. Because of this condition, groundwater in the Mesa verde formation is eventually lost to the North Fork Valley, flowing to northeast under Grand Mesa. On public lands within the LHA area, there are about 12 known springs, most discharging from small localized, unconsolidated aquifers. On average they have good water quality, with Total Dissolved Solids concentrations less than 500 ppm

METHODS

The land health assessment was conducted on public lands in the North Fork LHA Unit during the period spanning April through June of 2006. The following procedures were used:

1). The area was first broken apart into 53 different polygons. Polygons were based on ecological sites (NRCS-USDA 2002) derived from soil mapping units and allotment boundaries. Polygons ranged from 19 to 5,967 acres in size. Some ecological sites within allotments were too small or minor to evaluate, and are categorized as "Unknown".

2). The interdisciplinary team made up of range, wildlife, ecology, hydrology, and T&E specialists 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 two to 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 one to five sites spread across the polygon. The sites were predetermined on maps, and not subjectively chosen in the field. Data collection occurred in the field. Most points were mapped by a GPS unit in the field. A photo of each site was also taken.

4). Riparian Proper Functioning Condition (PFC) data was collected at points along nearly all perennial and intermittent streams within each grazing allotment during the summer of 2005. Where data was not collected, PFC data from 1995-1997 was used. This data was used to address Standard 2.

5). In addition to the PFC data, water chemistry was analyzed, and macroinvertebrate samples were collected in 2005 at the PFC points where there was live water. 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.

6). A comprehensive weed inventory of the North Fork LHA area was conducted in the summer of 2006. All likely sites for weed invasion were visited in the field, and weed infestations that were found were documented and data entered into GIS. Likely sites for invasion included known soil disturbances, drainages and travel corridors.

7). Data from the field forms and location data was entered into an ARCGIS personal geodatabase. The databases were 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 mean values were then used as a standard of comparison to assess each individual site for some parameters.

8). A final determination for Standards 1 and 3 for each polygon was made by the ID team. This was done by identifying problems with the range health indicators or by finding substantially lower than average values for the ecological site type. Problems were defined as a score of 1 or 2 for the following health indicators: runoff drainages, pedestals, plant distribution, community diversity, exotic plants, or noxious weeds; or for scores of 10% worse than average for soil cover or plant cover. Browse plant vigor attributes were also considered. 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 (minor 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.

9). Polygon rating (Meeting, Not Meeting, Meeting With Problems) was then entered into the geodatabase, along with land health problems and causes. Causes for polygons not meeting or meeting with problems for any standard were discussed by an ID team. The team considered evidence which included observations made on the site of possible disturbances, grazing dates, actual use, records of past treatments, and proximity to roads and recreational or mining related disturbance.

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

11). Large scale health issues were assessed by using a remotely sensed vegetation map (from 1993 Landsat imagery) and the desired landscape map that has been developed through the fire planning process, in addition to wildlife population data.

12). 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 Health Evaluation.

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 or other N/A**
Meeting	Meeting with problems			
31,833	28,399	1,472	4,065	356

See figure 2.1 for map showing polygon ratings.

Specific Problems
Active Soil Erosion-Pedestals and Gullies

Soil erosion is a concern because it reflects loss of site productivity and potential that usually cannot be regained for centuries or more. Gullies along with other downcutting or widening drainage channels, and the formation of pedestals on the soil surface were the primary indicators used to evaluate active soil erosion. Although the great majority of sites visited did not have active soil erosion problems, gullying and pedestals occurred at significant levels in one area in the southern part of the LHA unit (see Figure 2.2).

Active Soil Erosion–Runoff Drainages

Runoff drainages 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 an important source of soil erosion, carrying off soil particles as it goes. An additional concern is that water which does not enter into the soil is unavailable for plant growth. This reduces productivity in an area that is already constrained by a dry climate. Runoff drainage problems were a very minor problem across the unit (Figure 2.3). However, one area had multiple sites with runoff drainage problems. While one of these areas was on a steep slope which typically decreases infiltration and increases the velocity and erosive force of runoff, other problem areas were on flatter parts of the landscape where water should infiltrate into the soil more readily.

Figure 2.1 North Fork LHA Standard 1 Polygon Ratings.

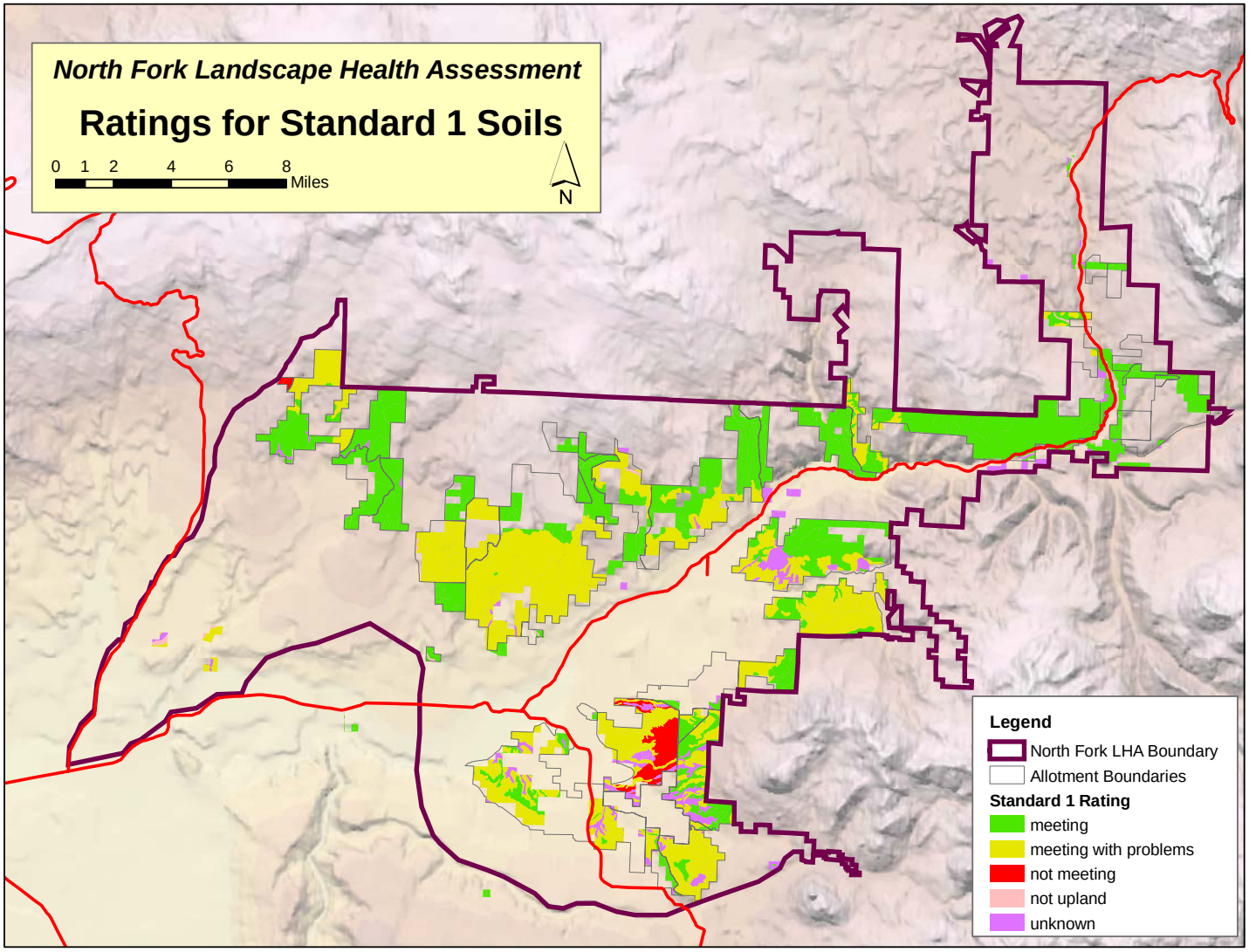


Figure 2.2 North Fork LHA Area soil erosion problems: map shows all sites with gully activity (Rosgen type F and G channels), and soil pedestals (sites with scores of 1 or 2 on the Rangeland Health Indicators data sheet.

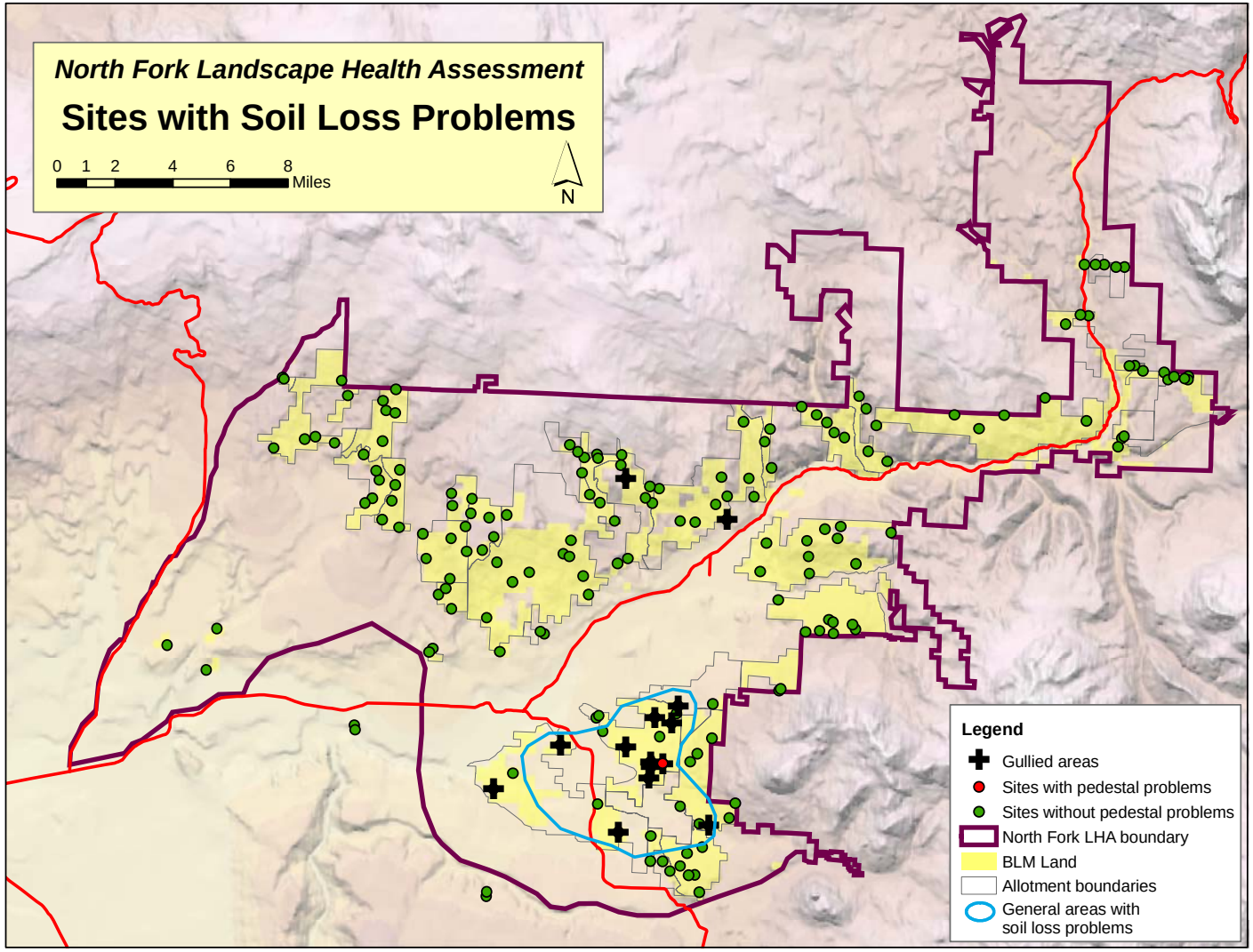
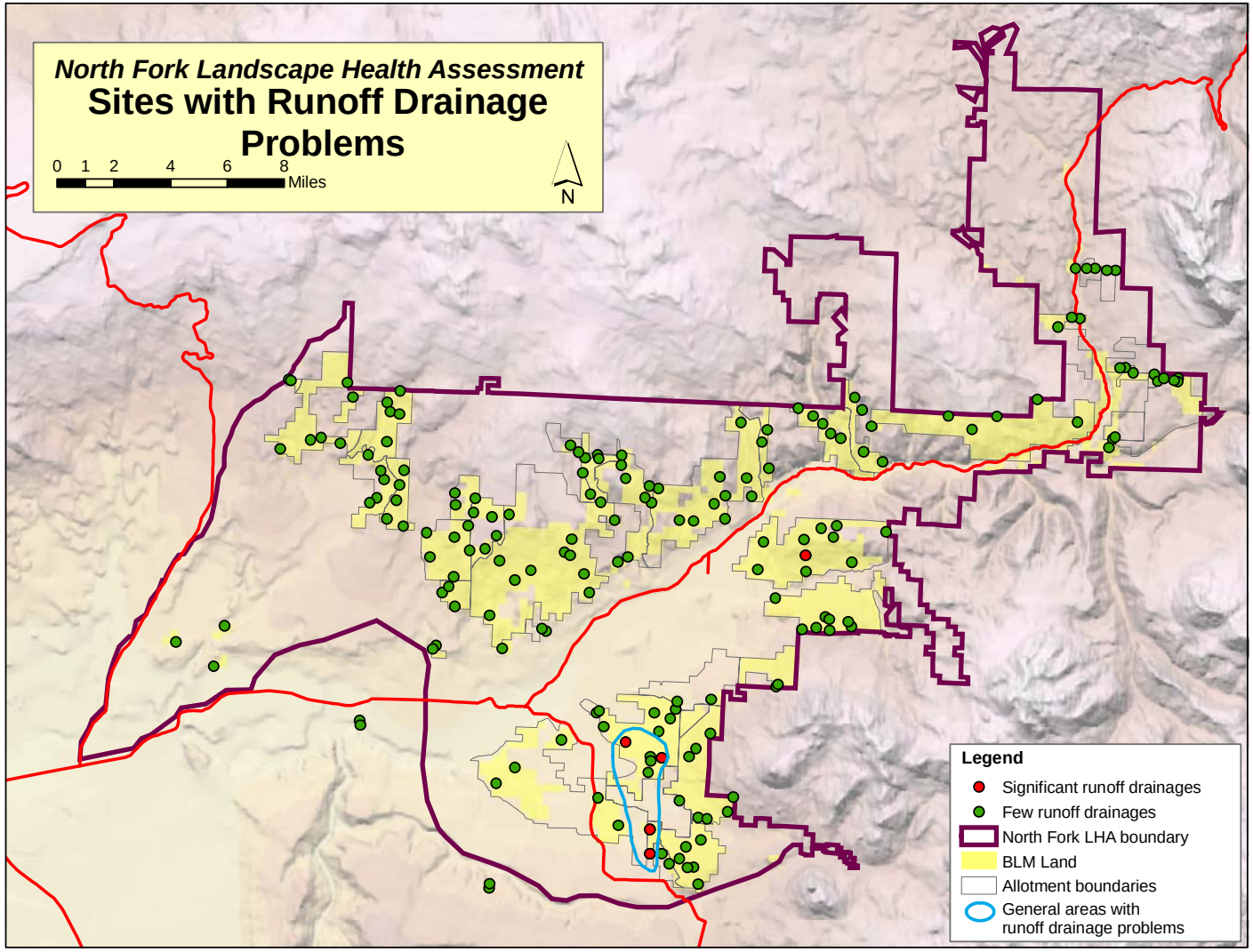


Figure 2.3 North Fork LHA Area runoff related problems. Sites with erosion associated with overland flow: runoff drainage scores of 1 or 2 on the Rangeland Health Indicator sheet are considered problem sites.



Elevated Bare Soil Levels

Bare soil is that part of the ground surface that is not protected by rock, plant basal area, cryptogamic crust, 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 the soil's vulnerability to erosion. Bare soil is a widespread problem across the unit (Figure 2.4), as many sites sampled had substantially higher bare soil than the average values for the ecological sites. Locations with numerous problem sites were found throughout the LHA area and are identified by blue circles in Figure 2.4.

Low Plant Basal Cover

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 crowns of perennial plants (basal area) 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 occurs at many sites throughout the LHA area, but not to the degree that bare soil does (Figure 2.5). Most of the areas where low plant basal cover is found are located on the slopes of Grand Mesa.

Low Litter Cover

Litter (the term for dead plant parts on the soil surface) is another plant-related source of soil protection. Litter is made up of persistent or long term litter which is typically the larger and woodier component, and nonpersistent litter which is finer and quickly degrades. Although the nonpersistent portion of litter tends to be less permanent than plant basal cover, persistent and nonpersistent together serve to protect the soil surface and enhance water infiltration by slowing movement of overland flow of water. In addition, as litter decomposes it adds to the organic material in the soil, increasing soil productivity. Low litter cover was another widespread problem in the unit (Figure 2.6). Many areas throughout the unit had numerous sites with significantly lower than average litter than the site and vegetation community are capable of producing.

Figure 2.4 North Fork LHA Area sites vulnerable to soil erosion because of high levels of bare soil. On this map red dots denote sites with bare soil levels worse than 10% higher than average for the ecological site.

