Roubideau Land Health Assessment
2004-2005

Uncompahgre Field Office - B.L.M.

Land Health Assessment
Roubideau Area, 2004-2005

SUMMARY

This land health assessment evaluated over 104,000 acres of public land. The evaluation resulted in a determination of the acreage meeting the Rangeland Health Standards, the acreage not meeting, and the nature and location of the problems on the landscape. A small amount of the 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 shows the amount of land meeting or not meeting the Standards:

Acres Meeting Standards 1, 3,& 4	**Acres Not Meeting Standards 1,3,& 4**	**Acres Unknown Or N/A**
79,929	22,551	1,654
Stream Miles Meeting Standards 2&5	**Stream Miles Not Meeting Standards 2&5**	**Stream Miles Unknown or N/A**
115.5	8.3	0.4

In order to make the above determination, the Roubideau 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)	45,905	45,186	9,616	3,426
Standard 2-Riparian (miles)	54.3	12.9	0	0.4
Standard 3-Healthy Communities (acres)	17,403	66,437	16,867	3,426
Standard 4-T&E Species (acres)	103,960	173	0	0
Standard 5-Water Quality (miles)	91.7	24.2	8.2	0

Major Land Health Problems

Standard 1: Soils across a substantial portion of the area met Standard 1 with no problems. A similar amount of the area had some soil problems, but still met Standard 1, while less than 10% of the area did not meet this standard. There were comparatively few areas observed where soil erosion was clearly accelerated above natural levels. However, many areas were vulnerable to soil erosion because of low plant basal cover, low cover of plant litter protecting the soil surface,

and high amounts of bare soil.
Standard 2: The majority of stream miles fully met this standard, and exhibited healthy riparian vegetation, and normal channel morphology and hydrologic processes. A fraction of the stream reaches had some problems, mostly related to the abundance of invasive or noxious weeds which are likely to increase given the abundance of moisture and frequent disturbance that occurs in the riparian zone. Some of these reaches had minor problems relating to the channel being overly wide relative to its depth.
Standard 3: The majority of areas met this standard, although many areas had minor problems. The most common and significant problems involved lack of perennial forbs, and low levels of cool and warm season grasses. Other significant, but less widespread problems included the presence of noxious weeds or invasive alien species, poor browse shrub condition, pinyon-juniper invasion, and tree vigor.
Standard 4: All upland areas met this standard with no problems identified. The only problematic areas were along degraded riparian zones, and these posed potential problems for special status fish species. There was inadequate data for some sensitive species, and recommendations are made to address this data gap.
Standard 5: 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 minimizing instances where livestock graze the same areas in both 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. Monitor use to better understand soil impacts from OHVs.

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

Implement monitoring system that will address trends in soils indicators.

Standard 2 Riparian
Develop map showing instream flows and water rights. If necessary, 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 with other entities and follow a strategic plan.

Reduce grazing use on native riparian woody species to 30%. Identify and enforce non-riparian trailing areas. Limit livestock utilization of woody riparian plant communities during the fall and winter periods. Evaluate cross fencing to assess whether they are causing unnecessary impacts to streams.

Use grazing exclosure(s) around some riparian areas to determine and demonstrate potential

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.

Reseed fires and similar disturbances with native, adapted species where threat of weed invasion is likely, or 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

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 habitat, maintaining Breeding Bird Surveys, and following best management practices.

Continue and increase weed management across the unit; work in coordination with other entities and follow a strategic plan. Target spotted knapweed for total eradication as soon as possible.

Restore seriously degraded plant communities

Finalize the Roubideau LHA area road and trail map, and implement more intensive monitoring of OHV use and potential for loss of native plant and animal species, and increase in invasive plants, with the objective of improving road and trail management.

Standard 4 Special Status Species:
Improve monitoring and inventory data for prairie dog colonies, Mexican spotted owl, Peregrine falcon, good-neighbor bladderpod, and Uinta basin hookless cactus at a minimum.

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 Resource Management Plan to evaluate special designations for the CNHP Potential Conservation Areas.

Improve management of riparian areas for sensitive fish species protection.

Standard 5 Water Quality:
Assess the condition of all in-channel structures for possible contribution of sediment to local drainages, and repair/reclaim as necessary.

Implement more intensive monitoring of OHV use and potential accelerated levels of sediment. The highest priority for monitoring is the extreme 4 wheel drive trails in the ephemeral drainages that are tributary to Dry Creek (Figure 6.2).

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 on roads 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.

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Land Health Assessment
Roubideau Area, 2004-2005

INTRODUCTION

Overview

The Roubideau Land Health Assessment (LHA) area is located in Montrose County, on the eastern slope of the Uncompahgre Plateau, a distinctive uplift in west-central Colorado. The LHA area extends southward from Monitor Creek to Dave Wood Road. It is bounded on the east by private lands of the Uncompahgre Valley, and on the west by the Uncompahgre National Forest Boundary (part of the larger GMUG National Forest, see Figs 1.1 and 1.2). The unit encompasses over 118,000 acres within its boundary, and is made up of parts of three Level 5 watersheds: Roubideau Creek, Dry Creek, and Spring Creek/Happy Canyon watersheds. The unit was identified in 1998, prior to the directive to base units on fifth order watershed boundaries. However, it is centered in the central part of the eastern slope of the Uncompahgre Plateau, and thereby forms a large and cohesive landscape "chunk".