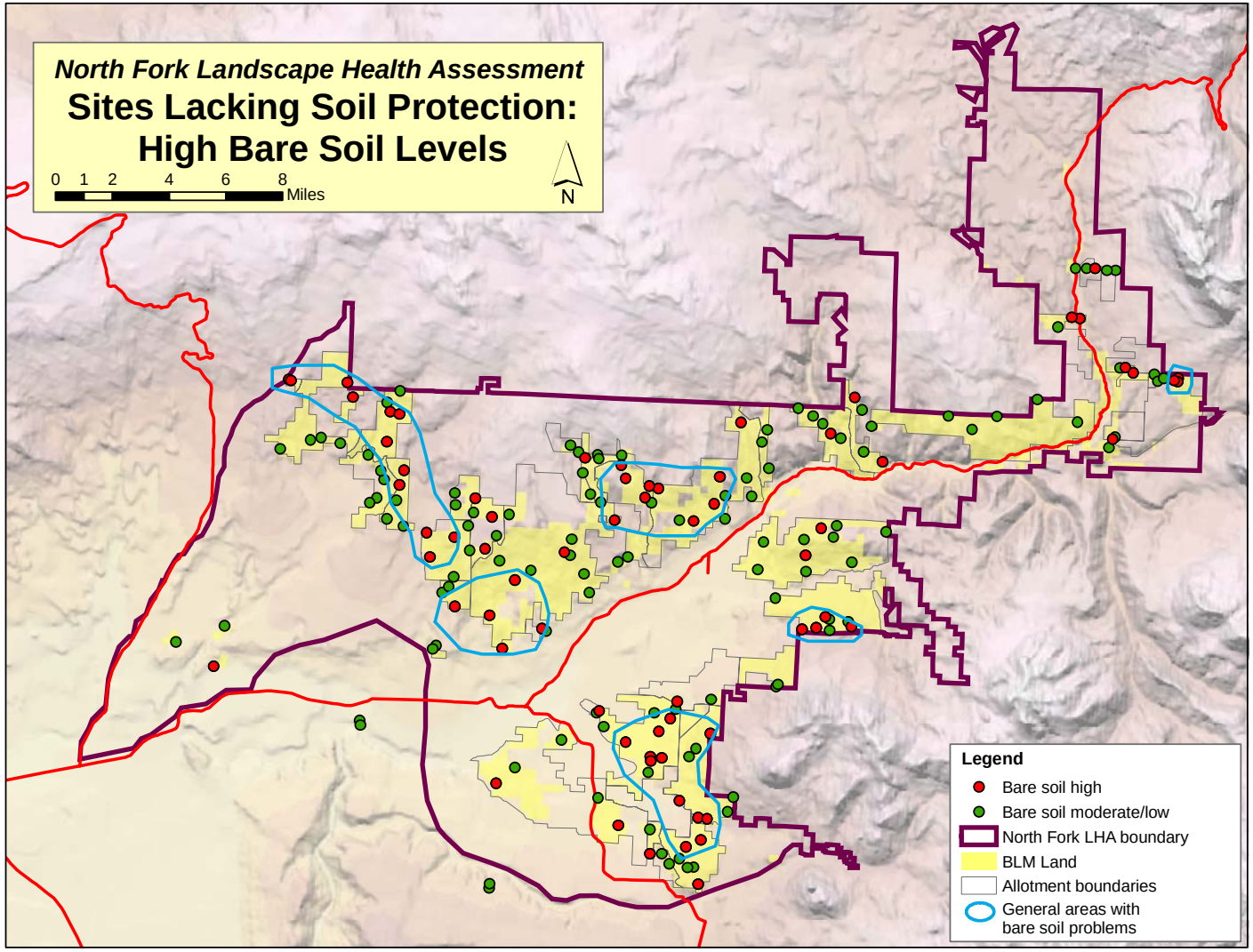


Figure 2.5 North Fork LHA Area sites with low plant basal cover. On this map red dots denote sites with basal area cover worse than 10% below average for the ecological site.

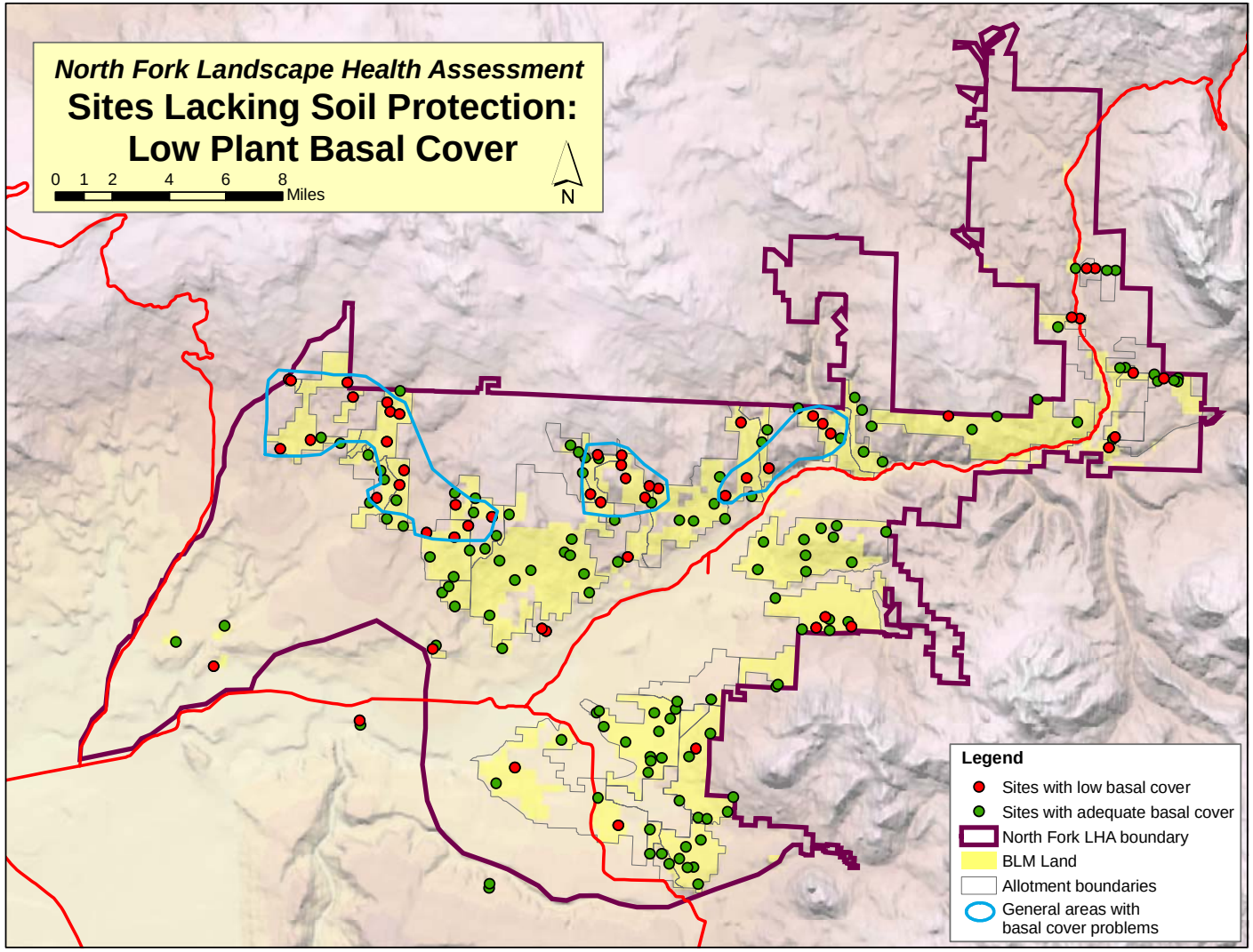
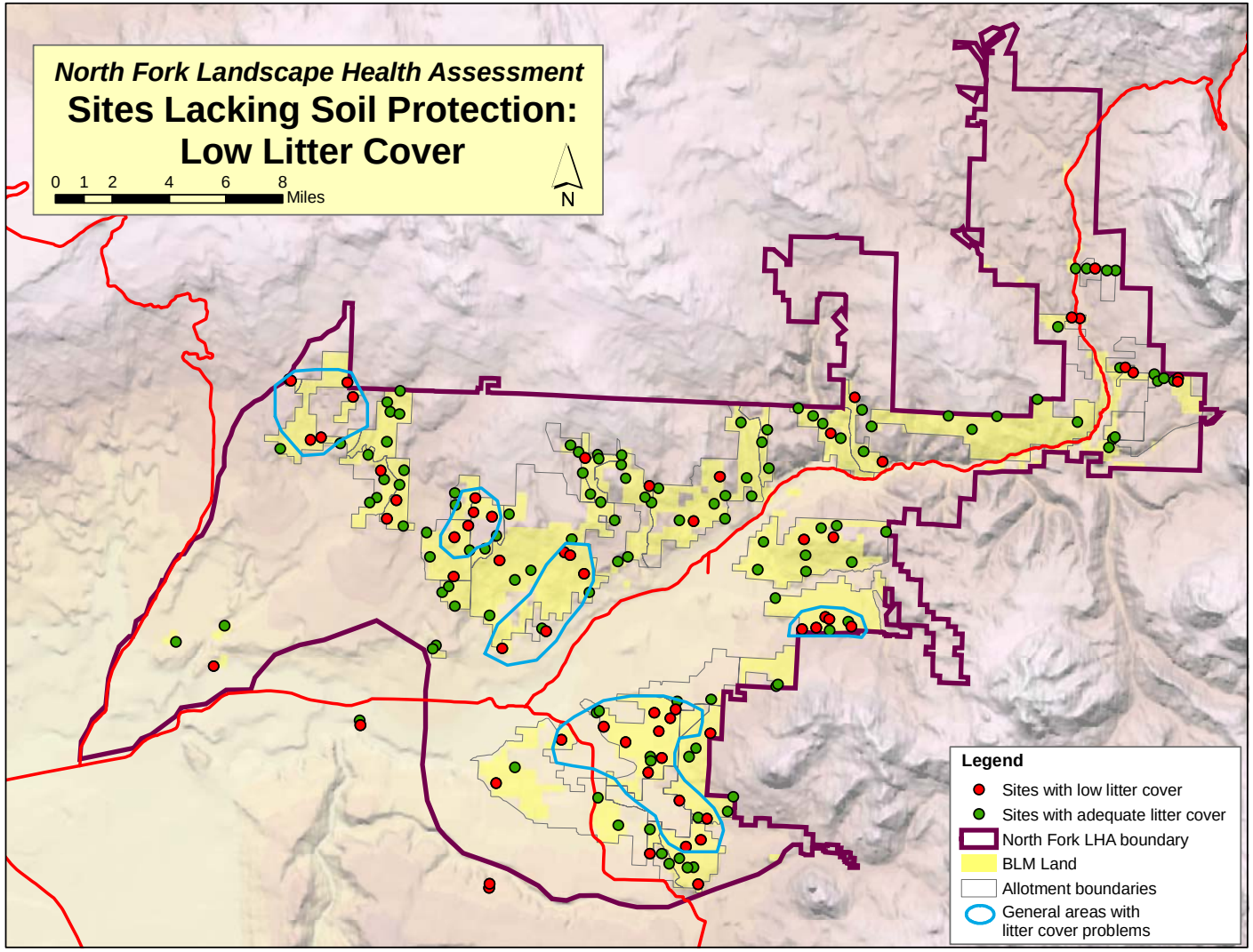


Figure 2.6 North Fork LHA Area sites with low litter cover. On this map, red dots denote sites with litter cover worse than 10% below average for the ecological site.



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		
39.1 miles	5.9 miles	2.6 miles	2.1 miles

See figure 3.1 for stream segment ratings.

Specific Problems

The majority of riparian areas on public land in the landscape unit fully meet Standard 2. These streams have no evident problems with hydrology, vegetation, or excessive erosion and deposition from either the stream channel or from the watershed, with the exception of weed problems which are not yet affecting stream functionality. This is the case despite significant flow alterations from extensive water developments and manipulations throughout the region. Out of the total 49.7 miles of perennial or intermittent streams, 5.9 miles were rated as "functioning at risk", which we have translated into "meeting Standard 2 with problem areas". An additional 2.6 miles did not meet Standard 2. All problem streams are detailed below.

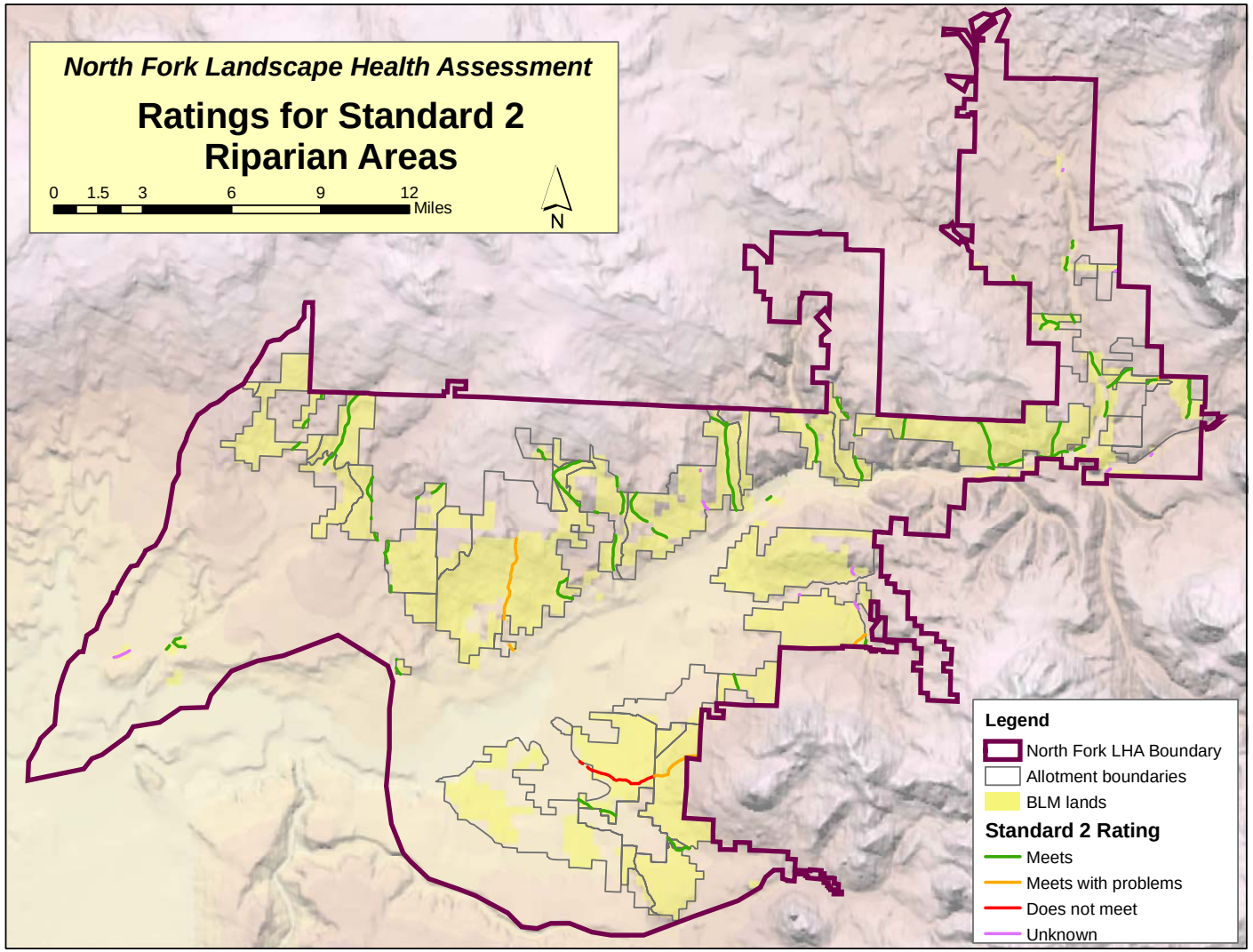
Deep Creek

A short reach (0.5 miles) of this perennial stream passes through BLM. When it was last evaluated in 2005, a portion (0.2 miles) of this reach was noted as having some problems that pose a threat to stream functionality. These problems related to stream channel and floodplain characteristics. The floodplain appeared too high to receive the appropriate amount of flooding, and there was a blow out with large trees fallen across indicating channel instability. Four ditches divert water and/or cross Deep Creek: Elk, Deer, Elkhorn Stomp and Fillmore Ditches cross Deep Creek above the BLM and undoubtedly alter its flow downstream.

Jay Creek

About 3.1 miles of this intermittent stream which feeds into the North Fork of the Gunnison were rated as a high "Meeting Standard 2 with Problems" in 2005. The problems were limited in scope and mainly related to vegetation. While there was healthy and abundant riparian vegetation in many areas, some areas showed inadequate cover to protect banks during high flows, and in some cases the streambank vegetation was made up of species with inadequate rooting types to

Figure 3.1 North Fork LHA Standard 2 ratings. Only streams with perennial or intermittent flow are considered for this standard.



withstand flooding. Noxious weeds were scattered through the riparian vegetation. Streamflows in this creek are evidently altered by irrigation and other water management practices, which probably has affected the amount of riparian vegetation in some places along the channel. Jay Creek appears to originate not far upstream, in West Reservoir No. 1. This clearly has influenced flows.

McDonald Creek

This stream is a deeply incised channel through Mancos Shale soils with remnant riparian vegetation interspersed with upland species. Just under 4.4 miles of this stream had problems. Riparian problems were most pronounced along the 2.6 mile lower reach, which was rated as not meeting Standard 2. The upper reach (1.8 miles) was rated as meeting Standard 2 with problems. Riparian vegetation along the stream was inadequate overall, occurring along no more than 25% of the stream, and exhibited low vigor. Canada thistle was also a common element of the vegetation. In addition, the channel showed lateral and vertical instability, lack of floodplain function, inability to dissipate stream energy, and imbalances between water and sediment. McDonald Creek is a short stream which arises from Todd Reservoir and associated springs up on Forest Service land. Streamflow is clearly controlled by the small reservoir and diverted by two pipelines and one ditch prior to reaching BLM.

Sams Creek

About 0.8 miles of Sam's Creek are rated as meeting Standard 2 with problems. This stream exhibited both channel and vegetation problems, including some areas with poor ability to dissipate stream energy, lack of adequate riparian vegetation cover, age class and species composition diversity problems, and lack of appropriate vegetation types to withstand and protect banks against flooding. Sams Creek is dammed upstream by Lone Cabin Reservoir which controls flows. Additionally, it appears to receive drainage from irrigated fields along the lower part of the reach.

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' potentiasl. 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, photosynthetic activity throughout the 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			
18,905	27,200	15,598	4,065	356

See figure 4.1 for map showing polygon ratings.

Specific Problems

Plant Diversity

Native plant diversity indicates that the soil and water resources are being efficiently and maximally used. A diverse community also has greater resilience to disturbance, since the various species represent more survival and reproductive strategies and capabilities than would be present in monocultures. Figure 4.2 shows that diversity problems are concentrated in the central and southern section of the North Fork Landscape Unit, with many sites supporting significantly less species than expected for those ecological sites.

Cool Season Grass Cover

Perennial grass is an important if not dominant plant type in most of the plant communities occurring in the unit, particularly in the non-forested communities. It is also one of the plant community components most reduced by historic and present day uses, especially grazing. 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 managed by the Uncompahgre Field Office, low cool season grass cover is a particular problem because most grazing on BLM has historically taken place during the fall and spring. This coincides with the cool season grasses' vulnerable, active growing period. When these 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 are important for the competition they provide against cheatgrass and many other annual invasive species, because they use the same growing period. The percent canopy cover of cool season perennial grass was used as an indicator of plant community health and wildlife habitat quality (Figure 4.3).

Figure 4.1 North Fork LHA Area Standard 3 ratings.

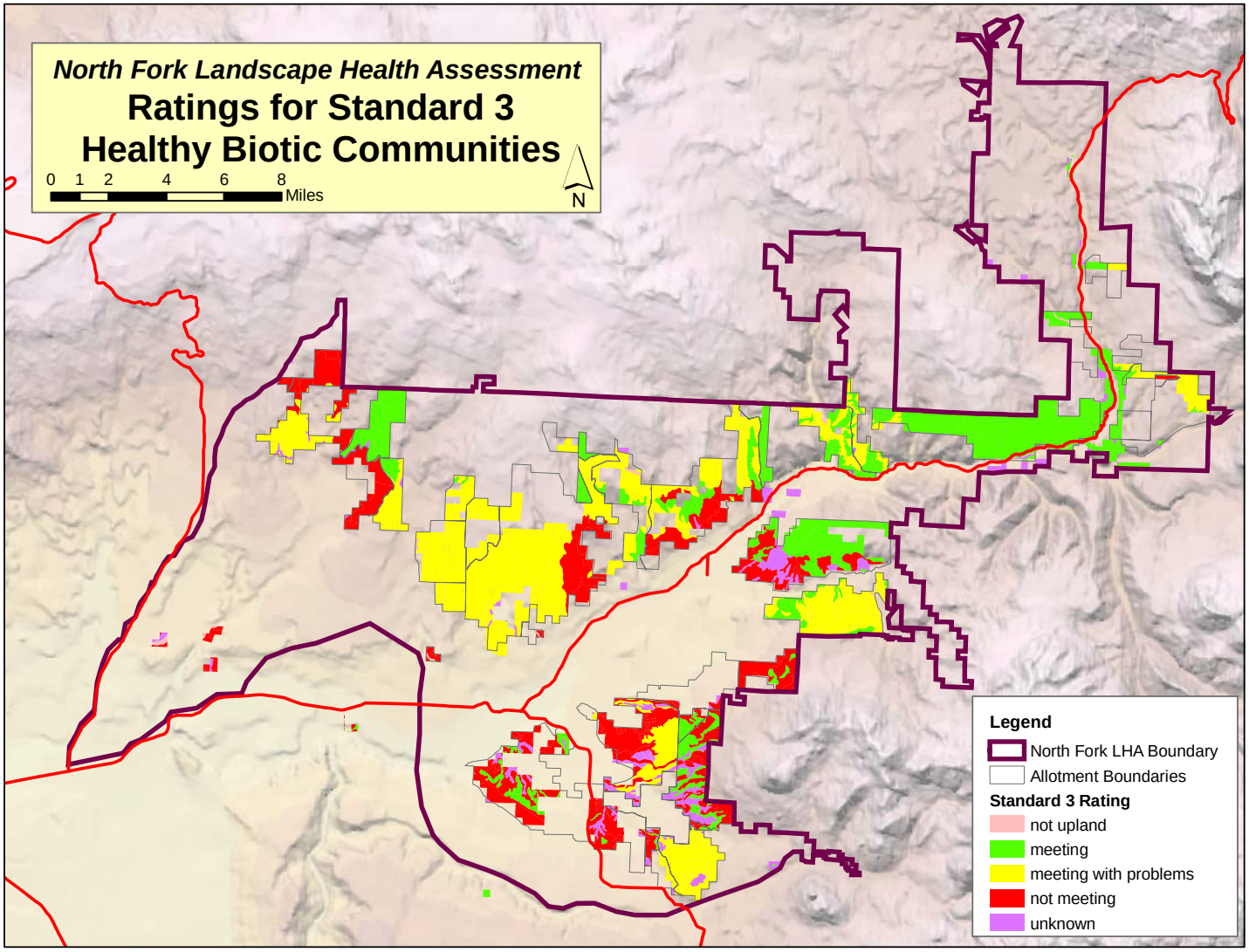


Figure 4.2 North Fork LHA Area plant diversity. This map shows sites with Rangeland Health Sheet scores of 1 or 2 as diversity problem sites, scores of 3, 4 or 5 as adequate to good diversity.

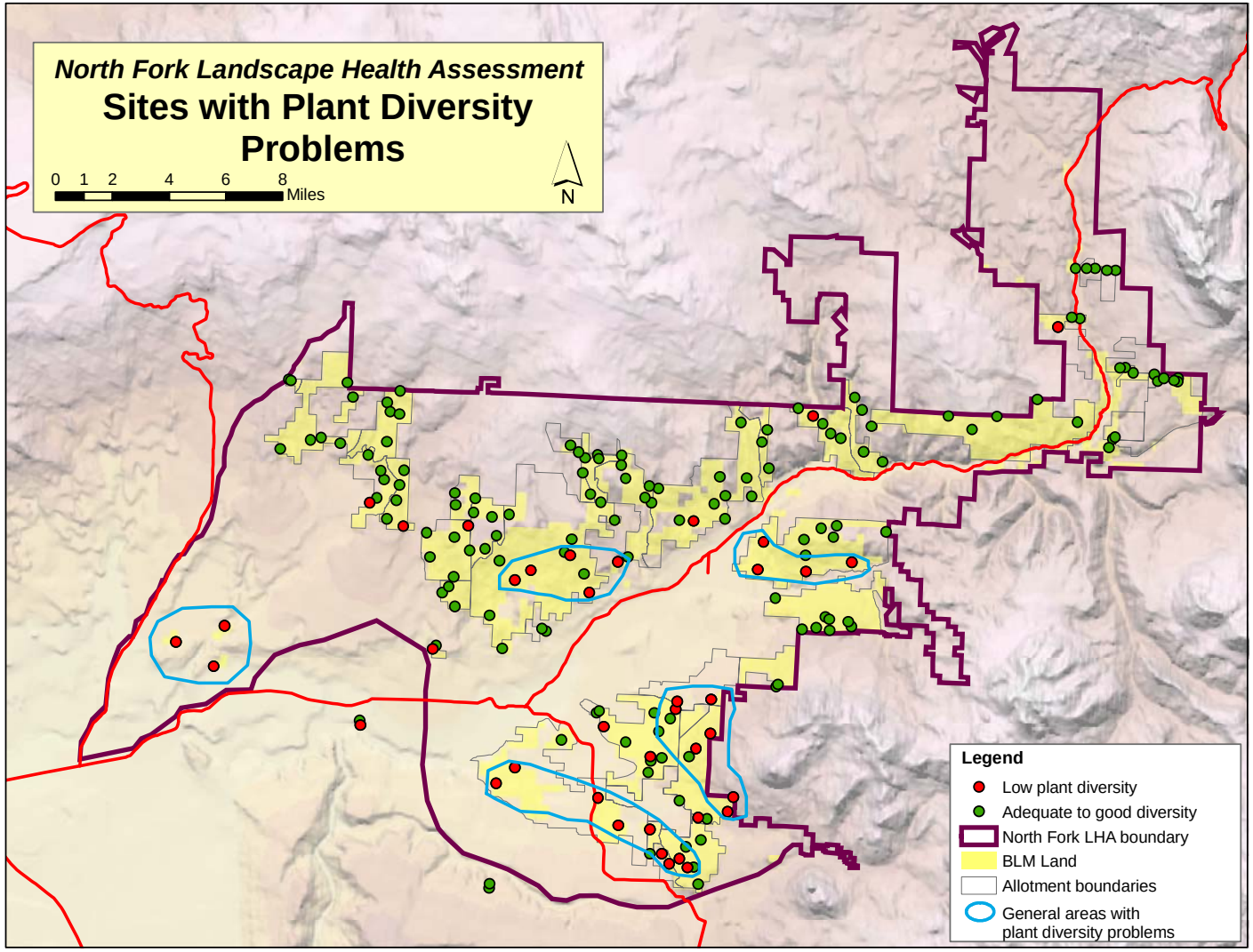
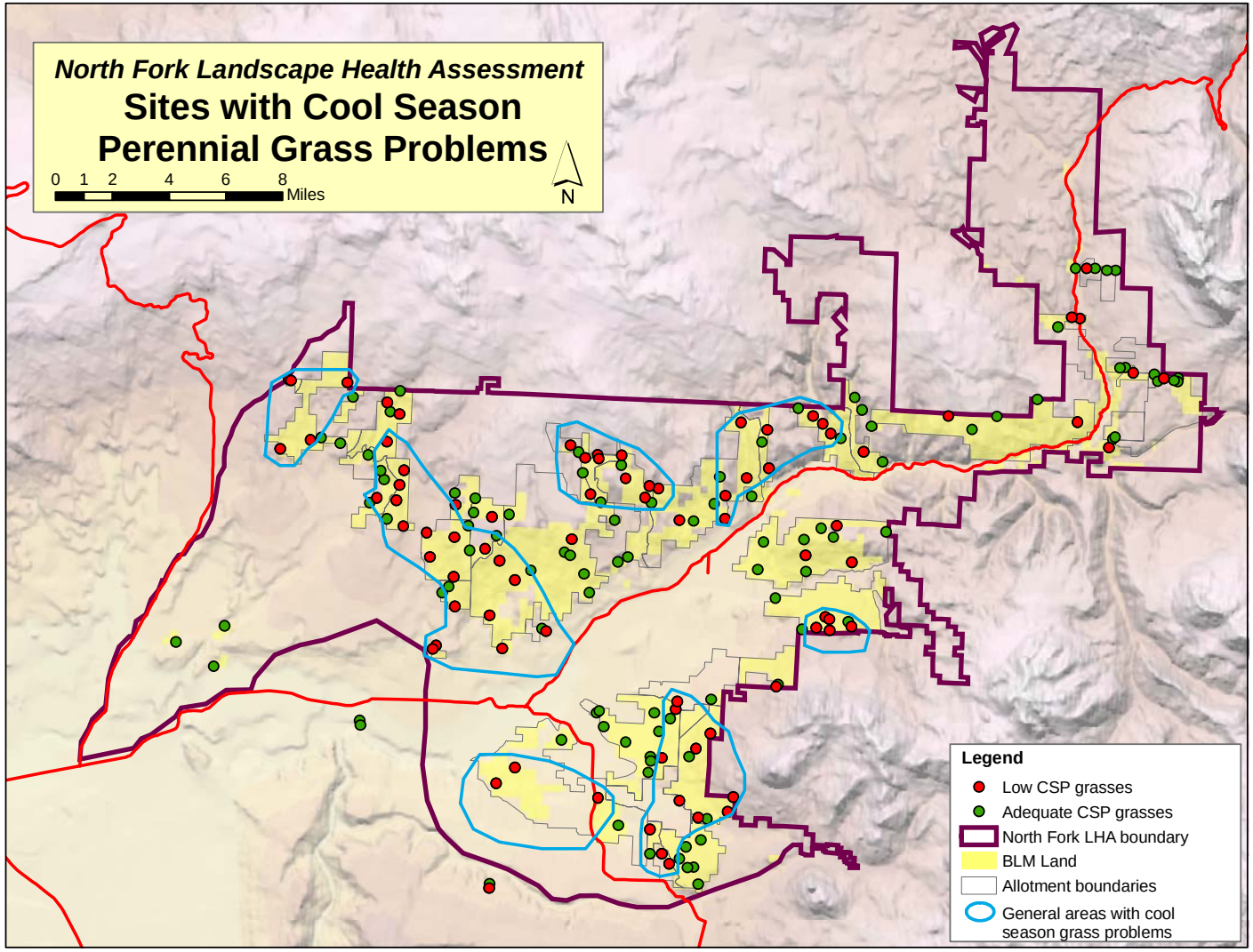


Figure 4.3 North Fork LHA Area perennial cool season grass cover. On this map red dots denote sites with perennial cool season grass canopy cover worse than 10% below the average value for the ecological site.



Problems with low cool season grass cover were widespread across the unit. There is no obvious connection between elevation or region and low perennial cool season grass cover.

Warm Season Grass Cover

Warm season grasses germinate and grow during periods of summer moisture. This capability enables them to use monsoonal moisture during warm periods when cool season grasses are mostly dormant. Warm season grasses are growing and vulnerable to grazing during the summer, a season in which only higher elevation BLM lands are grazed. Historically, vegetation treatments and seedings have reduced warm season grasses in many areas across BLM lands. The North Fork area has had comparatively few such vegetation treatments. Nevertheless, the North Fork LHA area generally has very low levels of warm season grass, perhaps as a result of local climate patterns and soil characteristics. Limited problems with warm season grasses were observed in the central part of the LHA unit (Figure 4.4).

Perennial Forb Cover

Perennial forbs are a source of diversity, nectar, seeds, palatable forage, varied photosynthetic periods and root morphologies. These characteristics increase a community's water and sunlight capturing capabilities, 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 appear to have been most impacted by historic grazing, especially at lower elevations. Native perennial forbs have also been reduced in many areas by past BLM treatments and seedings. Percent perennial forb canopy cover is used as an indicator of plant community health and wildlife habitat quality.

Low perennial forb cover was another widespread problem across the unit (Figure 4.5). As with cool season grass cover, there is no obvious connection between elevation or region and low perennial forb cover. Although the drought of the previous several years may have reduced the appearance and abundance of forbs, comparison with average values based on ecological sites shows that many of the problem sites have the capability of producing more perennial forbs, even in a drought year.

Pinyon-Juniper Invasion and Decline

Pinyon and juniper trees are native species which live for centuries and have been common in the region for thousands of years. However, historic photos and tree stand structure indicate that in some areas across the Uncompahgre Field Office, pinyon-juniper woodlands are becoming denser than they were in the past and are expanding into other plant communities. As this occurs, herbaceous and shrub species visibly decline in dominance and vigor, and the landscape loses patch 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. Tree invasion was found in only one small part of the unit (Figure 4.6), and was occurring mainly as tree reestablishment in a formerly chained woodland.

Recent long-term drought has brought on an ips beetle epidemic in much of southwestern Colorado. Many other pinyon pathogens have also combined with these to create "pinyon decline" which kills the pinyon trees. Because pinyon are such an important part of the plant communities in western Colorado, pinyon decline was used as an indicator of health, and captured by evaluating pinyon tree vigor at each site. Pinyon decline was observed at only two sites throughout pinyon-juniper woodlands in the unit, a level much lower than is the case

Figure 4.4 North Fork LHA Area perennial warm season grass cover. On this map red dots denote sites with canopy cover values worse than 10% below the average value for the ecological site. WSP is used in the map legend for Warm Season Perennial.

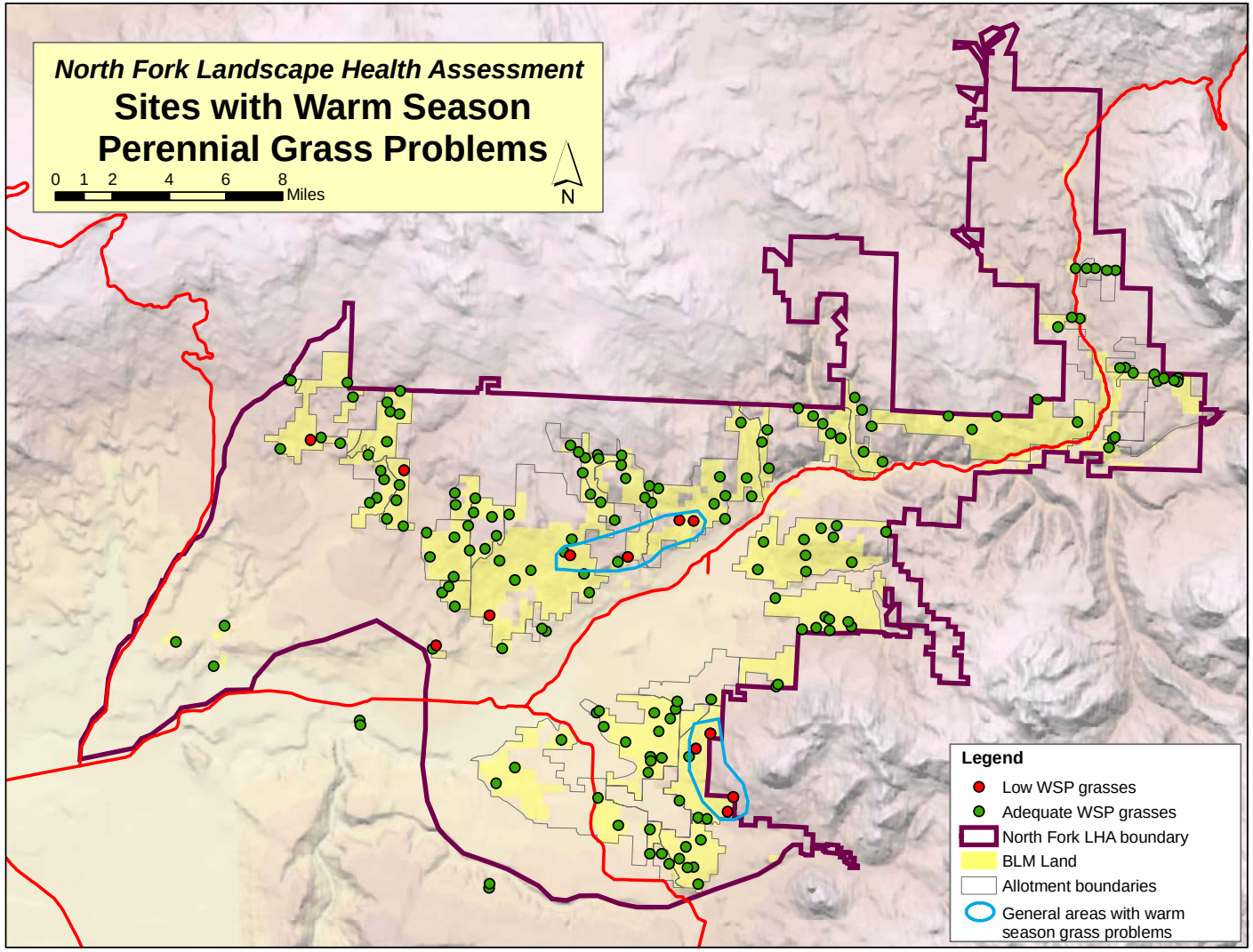


Figure 4.5 North Fork LHA Area perennial forb cover. On this map red dots denote sites with perennial forb canopy cover values worse than 10% below the average value for the ecological site.