Land Ownership Pattern

The Roubideau Land Health Assessment boundary encompasses a little more than 118,800 acres of which 104,133 acres are public land. These public lands are distributed across the area in almost continuous blocks of public land, except for along the eastern and western boundaries where blocks of private land are scattered across the BLM land (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 five different RMP management emphasis units, and contains the Camelback Wilderness Study Area, which is presently managed as wilderness. The majority of the area falls into the RMP's livestock emphasis unit. The Roubideau and Spring Creek drainages are identified for aquatic and riparian emphasis. Large blocks of land at the upper elevations are designated for forestry emphasis, and two smaller areas are designated as deer and elk winter range. Small, isolated parcels on the eastern side of the unit are designated for general management.

Grazing Allotments

There are 25 grazing allotments in the unit that contain public land (See Figure 1.4, and Table 1.1). Sixteen of these are almost entirely made up of public land (Dave Wood, Spring Creek, Beaver Hill, Highway 90, Pipeline, Dry Creek Basin, Cushman, Shavano Mesa, Transfer Road, Sandy Wash, Roatcap, Dry Creek Place, Flatiron, Ben Lowe, Canal and Winter/Monitor Mesa). Seven allotments are primarily public land but also contain more than 10% private land: South Piney, Piney, Franklin Mesa, Coal Creek, Green, Lee Bench and Lower Roubideau Canyon. The remaining two are 25% or less public land: Bald Hills and East Fork Dry Creek. Eighteen of the allotments are grazed by cattle. Sheep graze the remaining seven (Highway 90, Dave Wood, Beaver Hill, Shavano Mesa, Cushman, Sandy Wash and Canal).

Figure 1.1 Roubideau LHA general location map.