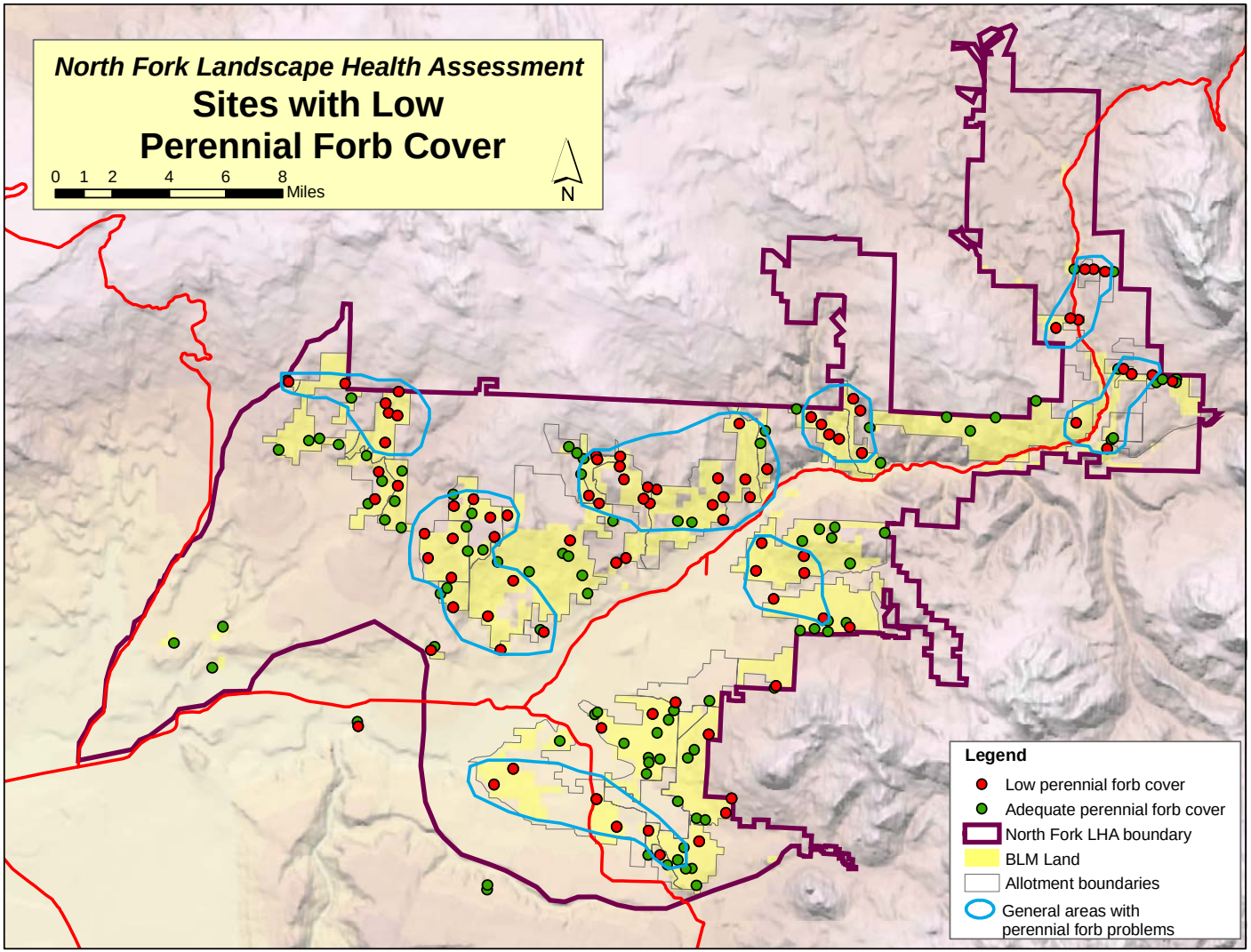
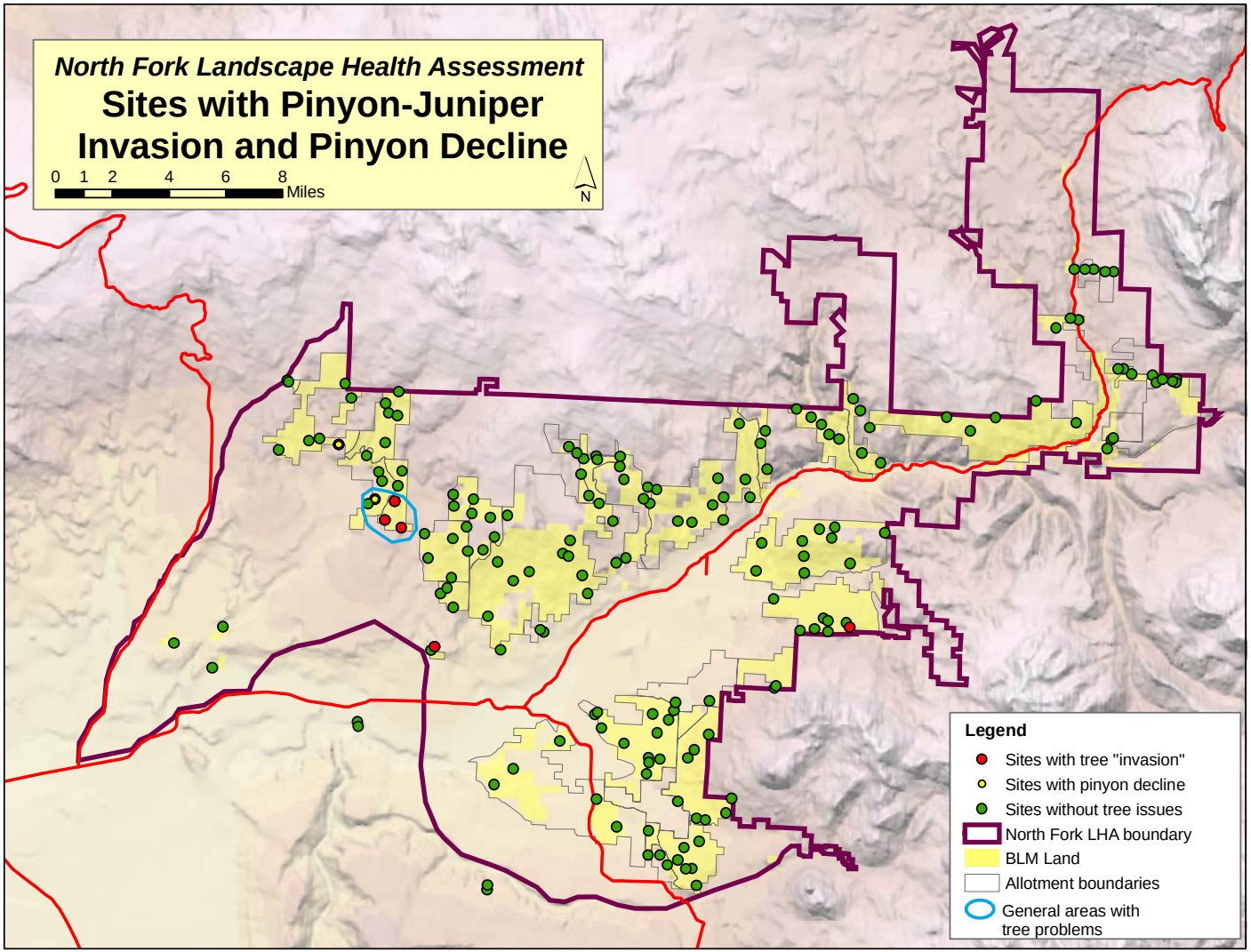


Figure 4.6 North Fork LHA Area pinyon-juniper invasion and pinyon decline. Red dots denote sites where young age classes of either pinyon or juniper are the dominant tree age classes on the site. Yellow dots denote sites where most pinyon trees are in a state of low vigor.



elsewhere in the UFO area. Some of this may be due to the predominance of juniper woodlands and lack of pinyon trees in much of the North Fork LHA area.

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 were a widespread problem across the LHA area (Figure 4.7). About 30% of the sites visited were dominated by exotic plants, and these were located throughout the North Fork unit. There appeared to be an association between exotic dominance, lower elevation plant communities, and proximity to agricultural lands. Exotics were present at significant levels within the communities, but not dominant at an additional 27% of the sites. The primary exotic species encountered were cheatgrass (*Bromus tectorum*), European madwort (*Alyssum simplex*), burr buttercup (*Ceratocephela testiculata*), Kentucky bluegrass (*Poa pratensis*), filaree (*Erodium cicutarium*), horehound (*Marrubium vulgare*), and the seeded species crested wheatgrass (*Agropyron cristatum*).

Cheatgrass is an exotic species of particular concern, as it has completely overtaken and transformed many plant communities in the Great Basin. Land managers in the Colorado Plateau region are concerned that this area may be on the threshold of a similar level of cheatgrass invasion. Of the 183 sites visited in the North Fork LHA area, cheatgrass occurred at very high levels at 13% of the sites, and an additional 17% had significant cover of cheatgrass. Cheatgrass was present at low canopy cover levels in 22% of the remaining sites, and was at trace amounts at another 10% (Figure 4.8). The remaining 38% of sites were free of cheatgrass. The cheatgrass problems were found throughout the unit except at the uppermost elevations.

The burned areas in the North Fork unit appear to have the most widespread and densest infestations of cheatgrass. The Stucker Mesa Fire recently burned in the older, cheatgrass infested Wake Fire. This represented the first significant instance of an altered fire regime and increased fire frequency due to the dominance of annual exotic plants in the North Fork Unit. Stucker Mesa was approved for emergency rehab funding, which will be used to investigate different measures for controlling cheatgrass and reestablishing the former fire regime.

Noxious Weed Infestations

Noxious weeds are those exotic species which are formally designated by the state of Colorado as noxious. On North Fork area BLM lands the following noxious weed species are established: Russian knapweed (*Acroptylon repens*), lesser burdock (*Arctium minus*), hoary cress (*Cardaria draba*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), chickory (*Cichorium intybus*), bull thistle (*Cirsium vulgare*), field bindweed (*Convolvulus arvensis*), houndstongue (*Cynoglossum officinale*), Russian olive (*Eleagnus angustifolia*), tall whitetop (*Lepidium latifolium*), tansy ragwort (*Senecio jacobaea*), tamarisk (*Tamarix chinensis*), and cocklebur (*Xanthium strumarium*). Of these species, Russian knapweed, tamarisk, hoary cress and Canada thistle are the most widespread.

Weeds are distributed across the unit (Figure 4.9). Many of the infestations are associated with irrigation ditches and canals which pass through BLM land. Roads, especially maintained

Figure 4.7 North Fork LHA Area exotic plants. This map shows sites with Rangeland Health Sheet scores of 1 or 2 as exotics dominant, scores of 3 as exotics present, and scores of 4 or 5 as exotics minimal.

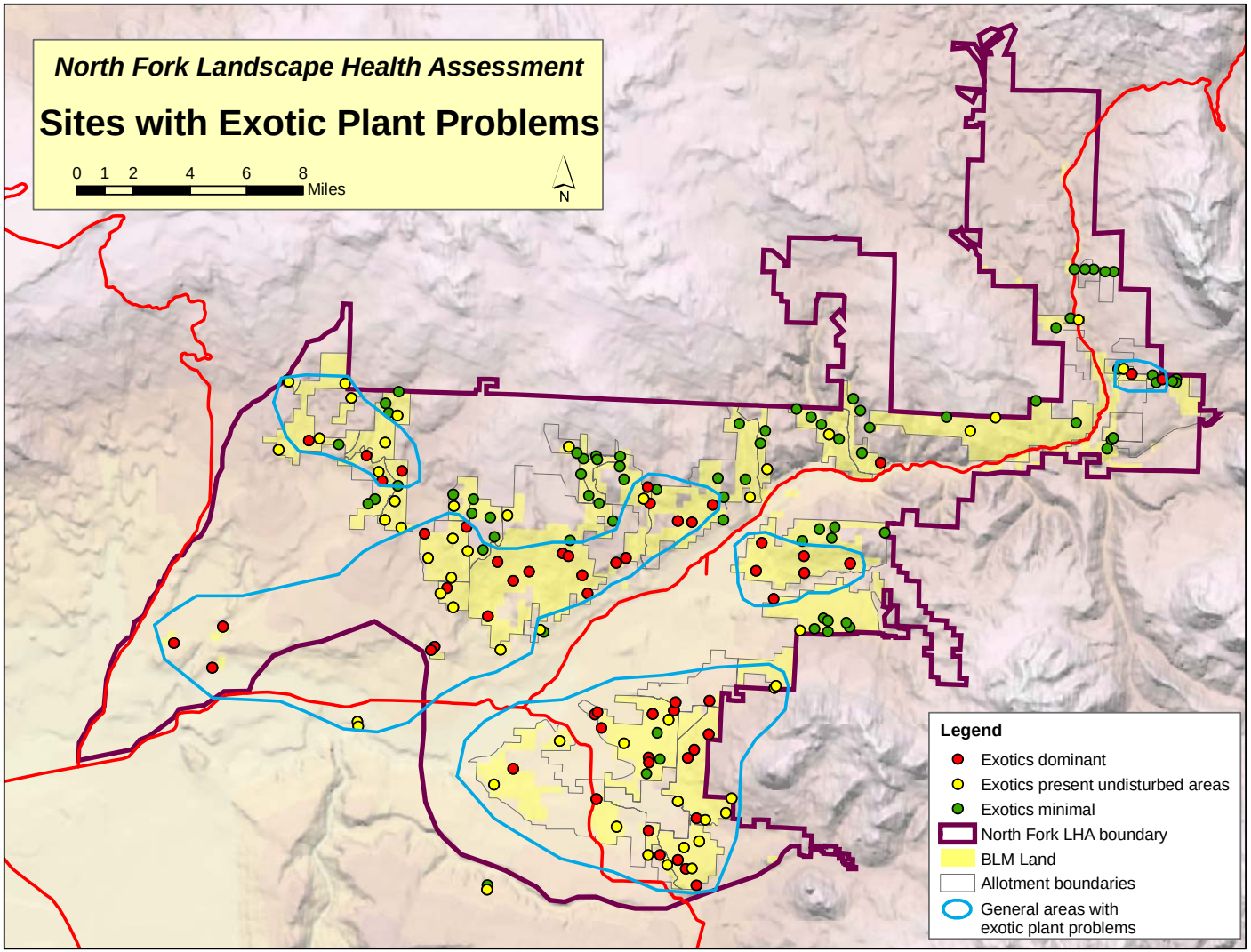


Figure 4.8 North Fork LHA Area cheatgrass infestations. This map shows sites with cheatgrass at varying levels of canopy cover.

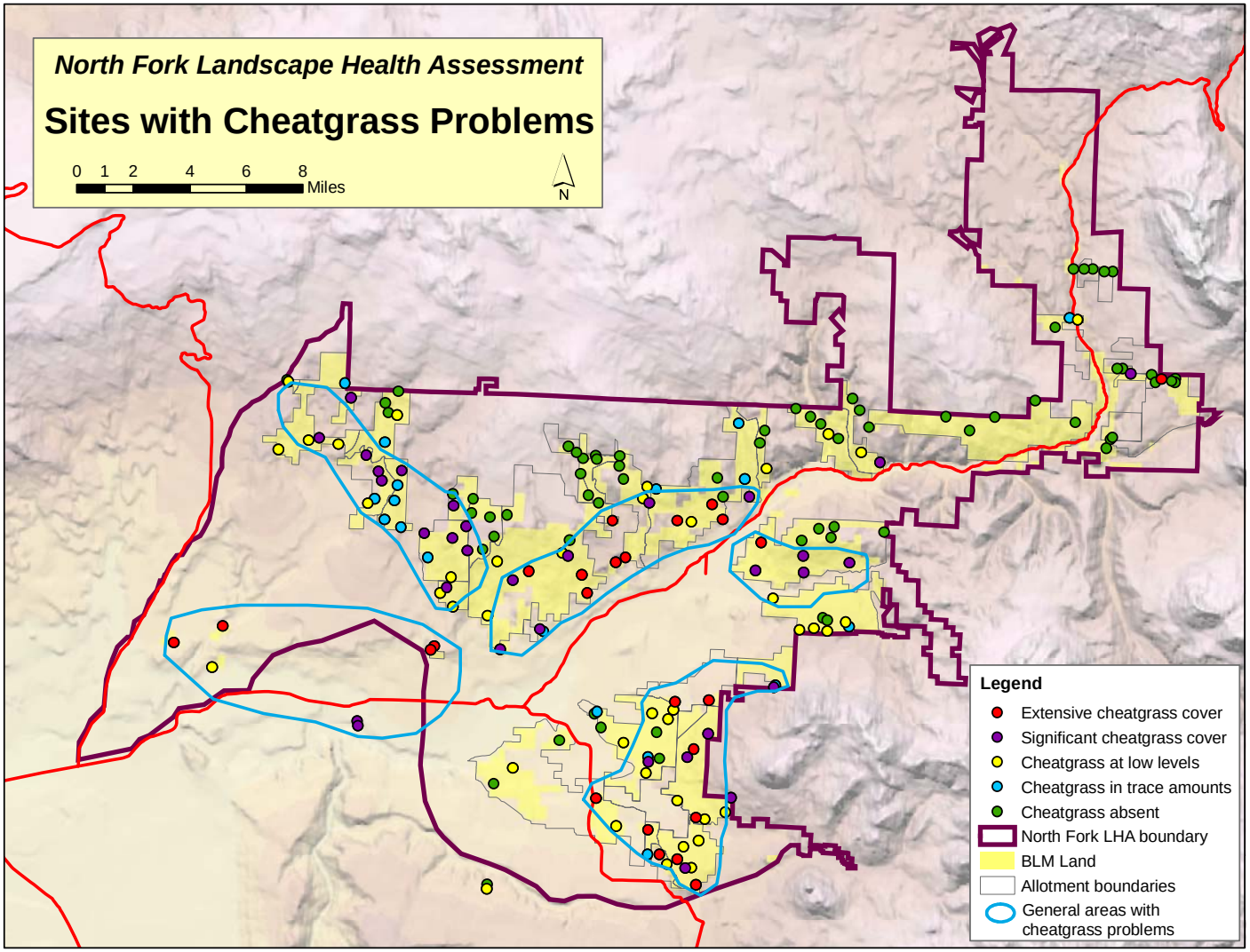
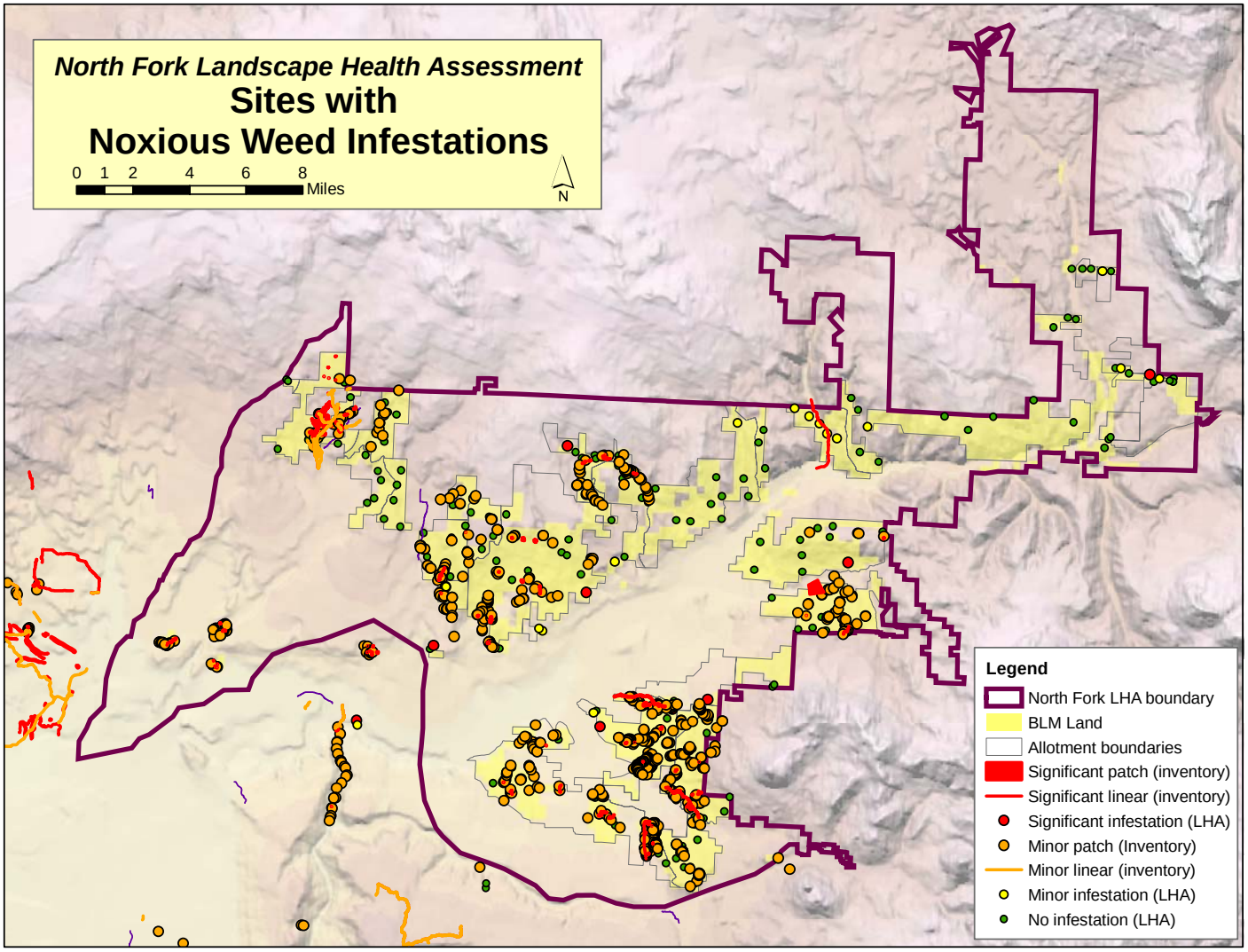


Figure 4.9 North Fork LHA Area noxious weed occurrences. This data comes from two sources-a comprehensive weed inventory which maps large patch infestations, linear weed infestations and small point infestations. The LHA data collection points also generated weed data.



roads, are another frequent site for noxious weeds. Stock ponds, roads and drainages are also often infested with Russian knapweed, tamarisk, whitetop Canada thistle, cocklebur and burdock. For most of the landscape apart from drainages, noxious weeds are not yet a dominant part of the plant community, and usually not even present. However, although few infestations are present in undisturbed lands, infestations tend to be distributed frequently enough across the landscape to pose a threat to undisturbed lands, especially with some of the more invasive species.

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 occur across the unit, with many sites--particularly south and east of Paonia--showing severe hedging (Figure 4.9). This indicates there is probably an imbalance between the available vegetation and the browsing animals.

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. We observed widespread problems with shrub vigor across the unit. In the mountain shrub vegetation, extensive frost kill from current and past years on Gambel oak was seen. Drought was also apparently a factor in some of the oak top-kill, according to local ranchers. Oak defoliation from linden loopers (caterpillars) was also a factor in low oak vigor. Sagebrush in many areas also showed low productivity and reproduction at the lower elevations.

Native Plant Distribution

Two hundred seventy different plant species were found to occur in the unit. Of those native species which occurred in significant amounts on at least one site, Utah serviceberry was the most widespread species. It was at 72 out of a total of 183 sites where data was collected. Gambel's oak was the second most widespread species occurring in significant amounts on 54 sites, with the low shrub western snowberry the third most common on 48 sites, followed by Wyoming big sagebrush at 37 sites. Elk sedge, a native cool season perennial sedge, was the most common grass-like plant occurring as a significant part of the plant community on 35 sites. The most common warm season perennial grass was galleta grass at only 6 sites, reflecting the overall scarcity of this functional group in the LHA area. The most common perennial forb was western yarrow which was significant on 13 sites. Forty three species occurred at substantial levels on only one site, and another 68 occurred on less than 10 sites as a significant component of the plant community.

As expected, both elevation and soils appear to drive where most of the plant species are located. The Mancos shale derived soils in the valley bottom in some areas support substantially different plant species than the loamy, basalt-studded soils found on the mesa side slopes and pediment surfaces. Deeper soils typically support some different species than shallow and rocky soils, although many species also occur on both soil types. Elevation and aspect also affect plant

Figure 4.10 North Fork LHA Area shrub utilization and hedging levels. 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.

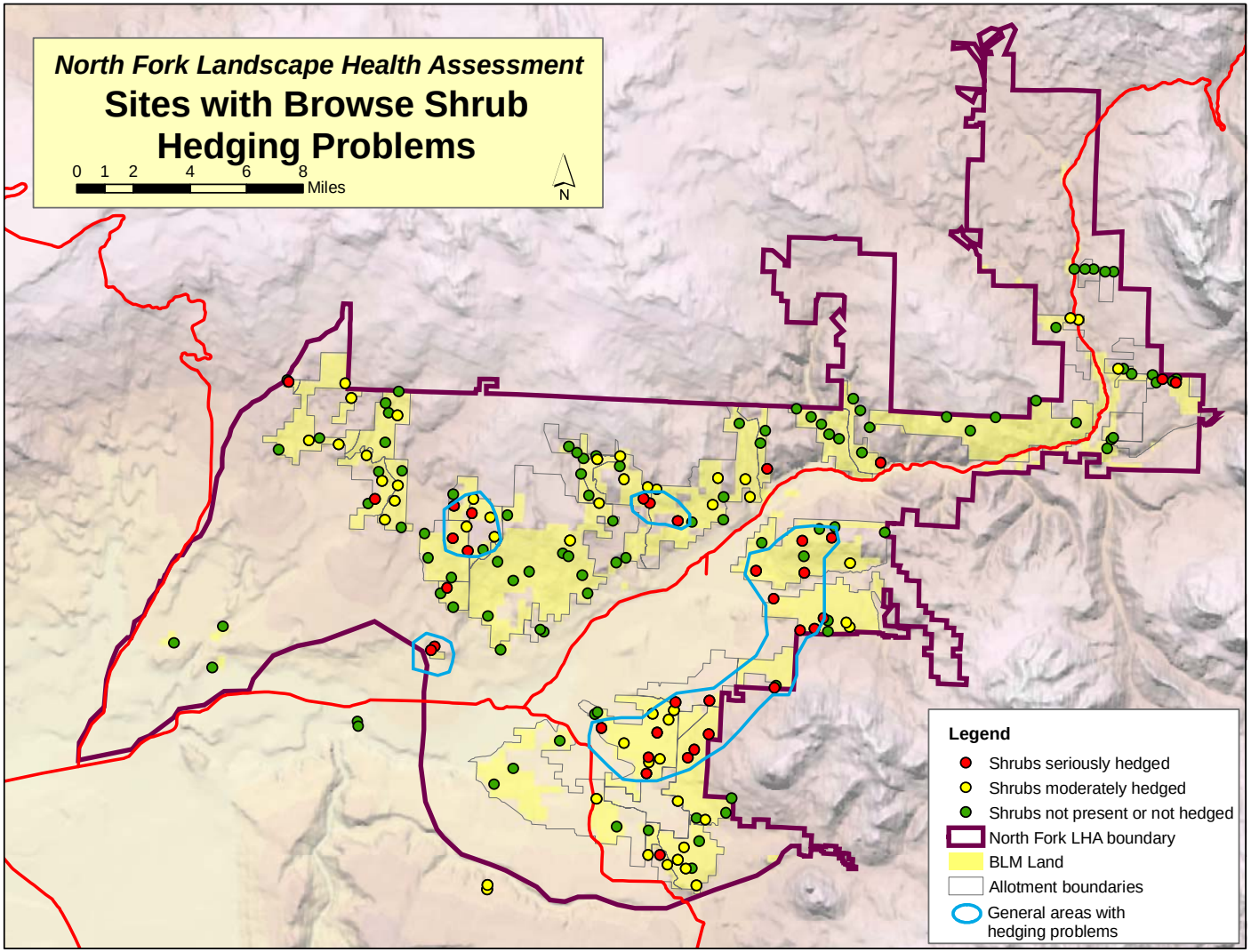
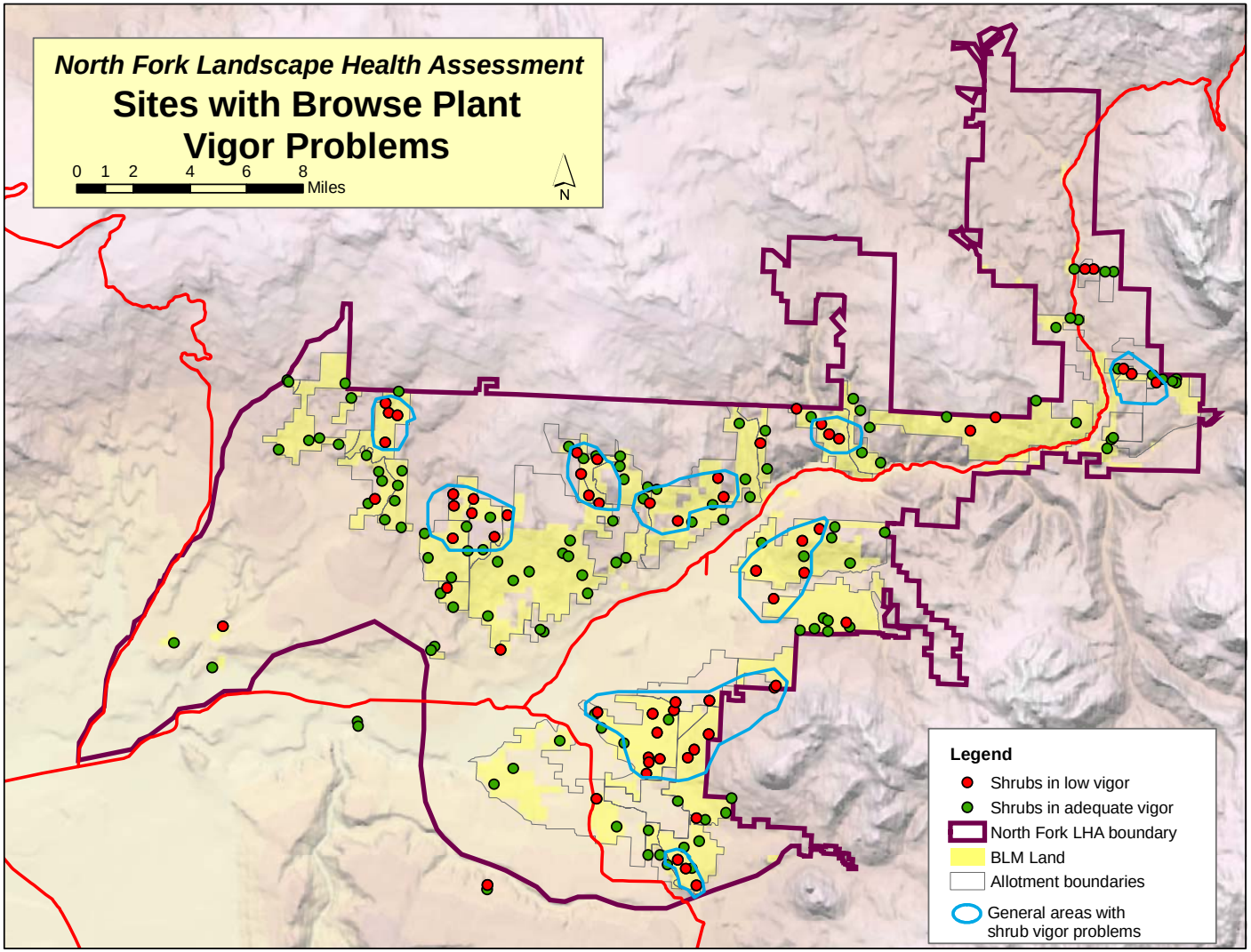


Figure 4.11 North Fork LHA Area browse plant vigor. Red dots denote sites with at least one major browse shrub species that is in predominantly low vigor across the site.



distribution, with the moist, higher elevations and aspects typically supporting a greater variety of species.

The most obvious problems observed with plant populations are associated with the ongoing climatic influences such as the recent drought and series of years with late spring freezes. Most evident is the top kill occurring on the Gambel's oak. This has taken place across large areas in the mountain shrub zone. However the clonal growth habit of oakbrush gives this species resilience and it is still persisting as a dominant plant to this point.

At the level of data collection, it appears that the major plant species appropriate to soil and elevation are found broadly scattered across their available habitat. This evidence suggests that major plant distribution problems are not occurring which would interfere with region-level population viability or resilience among the more common species.

Connectivity

Not much information is available, nor are we aware of formal procedures that are outlined for assessing connectivity of habitat in dry woodland, mountain shrub or semi-desert shrubland vegetation types, particularly in very rough terrain. Because the North Fork area is highly fragmented by topography, we assume that land uses like agriculture and urban uses together with manmade constructs like roads and dams interact with natural barriers or corridors to alter wildlife movement. A map of likely barriers and dispersal routes is included (Figure 4.12). Possible barriers and dispersal routes are outlined below.

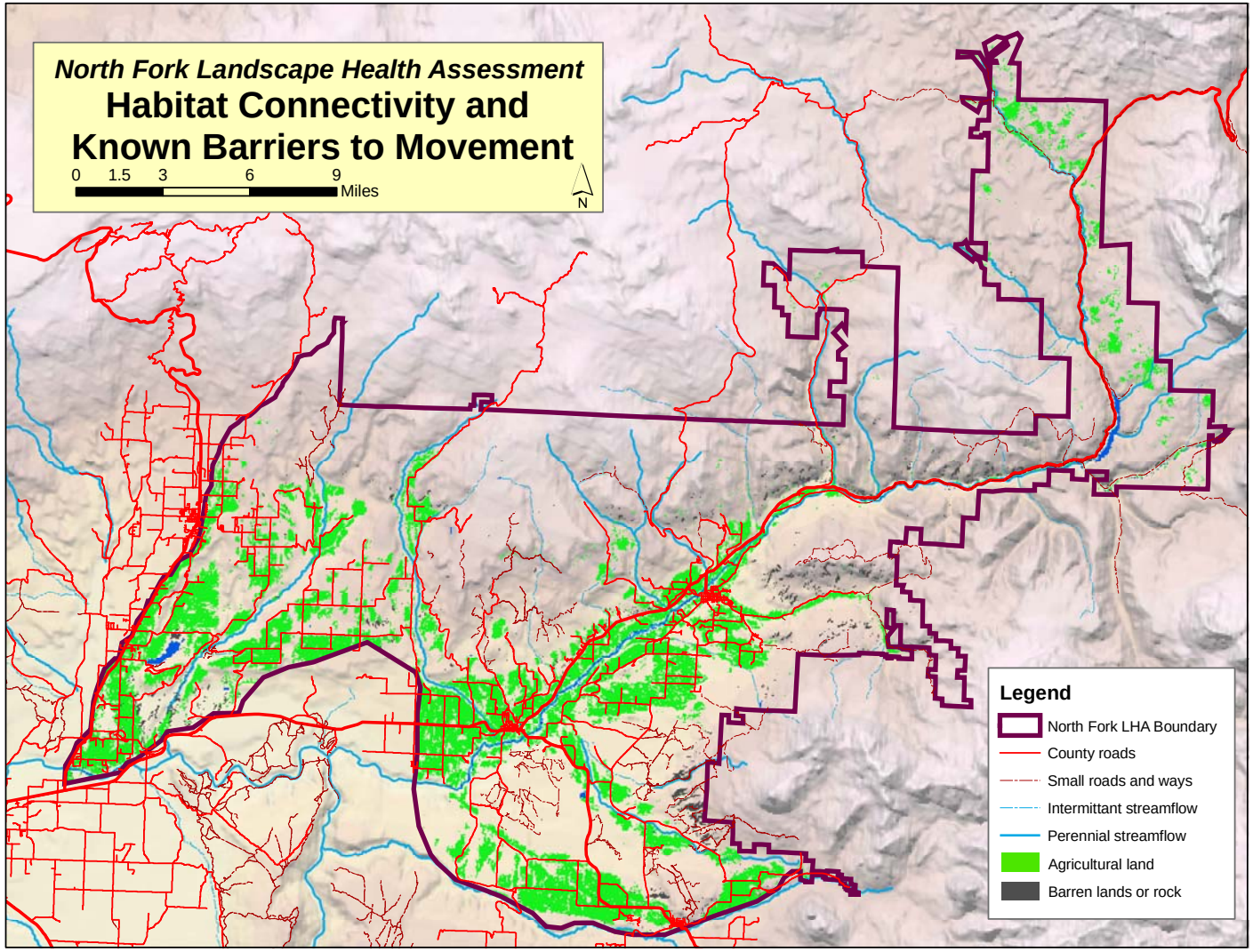
Steep rock outcrops and rocky slopes: Steep rocky areas are typically found in small patches on the sides of drainages or as rock outcrops mainly on the east side of this LHA unit. Usually These are not continuous bands that completely cut off movement from ridge top to drainage bottom, but they tend to funnel movement of larger animals into the few passable areas and make movement more difficult. Given their isolated occurrence, it is unlikely that these rocky areas significantly reduce large ungulate and carnivore use of large areas.

Rivers, streams, and dams: The North Fork of the Gunnison River is a small river that lies at the heart of the North Fork LHA area. It may present some barrier to movement, especially for smaller animals which are not able to swim across it. This is particularly the case at Paonia Reservoir, which averages more than 0.1 mile across. The streams within the unit do not present significant barriers to movement because they are narrow, and often dry in places during some parts of the year.

In addition to being a barrier for some animals, rivers, 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 or landscaping (which are often sources of weeds) in the riparian zone. Russian knapweed and hoary cress form numerous infestations throughout the LHA unit, and seem to become established along drainage corridors, ditches and where livestock ponds have been built.

Agriculture and 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 cannot travel long distances in unsuitable habitat. 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 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. Species like the European starling, raccoon, domestic cats,

Figure 4.12 North Fork 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)



burdock, Russian olive, and Siberian elm are probably spreading and utilizing parts of the unit as a result of agricultural and human land uses in and adjacent to the unit. Deer and elk feed on the irrigated lands, and their behavior and movement patterns are altered by the presence of these fields.

Irrigated agriculture and residential development are the dominant land uses in the western, central and southern parts of the unit. The increased human presence and altered plant communities in these developed areas are certainly affecting plant and animal communities on adjacent BLM lands. This is apparent both in the distribution of weeds and in the browse plant condition on these lands.

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 major cause of mortality for animals trying to cross. The most heavily traveled roads in the unit are Highway 65 to Cedaredge, Highway 92 to Hotchkiss and Crawford, and Highway 133 through Paonia. Many animals are killed by vehicles along these routes. Because of proximity to towns and a history of open travel designations, a dense road network has developed in this unit. Most of these roads are lightly 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, particularly where the roads are maintained and graded or graveled.

Livestock, wildlife, people, vehicles, and pets: Livestock, deer and elk provide a mechanism for dispersal of seeds, insects, and disease. They are likely a principal source of weeds in native communities because they can transport seeds in their fur or digestive tracts, and because they often 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. People, their vehicles and their pets transport weed seeds in the same way.

Healthy Wildlife Community

The wildlife community health assessment in the LHA area, including habitat, was made using existing CDOW, CNHP and BLM data, qualitative knowledge and data collected during the LHA 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 assessment 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, herptiles, birds, and predators.

Based on the available information, the main problems or changes that relate to Standard 3 which are occurring in the North Fork unit at a landscape scale include: 1) winter range quantity and quality is declining in key winter concentration areas 2) population growth and development in the region (such as gas wells, gravel pits, recreation) is concentrating wildlife into smaller areas and changing habitat through disturbance 3) invasive species and loss of vegetative diversity are on the increase in several areas 4) several species of neo-tropical birds in the Western Colorado region are declining. The natural dynamics of this system in some areas appear to have been slowed down due to lack of disturbances, thus vegetation is getting older with less diversity. Large fires in the area (McGruder, Wake) have reset plant succession but

poor rehabilitation success and heavy wildlife use have resulted in weed problems in many of the fire areas.

Specific problems or changes:

Winter range quantity and quality is declining in much of the LHA area due to several factors. Shrub vigor is poor because of drought, late freezes, and insects. The Gambel oak has had spring freeze dieback for several years along with infestation by caterpillars, and sagebrush at low elevations has decreased vigor due to drought and hedging. Over use by mule deer and elk, caused by their number being concentrated on the remaining amount of shrinking winter range, is contributing to hedging on many shrub species and loss of diversity. The lack of disturbances scattered throughout the unit to reset succession and create a more desirable mosaic of feeding and cover areas and improve the herbaceous species composition and vigor of browse plants is an area that needs to be addressed. This leads to advanced seral stage of existing browse stands, and in some areas the replacement of browse plants by pinyon and juniper. Some of these habitat changes are due to fire suppression, historic grazing, development, and fragmentation. Over the last 20 years elk populations throughout the study area have been above the Division of Wildlife objectives and are another factor contributing to this decline in habitat quality. Populations have recently been reduced and are now close to objective levels.

The highest potential value of the LHA area to mule deer and elk is winter range; approximately half of the unit is severe winter range. There is abundant summer range at higher elevations of the surrounding areas, but much of the critical winter range is on private property, some of which is fenced to keep wildlife out. The mid to late seral stage of shrubs on public lands throughout the study area also contributes to a lack of diversified herbaceous understory of cool and warm season grasses and forbs necessary for good wildlife habitat, as described in the plant community section above. See the Desired Landscape Objectives map for a comparison of existing mule deer winter range conditions to the desired landscape objectives for winter range.

Development is creating habitat changes throughout the unit and increasing the wildland urban interface (WUI). Agriculture and urban land use, and manmade constructs such as roads, pipelines, and gravel pits interact with natural barriers or corridors to alter wildlife movement. Factors that affect the wildlife habitat quantity and quality are: human impacts due to commercial activities, new homes, and increasing recreational use; expanding development is causing loss of connectivity, fragmentation of key habitats for several species, and concentration of winter wildlife into smaller areas. Disturbance and development in historic wildlife areas is also driving deer and elk to private property where they become resident animals and are unavailable to hunters. In general, this area, as well as much of the adjacent landscape, is declining in overall quality for many species. It is becoming more favorable for species that require later seral stage vegetation with less diversity.

The abundance and amount of exotic and noxious vegetative species is increasing. Factors contributing to this include the proliferation of roads and off-road-vehicles throughout the area, the spread of weeds through irrigation ditches and stock ponds, poor wildfire rehabilitation success, and over-use by livestock and wildlife which decreases plant diversity. When exotic plants increase there is a resultant decline in food and habitat value for most wildlife and livestock.

Several Neo-Tropical Migrant Bird species show population trend declines, or have inadequate data for making trend determinations in the Western Colorado region (Kingery, H.E. ed. 1998). The Breeding Bird Survey provides the most complete and accurate data available for

NTMB species throughout their range, and in the LHA area. Partners In Flight (PIF) have organized and presented information concerning bird population status and other information by Physiographic Region. (PIF 2000)

The North Fork LHA area is within the Colorado Plateau region. PIF has determined there are eight important habitat types for birds in the Colorado Plateau Region, and they have determined priority bird species for each. These habitat types, along with priority bird species are:

1. Cliff/Rock: peregrine falcon, white-throated swift,
2. Lowland Riparian: Lewis's woodpecker, western kingbird,
3. Mountain Shrubland: common poorwill, Virginia's warbler,
4. Pinyon-Juniper: black-chinned hummingbird, gray flycatcher, Cassin's kingbird, gray vireo, pinyon jay, juniper titmouse, black-throated gray warbler, Scott's oriole,
5. Ponderosa Pine: band-tailed pigeon, Mexican spotted owl, western bluebird, Grace's warbler,
6. Sagebrush Shrubland: Gunnison sage grouse, Brewer's sparrow, sage sparrow,
7. Semidesert Shrubland: burrowing owl, loggerhead shrike, horned lark,
8. Wetland: northern harrier, short-eared owl

Of these 24 species, 7 appear to be in decline, another 12 do not have adequate data for meaningful trend analysis, and 5 appear to be stable. Of course, the data in this report is also 10 years old (1966-1996), so things may have changed quite a bit since then.

PIF reports that the Colorado Plateau hosts at least 190 species of breeding birds in the eight habitats. This area has few species that are wholly or nearly absent from other regions of the state; Gambel's Quail, Black-throated Sparrow, Sage Sparrow, and Scott's Oriole fit into this group. More species are at their highest numbers in this region; Chukar, Western Screech-Owl, Canyon Wren, Brewer's Sparrow, and several pinyon-juniper woodland species are in this class. Nesting Purple Martins occur along the boundary between the Colorado Plateau and the Southern Rocky Mountain physiographic areas, in the higher elevations of the North Fork LHA area. (PIF, 2000)

Also, PIF states that livestock grazing is the most extensive use of land in western Colorado, and the extent and timing of grazing are constant conservation issues. The manipulation of habitats (e.g., sagebrush and pinyon-juniper "treatment") for improved grazing and the degradation of habitats (especially riparian) by grazing have significant effects on wildlife. Livestock water development and operation offers hazards and opportunities for wildlife.

The manipulation of water, including irrigation and dam building, and the resultant land uses (orchards, farms, industrial, residential) have created major threats to wildlife habitats, especially the lowland riparian where water storage and allocation has greatly reduced cottonwood regeneration and has encouraged exotic plant invasion (e.g., salt cedar, Russian knapweed). Irrigation, however, has also expanded waterbird habitat in the arable valleys.

The control of natural fires has created successional patterns that may be quite different from historical patterns and which may have profound effects on wildlife populations and distribution. Pinyon-juniper has expanded in some areas. Fire exclusion and climatic fluctuations have resulted in stands overstocked with small trees. Wildfires tend to be less frequent and more

catastrophic. The result has probably been harmful to non-forest raptors and seed-eaters, and has been beneficial mostly to non-game upland bird species.

A query of the Breeding Bird Survey Database (www.mbr-pwrc.usgs.gov/bbs/) indicates fourteen NTMB species (Table 4.1) in Western Colorado show population trend declines for the years 1966-2005, and 1980-2005. All of these species have high "importance of area" (IA) rankings; indicating a high proportion of their habitat in this region provides essential breeding habitats. Five of these species, vesper sparrow, Swainson's hawk, Say's phoebe, rock wren, and loggerhead shrike have very low abundance ratings, indicating they are the species' of highest concern in this unit and landscape. The nine remaining species, horned lark, common nighthawk, killdeer, northern flicker, western wood-pewee, chipping sparrow, sage thrasher, Brewer's sparrow and mourning dove have moderate to good abundance ratings, 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 third priority species. An additional review of data collected from 1966-2005 show that of 96 species with adequate data for analysis, there are 33 with positive trends, 41 with negative trends, and 22 are stable. The LHA area is part of the larger overall landscape that provides habitat for all these species, which is important for their long-term sustainability.

Table 4.1 Neotropical migratory bird (NTMB) species showing population trend declines during the 26 and 10 year Breeding Bird Survey (BBS) datasets in western Colorado

NTMB SPECIES	HABITAT	(PT26)-26 year Population Trend Ranking	(PT10)-10 year Population Trend Ranking	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.					
NTMB SPECIES	HABITAT	(PT26)-26 year Population Trend Ranking	(PT10)-10 year Population Trend Ranking	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

Priority # 2 Species continued					
NTMB SPECIES	HABITAT	26 year Population Trend Ranking (PT26)	10 year Population Trend Ranking (PT10)	Abundance Ranking (AB)	Importance of Area Ranking (IA)
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
Horned Lark **	Annuals/Grassland	5	5	1	5
Brewer's Sparrow **	Sagebrush	4	4	2	5

Breeding Bird Survey rankings: 1= low concern, 5 = high concern.
* =Low, **=moderate, ***=highest potential for affects (+ or -) in Roubideau LHA area based on Breeding Bird Atlas (Kingery 1998)

Table 4.2 Neotropical migratory bird (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 Fork LHA area based on Breeding Bird Survey Data.

The Vegetation Mosaic

Vegetation diversity in the North Fork LHA Area arises from geology, soils and elevational diversity, as well as disturbance like fire and drought and the vegetation successional processes that follow (the successional processes are the relatively predictable vegetation stages that a plant community passes through after disturbance.) The arrangement of the various vegetation types and seral stages across the area is called the vegetation mosaic. The vegetation mosaic is a dynamic characteristic that changes over time. The mosaic is important because it helps determine 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, such as grass dominated vegetation which can occur at nearly any location in the area, either as an early successional stage following disturbance, or as a stable community that occupies a site for the long term. 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. In order to manage for healthy vegetation mosaic and coordinate activities that affect the mosaic, large scale plans have been developed that set objectives for the how the mosaic should look. The Uncompaghre Field Office Fire Management Plan (FMP) (USDI/BLM 2002) states objectives for vegetation mosaics for vegetation management subunits and polygons within them. These mosaic objectives describe desired proportions for each seral stage and patch sizes within the mosaic for different types of management polygons on various parts of the landscape. In this plan, the objectives were based on the best information available at the time, but were designed to be flexible if assumptions proved wrong. Recent studies on fire history and the range of natural variability in pinyon woodlands (Eisenhart 2004) may cause the existing objectives to change, and reduce the amount of early and early mid seral stages prescribed. These adjustments will probably be made to the UFO Fire Management Plan plan's recommendations at its next update.

The North Fork LHA assessment area is broken into three vegetation management subunits (Figure 4.14): Wolf Park, Young's Peak, and Terror Creek. These units are further subdivided into polygons, each representing different landscape mosaic objectives (Figure 4.13). The existing vegetation mosaic on BLM lands is shown in Figure 4.14. Table V1 in the Appendix compares the existing seral stage proportions on BLM lands with the desired amounts specified by the Fire Management Plan objectives. Patch sizes for each of the vegetation management subunits in the North Fork LHA area are also compared with objectives.

Wolf Park Unit

The majority of the unit is made up of the C5/D1 polygon, which has an objective of restoring a natural mosaic appropriate for the southern and western side-slopes of Grand Mesa, such as would result if all natural disturbance processes were intact. Vegetation in this area is somewhat similar to vegetation mosaic objectives described in the Fire Management Plan, although it is somewhat skewed toward the mid and late mid stages. While the late seral vegetation should be retained and allowed to age and additional late stage should be recruited from the mid stage, about 3,900 additional acres of early seral vegetation are needed to bring this unit in line with objectives. This acreage should come from vegetation currently identified as mid seral, and be carved into patches of early seral that range between 6 and 200 acres in size. Mid, late mid and late stages should continue to intermingle and form the matrix.

Wildland-urban interface makes up the next largest portion of this unit. The objective behind this unit is to create a vegetation mosaic which slows the spread of fire and gives firefighters multiple opportunities to control a fire. Vegetation in this unit is substantially outside of the ranges, amounts and patterns specified in the mosaic objective. Over 700 additional acres of early seral stage are needed along with about 1,600 additional acres of early mid stage vegetation. The additional early mid seral vegetation should be arranged so it forms the matrix, while early patches should mostly be arrayed as many small (<5 acre) and fewer larger (5-50 acre) patches. Currently there is an abundance of late mid vegetation. While around 500 acres of this should be set aside to age to later seral stages and around 700 acres of late mid stage vegetation should remain, the balance of the late mid class should be targeted for projects or managed fire. What remains should be distributed in mostly 5 acre patches with a few patches up to 50 acres in some areas.

Figure 4.13 North Fork LHA Area Vegetation management subunits and polygons within them that prescribe various desired vegetation mosaics (From USDI/BLM, 2002: UFO Fire Management Plan).

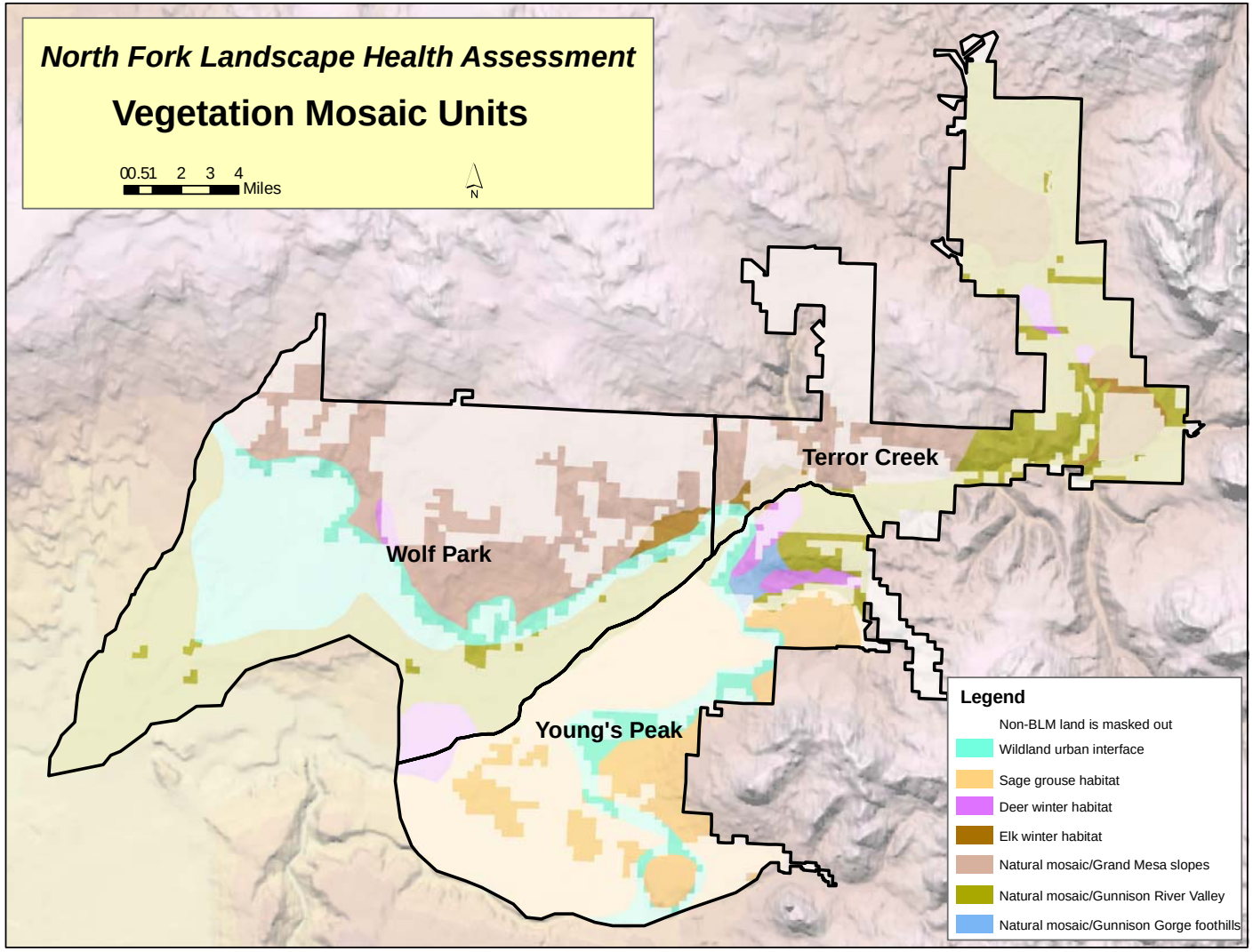
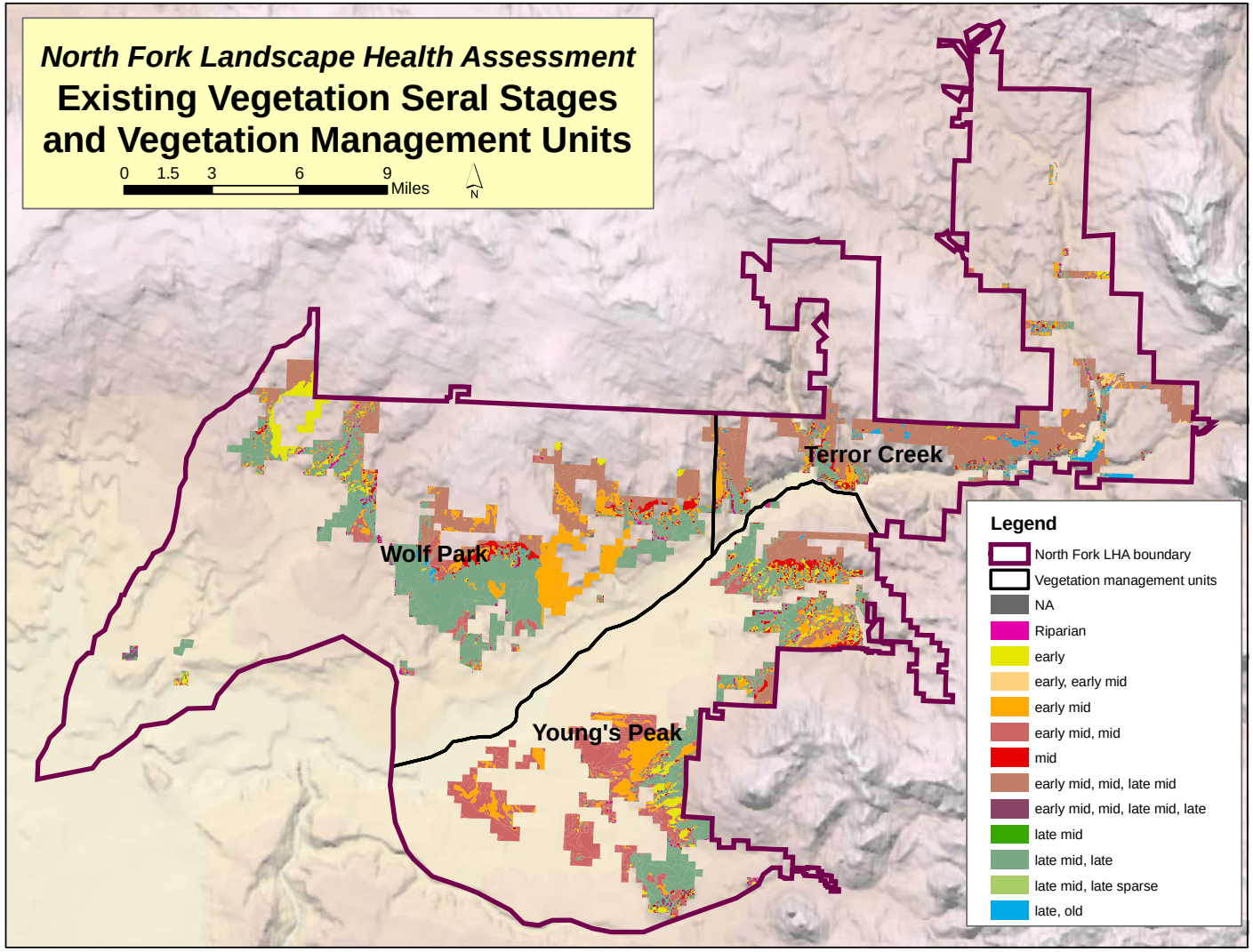


Figure 4.13 North Fork LHA Area existing vegetation seral and structural stages. Colors that denote more than one stage indicate areas where the exact seral stage is uncertain so the range of possible stages for the area is shown.



Young's Peak Unit

Most of this unit is comprised of the C1 polygon designed to optimize Gunnison sage grouse habitat. On balance, the existing mosaic in this unit is largely similar to the mosaic objective. Nevertheless, it would benefit from some additional early seral patches, and a reduction of late mid seral stage where slopes are gentle to moderate, and there is the potential for sagebrush to grow. In such areas, late stage vegetation should be confined to steep slopes and small patches.

Wildland-urban interface makes up the next largest portion of this unit. The current vegetation mosaic in this polygon is not substantially different from the mosaic specified in the objective, except for the need for additional early seral vegetation. About 800 additional acres of early seral stage are needed, while there are about 570 excess acres of the late mid stage vegetation. The present matrix of early mid-mid stage vegetation is appropriate, but the later seral patches are far too large for effective fire management. These patches should be broken down into patches of less than five acres, with a few ranging up to 50 acres.

Polygon D2 makes up the third largest part of this unit. It has the objective of restoring a natural mosaic appropriate for the Gunnison River Valley, as would result if all natural disturbance processes were intact. Much of this polygon seems inappropriate for this unit, as the polygon is supposed to be confined to the salt desert shrub and low elevation sagebrush zones, but in this case it contains substantial woodland and tall shrub habitat. As a result of this mismatch, the existing vegetation mosaic is very different from that described in the objective. Ninety percent of the polygon is currently in mid and late mid stage vegetation, which are structures and ages that are not even present in the objective. Because of this discrepancy, the existing vegetation mosaic will not be evaluated here against the objective.

Polygon C2, with the objective of optimizing winter habitat quality for mule deer, also makes up a significant part of the Young's Peak unit. Presently, the existing mosaic is skewed toward the older age classes and tree-dominated vegetation as compared with the objective. About 200 additional acres of early seral and 150 acres of early mid seral vegetation should be added to this polygon, and removed from the late mid stage vegetation. While the later stages should continue to form the matrix, more early stage patches are needed within it, averaging 10-15 acres in size.

Terror Creek Unit

Polygon D2 makes up the largest part of this unit. Again, it has the objective of restoring a natural mosaic appropriate for the Gunnison River Valley. As with the Young's Peak unit, polygon D2 seems inappropriate for this unit, since the polygon is supposed to be confined to the salt desert shrub and low elevation sagebrush zones, but in this case it contains substantial woodland and tall shrub habitat. Because of the seeming inappropriateness of this unit for this part of the landscape, the existing mosaic will not be analyzed against the Polygon D2 objective.

Polygon D1 forms the second largest portion of the Terror Creek Unit. This polygon has the objective of restoring a natural mosaic appropriate for the southern and western side-slopes of Grand Mesa, such as would result if all natural disturbance processes were intact. The existing mosaic in this polygon is substantially shifted toward the middle seral/structural stages as compared with the objective. Approximately 1,600 additional acres of early seral stage are needed, and 750 acres of early mid stage. Additionally, 2,050 acres of late mid and late stage are needed. All of these acreages should come from the middle seral stages. Additional evaluation of the existing mosaic would be helpful before final project planning takes place, however, because much of the polygon is made up of mountain shrub vegetation which is difficult to relate to

seral/structural stage. Overall, the later stages need to form the matrix, while earlier seral patches should be up to 200 acres in size.

The C3 Polygon also makes up substantial acreage in this unit. The objective of this polygon is to optimize elk wintering habitat quality. This polygon is also largely skewed toward middle stages as compared with objectives. Currently, early stage vegetation is absent from the mosaic, but about 240 acres are needed to meet the objective. About 120 additional acres of late stage vegetation are also needed. These acreages should come from the mid stage. Late stages should be arrayed as the matrix vegetation, with early patches ranging from 50 to 200 acres in size.

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		
55,562	3,744	6,819	521

Specific Problems:

There are several problem areas for sensitive species scattered throughout the LHA study area, mostly at lower elevations and riparian sites. These sites had low ratings for healthy biotic communities, noxious weeds, and low plant diversity. Details are discussed below, and locations shown on Figure 5.1.

Analysis of indicators:

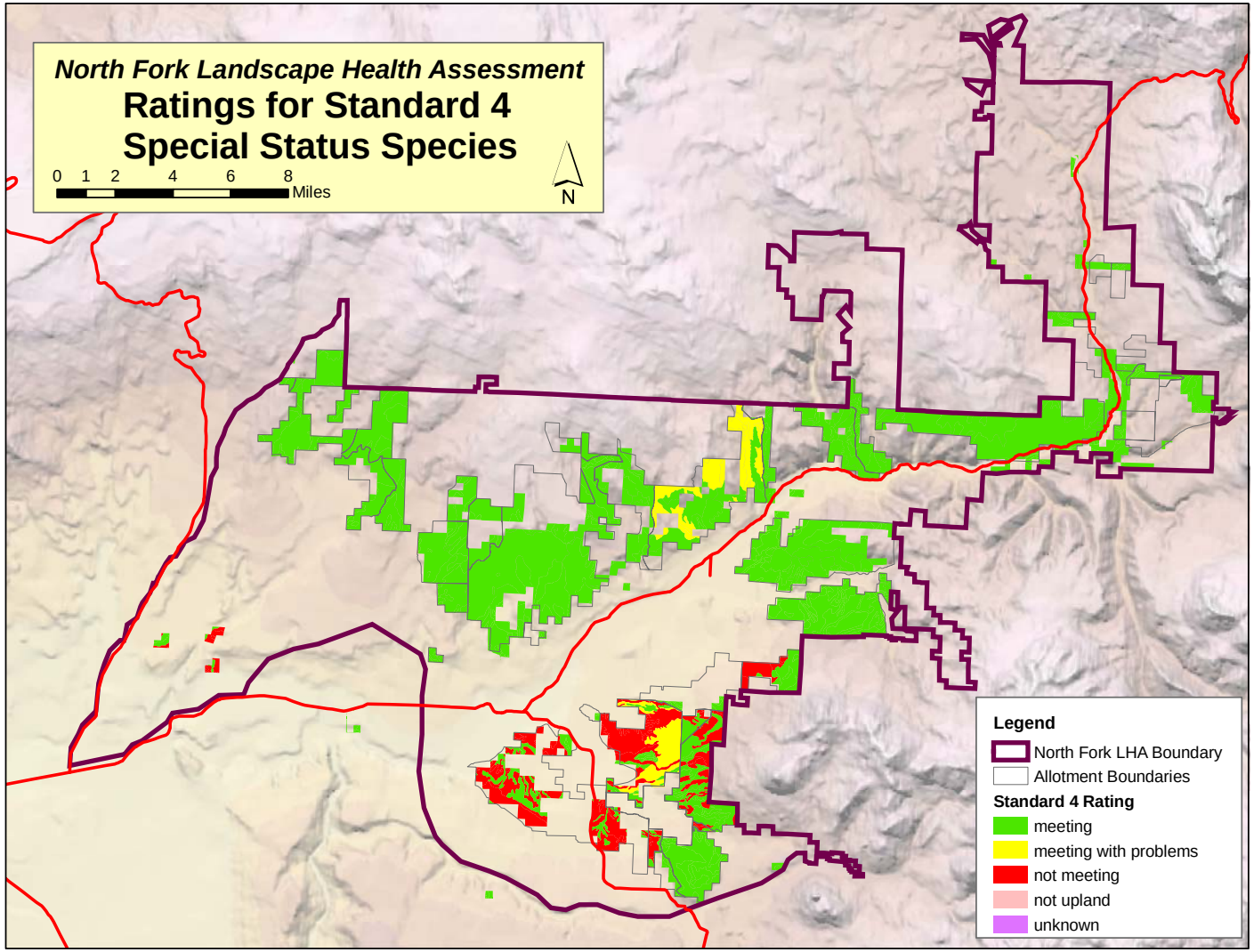
The analysis of T&E, BLM sensitive and rare species has been conducted largely with existing information from the BLM files, CDOW data, CNHP data, and PIF reports. The rapid assessment process is not designed to provide the kind of data required for evaluating rare species. Where this analysis uncovers a significant data gap, recommendations will be made to help resolve it.

The black-footed ferret (*Mustela nigripes*) is not thought to have populations in the LHA area at this time. However, BLM has not mapped the distribution of prairie dogs upon which this species is dependent. Current data on the distribution and health of the area's prairie dog colonies is not available to help establish a baseline for prairie dog distribution and health. This would facilitate an assessment of habitat availability for species dependent on prairie dogs, such as the burrowing owl and black-footed ferret.

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. We do not believe that current management of public lands is having any impacts on habitat quality for this species within the LHA area.

The Gunnison sage grouse has an existing population near Crawford on Fruitland Mesa (Figure 1.13). Active leks are on BLM land near Black Canyon Road between Poison Spring Gulch and Green Mountain and are the center of activity for the remaining birds. Their potential habitat in the LHA area continues up the North Fork to Minnesota Creek near Paonia, then south along the Gunnison National Forest boundary, but presently it is fragmented by a lot of private and agricultural land, and much of the necessary connectivity within the larger area may have been lost. It is doubtful that areas of the potential habitat could be rehabilitated for successful

Figure 5.1 Standard 4 Ratings for North Fork LHA area.



spread of this population. Development pressure, fragmentation and loss of connectivity, and low biotic community health (species diversity, noxious weeds) are major factors governing the recovery of the historic habitat for this species.

Yellow-billed cuckoos have been reported in the North Fork area on several occasions during the last 5 years, but breeding has not been confirmed (personal communication, Beason 2007). Potential habitat appears to be present in a few areas along the North Fork of the Gunnison, although no habitat condition inventories have been completed for riparian systems such as those in the North Fork River or its larger tributaries. Improvement of riparian habitat, much of which is private, is an important factor here, and the North Fork River Improvement Association is working on this issue. Control of riparian weeds on BLM land should be an area of agency emphasis.

Endangered fish habitat in the LHA area is in poor condition in the Gunnison River below the North Fork, and the lower North Fork River. The Colorado pikeminnow, razorback sucker, roundtail chub and flannelmouth sucker are potential inhabitants of these areas. The main threats are unnatural flow and temperatures due to irrigation diversions, excess selenium in the water caused by irrigation and development of desert areas, and competition with non-native fish species. Increased spring-time flows to restore historic flow regimes and backwater habitat would be helpful for these species. It is doubtful that BLM management actions could have any detectable impact in this case. Bluehead suckers are found in upper reaches of the North Fork River, and Colorado River cutthroat are in some of the tributaries to the North Fork upper reaches, and are faring better with healthier stream conditions, and fewer non-native fish (personal communication, Kowalski).

Much of the roosting habitat for bats is in cracks and crevises in rock/cliff faces, and is not affected by current management. Snags (dead trees) with bark should be retained whenever possible to provide tree roost habitat. Foraging habitat for bats would be the greatest concern. Any improvement in native vegetation communities, especially riparian and wetland habitat, would improve foraging habitat for bats and their insect prey.

River otters in the Gunnison River and North Fork of the Gunnison appear to be doing well, but a small portion of their habitat on the lower North Fork has noxious weeds and does not meet the standard for healthy biotic communities, which could have some affect on this population.

Ferruginous hawks, long-billed curlew and white-faced ibis are migrant sensitive bird species which could be impacted by development, loss of plant diversity, and weed infestations in the areas they use, which include open shrubland and sagebrush and lower elevation wetlands. The Hart's Basin area is especially important to migrating and breeding water birds as a migration stopover spot for an estimated 15,000 sandhill cranes (approximately 75% of the western US population) (Horn pers. comm. 2007).

There are a number of rare plants occurring in the LHA area, and some evidence to suggest that current management of public lands is having an impact on the health of these species. The species of concern are adobe beardtongue, Colorado desert parsley, Uintah Basin hookless cactus, and Rocky Mountain thistle. All of these occupy low elevation adobe hill and desert shrub type habitats (Figure 1.12), and are under threat by human development, overgrazing from both livestock and wildlife, noxious weed invasion, and soil erosion. The main areas of concern are in the southeast near Hotchkiss Hills, Crawford Mesa, McDonald Mesa, and Lennox Mesa (see Figure 1.13 and Table 1.7 for area locations and descriptions). These areas all contain habitat and/or populations of the above listed species, and have combinations of poor plant diversity, weed infestations, and soil erosion problems.

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.

Mileage Figures: Stream Miles Evaluated Against Standard 5

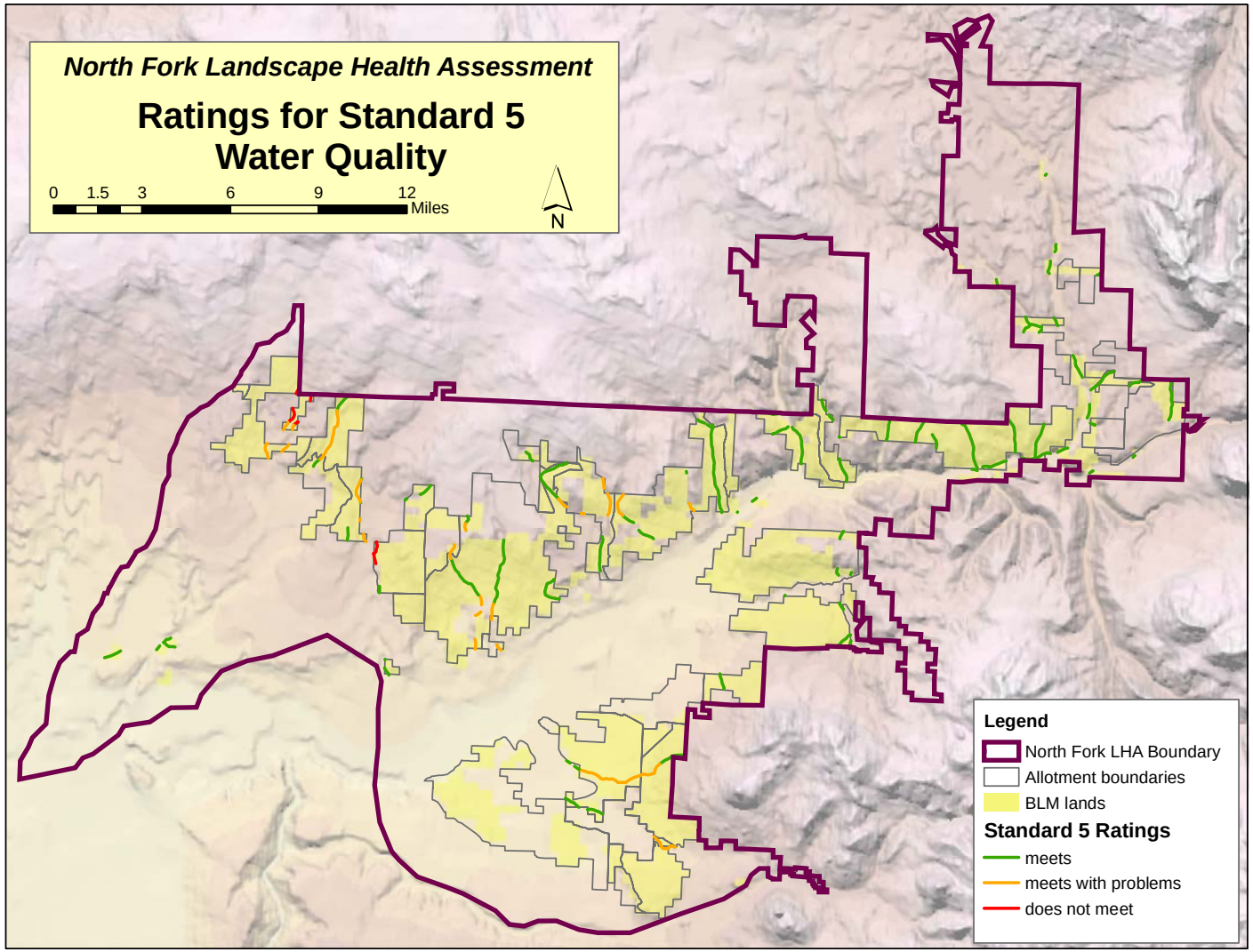
Stream Type	**Miles Meeting Standard 5**		**Miles Not Meeting**	**Unknown**
	Meeting	Meeting but Problem Areas		
Perennial	15.8	6.8	1.2	0
Intermittent	18.9	2.3	0	0
Ephemeral	8.5	4.7	0.7	0
Total	43.2	13.8	1.9	0

See Figure 6.1 for stream ratings for Standard 5.

Table 1.14 in the introductory chapter shows stream sites within the LHA area that were sampled for aquatic macroinvertebrates. The results of the macroinvertebrate sampling show that none of the five streams sampled had invertebrate numbers that equaled or exceeded all of the categories listed, compared to the average for the Southern Rocky Mountain Ecoregion. This is most likely a result of the extensive stream flow manipulation in the North Fork area, for a variety of out-of-channel water uses. The North Fork Basin is considered over appropriated by the Colorado Division of Water Resources, the agency responsible for state-wide water administration. Streams with significant flow depletion have less habitat available for invertebrate survival, and warmer water temperature in the summer months that can shift the invertebrate species to a less desirable composition.

Accelerated yield of sediment from upland soil and stream channel erosion is the most widespread water quality issue in the LHA area. The receiving water for the North Fork area, the Lower Gunnison River, is on the Colorado Monitoring and Evaluation List for suspected impairment from excessive sediment. Much of the sediment derived from the LHA uplands is detached and transported during intense rainfall events in the late summer months. These rainfall events are usually short duration, typically lasting from less than one to no more than three hours. The resultant runoff in the LHA area's streams is also short duration, making quantitative water quality assessments difficult. Thus, to assess a stream's potential for suspended sediment loading in the LHA area, surrogate indicators (soil surface conditions) in place of water quality analyses were used. The specific surrogate indicators used for this assessment, include the amount of bare soil surface, live plant basal coverage, and amount of plant litter on the soil

Figure 6.1 North Fork LHA area Standard 5 stream segment ratings.



surface. Low amounts of plant litter and plant basal cover, and high amounts of bare soil surface (soil surface with no plant, rock, or litter cover) are indicative of soils susceptible to high rates of erosion. Most of the drainages in the LHA have one or more of the soil surface indicators showing problems. On watersheds that have two soil surface indicators showing problems, the drainages that intersect problem areas are rated as meeting standard 5 with problems (Figure 6.1). Stream channels where all or portions of the drainage area showed problems with all three indicators, do not meet Public Land Health Standard 5.

The 303(d) listed stream segments in the North Fork (Table 1.12 Chapter 1) are impaired by excessive Selenium. Selenium in the Gunnison Basin is most associated with the Mancos shale formation. Excessive concentrations of Selenium are commonly found in stream flow as a result of man-caused leaching due irrigation practices and water delivery systems, and other land development practices that add excessive water to raw Mancos shale. None of the streams draining BLM managed public lands in the LHA area, sampled for Selenium (Table 1.9 Chapter 1) had detectable concentrations.

Lastly, roads and trails in need of maintenance can be large sources of sediment into receiving surface waters. This LHA did not evaluate the condition of all roads and trails in the evaluated area but did take note of problem areas when encountered. An example would be the Spring Creek Trail in T 12 S, R 89 W, Section 8. This trail starts at Colorado State Highway 133, north of Paonia Reservoir. It then navigates up a steep hillside, intercepting the flow of a small drainage. Additionally, drainage control features were absent along the entire length of the trail. The photo below shows a section of the trail that is eroding from poor drainage control. To correct this situation, trail relocation would be necessary in a short reach near the lower trailhead to eliminate the trail from intercepting the drainage. Along the entire trail length, the trail should be assessed for needed drainage control, and implemented as soon as funding permits.

Trail Erosion and Poor Drainage, Spring Creek Trail (T12S, R89W, Sec. 8)

Causal Discussion and Determinations
For discussion and analysis of probable causes for problems observed with each of the standards see the separate document entitled "Causal Determinations for North Fork LHA"

Recommendations

Standard 1 Soils
In areas with elevated bare soil levels, leave more plant litter on the soil surface. Limit grazing season 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.

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.

Ensure that existing mosaic objectives (UFO Fire Management Plan (USDI BLM 2002)) are reasonable and consistent with recent information concerning regional historic ranges of variability. Subsequently reevaluate existing mosaics, then implement measures to ensure objectives are met by allowing natural disturbances to take place, simulating natural disturbances, and restoring past vegetation treatments to increase herbaceous cover and minimize vegetation stages that provide little soil protection.

Reseed burns and consider mulching/rollerchopping/hydroaxing burned areas that are prone to erosion where existing vegetation or rocks on the soil surface are unlikely to stabilize the site within the first 1-2 years post fire.

Coordinate or participate in research on controlling cheatgrass invasions in new disturbances as well as reducing existing invasions. Implement measures/mitigation to reduce spread of cheatgrass and other invasive annuals for all permitted activities. Use the Stucker Mesa area as a demonstration site and study area.

Complete the road and trail map, and use it in a GIS to identify road-caused soil loss. This analysis should be used to direct road maintenance and rehab areas so that road and travel related erosion is reduced. Additionally, this information is needed to implement the North Fork Travel Management Plan. Monitor use to better understand soil impacts from OHVs. Where necessary, close and rehab abandoned roads and trails to prevent further erosion.

Ensure mitigation for mine-related soil damage is adequately carried out.

Standard 2 Riparian
Continue to work on the control of tamarisk, knapweed and other invasive exotics that infest riparian communities in the LHA area. Pursue development and implementation of weed management plans with Delta and Gunnison Counties and the USFS to manage weeds across landscapes with intermingled land ownership patterns. Incorporate weed management responsibilities into grazing permits on allotments where BLM has done initial treatment, and for new range projects.

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

Acquire an updated map of water rights and instream flows (online from the Colorado Water Conservation Board) within the North Fork area to better understand controls on stream flows, to identify segments still needing protection, and to help ensure existing water rights are being correctly managed.

Put into place a comprehensive series of riparian cross-section studies to monitor riparian condition changes over the long term.

Standard 3 Native Plant and Animal Communities
Improve cool season perennial grass and forb cover by adjusting livestock grazing where it is a contributing factor to low cover. Investigate overall shortage of warm season grasses to determine if it is a regional problem or a climate/soils related phenomenon. Prevent grazing on regrowth during the growing season 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.

Promote and support the native seed development program to generate a source of adapted, truly native species for rehabilitating damaged areas in the LHA unit.

Finalize the North Fork LHA area road and trail map. Implement more intensive monitoring of OHV use focusing on the potential for loss of native plant and animal species, and the increase in invasive plants. Use this information to help develop regional Best Management Practices for road and trail placement and management. Implement North Fork Travel Management Plan by informing the public and enforcing the change in travel designation from open to limited to existing roads and trails. Where necessary, further limit travel to designated routes and close and rehab abandoned roads and trails to prevent further damage to vegetation.

Prevent disturbed areas—particularly fires—from transitioning to dominance by invasive annuals. Evaluate findings from the UFO treatment studies, Stucker Mesa rehab site, Baker and Goetz (2006), and Shinneman (2006) to determine whether seeding is correlated with cheatgrass, and their other conclusions on factors associated with cheatgrass spread. Based on review of data, determine best management practices including seeding, spraying, and priority areas for combating cheatgrass. When seeding, use the best adapted seed possible as determined by

treatment monitoring studies, and use the products of the UP native plant material development effort as they become available.

Where the spread of weeds is not a threat, improve warm and cool season grass and forb cover, shrub vigor and the vegetation mosaic by reintroducing fire and other natural disturbances, or simulating their effects:

1) Review Fire Management Plan landscape units and objectives. Consider breaking a North Fork Uplands Unit out of the Gunnison/Uncompahgre Valley Bottom and Mesa Slopes unit to better reflect the mountain shrub dominated communities in that area.
2) Develop vegetation management strategies for each vegetation management unit. Use mosaic analysis (Chapter 4, this document) to guide vegetation treatment design, both in terms of quantity and pattern.
3) Review findings by Eisenhart (2004) and Shinneman (2006) and retool mosaic descriptions in the UFO Fire Management Plan (USDI BLM 2002) for natural landscape conditions based on this new data.
4) Where new mosaic objectives are developed, reevaluate existing mosaic versus desired mosaics to develop acreage figure recommendations for treatment.
5) Continue to implement the planned projects to achieve the mosaic objectives. Evaluate impacts from drought and pinyon and sagebrush decline to determine if each project is still needed.

Work with CNHP, Black Canyon Audubon, and academic partners to better understand small mammals, herptiles, birds, and predators, their habitat needs and the existing condition of their habitats.

Work with the Colorado Division of Wildlife through their Habitat Partnership Program and private landowners (individually and through Natural Resource Conservation Service) to encourage participation in habitat improvement programs.

Promote Neotropical Migratory Bird (NTMB) species by:

1) Continuing control work on noxious weeds and tamarisk to improve habitat for NTMB species
2) Following the Best Management Practices developed for woodland and sage dependent species when implementing vegetation treatments.
3) Maintaining support for the Rocky Mountain Bird Observatory to continue with Breeding Bird Survey transects on BLM land
4) Reduce or eliminate activities that degrade the structure and quality of the overstory or understory of riparian systems.
5) Monitor livestock grazing to ensure tree and shrub regeneration in riparian areas. Design recreational facilities such as roads, trails, and campgrounds to allow the long-term persistence of wooded riparian areas. Include plant species that attract large numbers of insect pollinators as prey in rehabilitation schemes in lowland riparian areas.
6) Maintain stands of large-diameter Gambel oaks, which produce acorns for deer, bears, Wild Turkeys, and Band-tailed Pigeons and which provide shade and access to elk sedge understory production for deer and elk, benefit Virginia's Warblers as well.
7) Defer grazing in a rotation that has some pastures with flowering forbs at all times

through the growing season. This should benefit the security of the forage resource for both livestock and hummingbirds.

Improve weed management by

1) Following a strategic approach to first contain spread then reduce existing infestations by developing a weed management plan, or implementing existing plans. In most areas of the North Fork this will require working with partners to tackle weeds across multiple jurisdictions.
2) Utilizing existing partnership with Delta County to help implement this strategy, and contacting Gunnison County to develop a similar partnership.
3) Incorporating weed control responsibilities into grazing permits where BLM has initiated weed control.

In seriously degraded plant communities implement vegetation restoration activities to reduce competition from weeds or woody species, and seed with native species.

Consider amending the Uncompahgre Basin Resource Management Plan to evaluate special designations for CNHP, TNC or SREP Potential Conservation Areas, biodiversity conservation areas and wildlife movement corridors.

Put into place a comprehensive series of monitoring transects (several per grazing allotment) to track plant community changes over time, and to monitor effects of management on Standard 3.

Standard 4 Special Status Species:
Undertake a mapping effort for prairie dog colonies in the area, and establish a monitoring program to track changes in prairie dog distribution and colony health.

Continue to assess the potential for increasing the amount of suitable habitat within the unit for reintroduction and expansion of Gunnison sage grouse populations.

Work with DOW, CNHP, and other constituents to improve information on special status, and rare animal and plant species in the area. To improve or protect habitat for these species, recommend management actions, or develop Best Management Practices, these partners will need to develop improved surveys and monitoring activities.

Implement BLM surveys and monitoring to fill data gaps. Conduct habitat inventories and surveys for yellow-billed cuckoo within the major riparian areas in the LHA area, and update sensitive plant species maps for Rocky Mountain thistle, Colorado desert parsley, Uintah Basin hookless cactus in the LHA area.

Consider amending the Uncompahgre Resource Management Plan to include special designations and management decisions for the CNHP, TNC, or SREP Potential Conservation Areas, biodiversity conservation areas, and wildlife movement corridors.

Enhance the management of those streams that are functioning at risk in order to improve habitat conditions for sensitive fish species (see recommendations for Standard 2.)

Standard 5 Water Quality:
Implement management strategies to maintain or increase basal vegetation cover across the LHA area, and decrease amount of bare soil surface on the uplands in the watersheds rated as "Meeting with Problems".

Perform road maintenance and/or closures on roads and trails identified with drainage or erosion problems.

Assess identified incised channel systems as to their stage of development and causal factors, and implement corrective actions, if appropriate.

Reseed burns and consider mulching, rollerchopping, or hydroaxing burned areas that are prone to accelerated sediment production where existing vegetation is unlikely to stabilize the site within the first 1-2 years post fire, or if the invasion of cheatgrass is a threat.

Implement periodic monitoring to identify potential impacts to water quality, including the annual thermal regime.

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Table V1. Existing vegetation mosaic versus desired vegetation mosaic for major Fire Management Plan. The estimated % seral stages are more accurately portrayed along a spectrum from young to old in the top row, and classified for analysis in the bottom row in the green blocks. Where percentages do not add up to 100, the balance is made up of rock, water, etc. These are approximations of what exists due to inaccuracies in the vegetation mapping.

Subunit, Polygon type, Acreage	**% of Sub-unit**	**Desired % of each Vegetation Seral Stage** e=early (herbaceous) em=early mid (shrub/grass) m-mid (shrub/young tree) lm=late-mid (tree-shrub; tall shrub) l=late (tree) * designates matrix stages					**Estimated % of each Vegetation Seral Stage** e=early (herbaceous) em=early mid (shrub/grass) m=mid (shrub/young tree) lm=late-mid (shrub/mature tree; tall shrub) l=late (mature/old tree) top numbers are an accurate portrayal of estimated percentages along the seral stage spectrum, while bottom bolded numbers have been interpreted to fit into a single seral stage					
		e	**em**	**m**	**lm**	**l**	**e----------em----------m---------lm----------l**					
Wolf Park **C5/D1: Natural Mosaic Grand Mesa Slopes** **20,546 acres** **Patch Sizes:**	75%	25	20	10*		45 *	6 **6**	18 **18**	3	34 **37**	0 **37**	37 **0**
	Early seral vegetation patches range in size from <1-325 acres, with an average patch size of 37 acres. Early mid patches range in size from <1-1,480 acres, averaging 25 acres. Mid, late mid and late stages are very intermingled and form the matrix. The prescription calls for younger age patches embedded in a matrix of late mid and late seral vegetation. Early and early mid seral patches should range from <5 acres to >200 acres, but mostly fall within the 6-200 acre range.											
Wolf Park **B1:Wildland-Urban Interface** **4,583 acres** **Patch Sizes:**	17%	20	55*		15	10	3 **3** **0**	8 **8**	12	**12**	**75**	75
	Early seral patches range from <1-45 acres, with a mean size of 9 acres. Early mid patches range from <1-258 acres, averaging 24 acres. Mid seral patches range from <1-126 acres, averaging 14 acres. Later stages make up the matrix in this unit. The prescription calls for a matrix of early-mid stage with early seral acreage distributed among many small (<5 acres) and fewer medium (5-50 acre) and a few large (>50 acre) patches. Later stages should be mainly in small patches with very few medium size patches.											
Young's Peak **C1: Sage**	62%	12	65 *	13	15		5 **5** **0**	19 **56**	37	5 **5**	**29**	29

Grouse Habitat **14,969 acres** **Patch Sizes:**	The early seral patches range in size from <1-113 acres, with a mean size of 12 acres. Early mid patches range from <1-1,517 acres, forming the matrix stage throughout much of the unit. Mid seral patches range from <1-330 acres with an average size of 11 acres. Later stages range from <1-1,164 acres with a mean size of 32 acres. In parts of the unit they are large enough to form the matrix. The prescription calls for a fine-grained mosaic with patches of 5-100 acres in a matrix of early mid seral sagebrush, with the late seral vegetation confined to draws and upper elevation slopes.						
Subunit, Polygon type, **Acreage**	**% of Sub-unit**	**Desired % of each Vegetation Seral Stage** See top of table for definitions					**Estimated % of each Vegetation Seral Stage** See top of table for definitions
		e	**em**	**m**	**lm**	**l**	**e----------em----------m---------lm----------l**
Young's Peak **B1:Wildland-Urban Interface** **4,403 acres** **Patch Sizes:**	18%	20	55*		15	10	**1 11 46 2 36** **1 57 2 36 0**
	Early seral patches range from <1-9 acres, with a mean of 3 acres. Early mid and mid vegetation form the matrix stage for most of the unit. Later seral stage vegetation is located into large patches at the north and south ends of the unit and in a portion of the middle. It is broken into patches that range from <1-1,600 acres, with an average of 63 acres. The prescription calls for a matrix of early-mid stage with early seral acreage distributed among many small (<5 acres) and fewer medium (5-50 acre) and a few large (>50 acre) patches. Later stages should be mainly in small patches with very few medium size patches.						
Young's Peak **D2: Natural Mosaic, Gunnison River Valley** **2,081 acres** **Patch Sizes:**	9%	20	80	NA		N A	3 4 2 73 15 **3 4 75 15 0**
	Early seral vegetation ranges from <1-22 acres, with an average patch size of 7 acres. Early mid patches range from <1-5 acres, averaging 3 acres. Mid and late mid vegetation from the matrix. The prescription calls for widely scattered, small (<5 acre) patches of herbaceous vegetation in the salt desert shrub type, and small to moderately sized (<20 acre) herbaceous patches in desert shrub/grassland and sagebrush areas.						

Young's Peak **C2: Mule Deer Winter Areas** **1,584 acres** **Patch Sizes:**	5%	25	25	25*	25 *	8 **8**	15 **15**	7	9 **16**	60 **60**	**0**	
	Early seral patches range from <1-22 acres in size, averaging 4 acres. Early mid seral patches range from <1-55 acres, with a mean of 5 acres. Mid, late mid and late stages are highly intermingled and form the matrix. The prescription calls for a matrix of late mid and late stages, but about half of the area should be made up of mostly small and medium (<25 acre) patches dispersed throughout the matrix.											
Terror Creek **D2: Natural Mosaic, Gunnison River Valley** **6,997 acres** **Patch Sizes**	48%	20	80	NA	N A	1 7 **1 7**	3 **7**	4	2 **71**	69 **10**	10	
	The early seral stage patches range from <1-35 acres with an average of 8 acres. Early mid patches range from <1-55 acres with an average of 6 acres. Late and late mid stages are in patches ranging from <1-120 acres, averaging 7 acres. The "mid" stage (mature mountain shrub/sagebrush) forms the matrix. The prescription calls for widely scattered, small (<5 acre) patches of herbaceous vegetation in the salt desert shrub type, and small to moderately sized (<20 acre) herbaceous patches in desert shrub/grassland and sagebrush areas.											
Subunit, Polygon type, Acreage	**% of Sub-unit**	**Desired % of each Vegetation Seral Stage** See top of table for definitions					**Estimated % of each Vegetation Seral Stage** See top of table for definitions					
		e	**em**	**m**	**lm**	**l**	**e----------em----------m---------lm----------l**					
Terror Creek **D1: Natural**	44%	25	20	10*		45 *	2 **0**	8 **8**	3	74 **77**	11 **11**	**2**

Mosaic Grand Mesa Slopes **6,491 acres** **Patch Sizes**	There are very few early seral patches, but for the small number present, size ranges from <1-8 acres, with a mean of about 3 acres. Early mid patches range from <1 to about 170 acres with a mean of 11 acres. The "mid" stage (mature mountain shrub/sagebrush) forms the matrix, while late mid and late stages in combination are distributed in patches that range from <1 to 200 acres with an average of 9 acres. The prescription calls for younger age patches embedded in a matrix of late mid and late seral vegetation. Early and early mid seral patches should range from <5 acres to >200 acres, but mostly fall within the 6-200 acre range.										
Terror Creek **C3: Elk Wintering Area** **794 acres** **Patch Sizes**	5%	30	10	20*	40*	9 **0**	9 **18**	2	55 **57**	14 **0**	**25**
	Early patches are essentially absent from this unit. Early mid patches range from <1-50 acres and average around 6 acres. Mid and late make up the matrix stage. The prescription calls for a matrix of late mid and late stages combined, with slightly less than half of the landscape made up of mainly medium sized (50-200 acre) patches of early and early mid stages.										