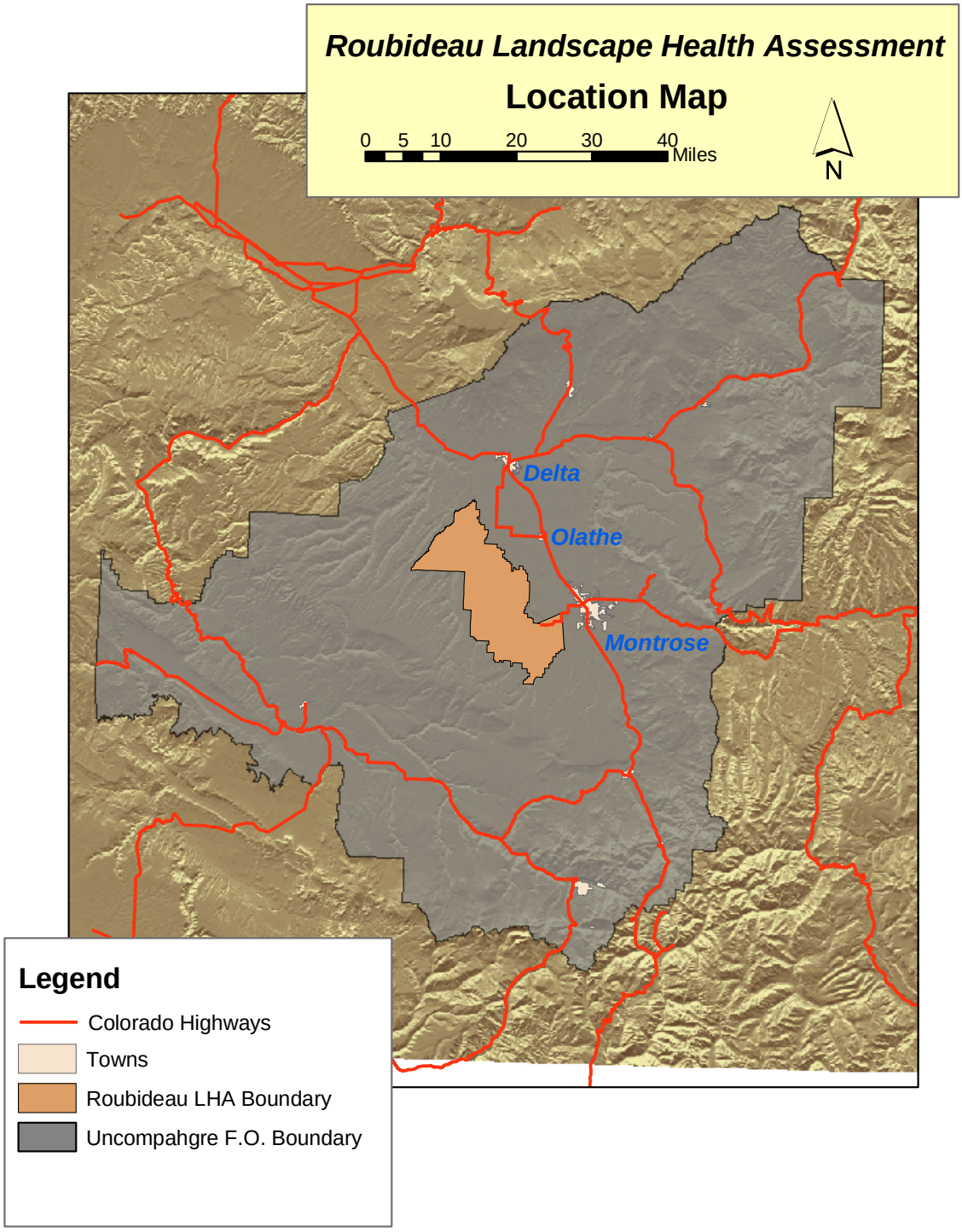


Figure1.2 Roubideau LHA land ownership.

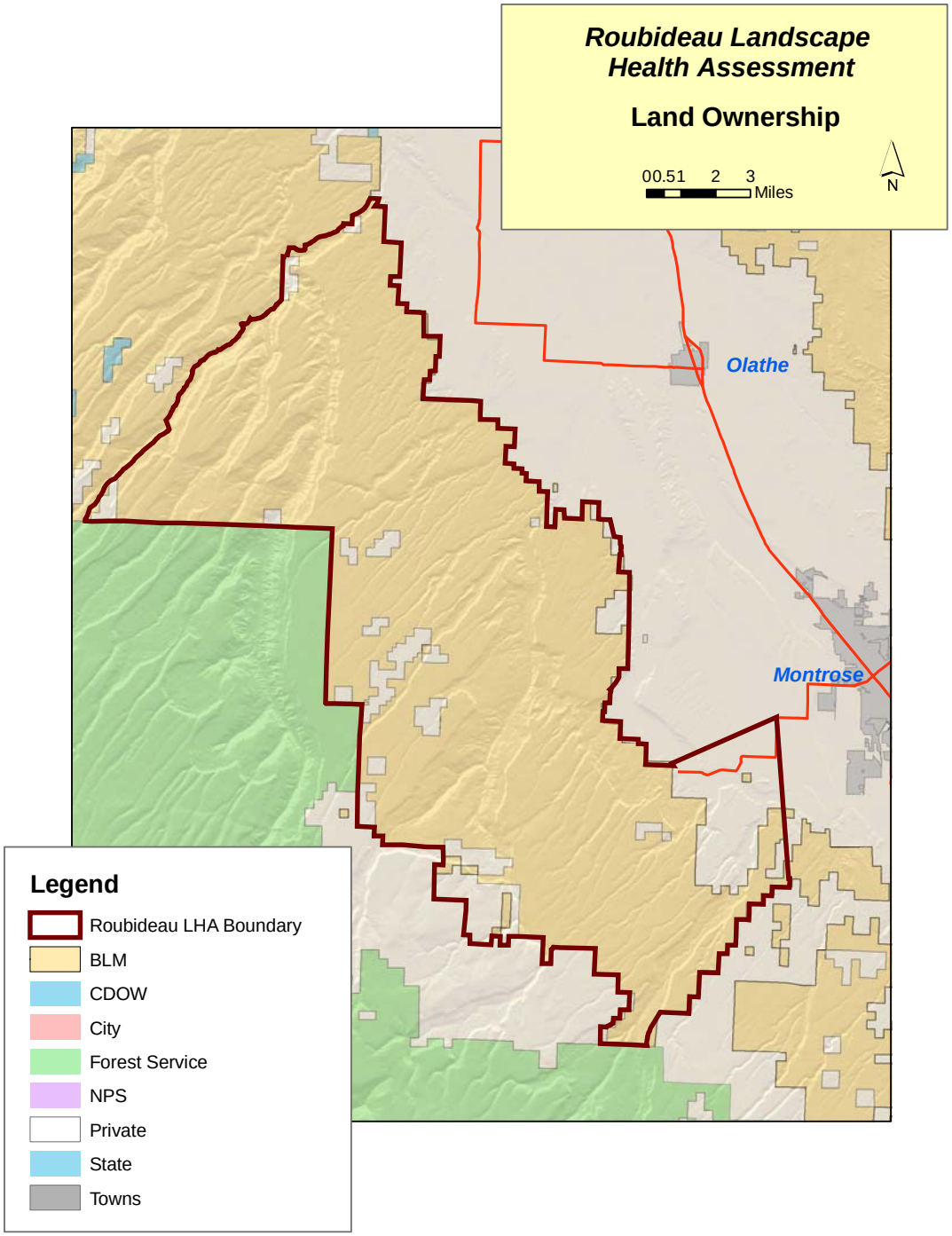


Figure 1.3 Roubideau LHA land management designations from the Uncompahgre Resource Management Plan. Map also shows Wilderness Study Areas.

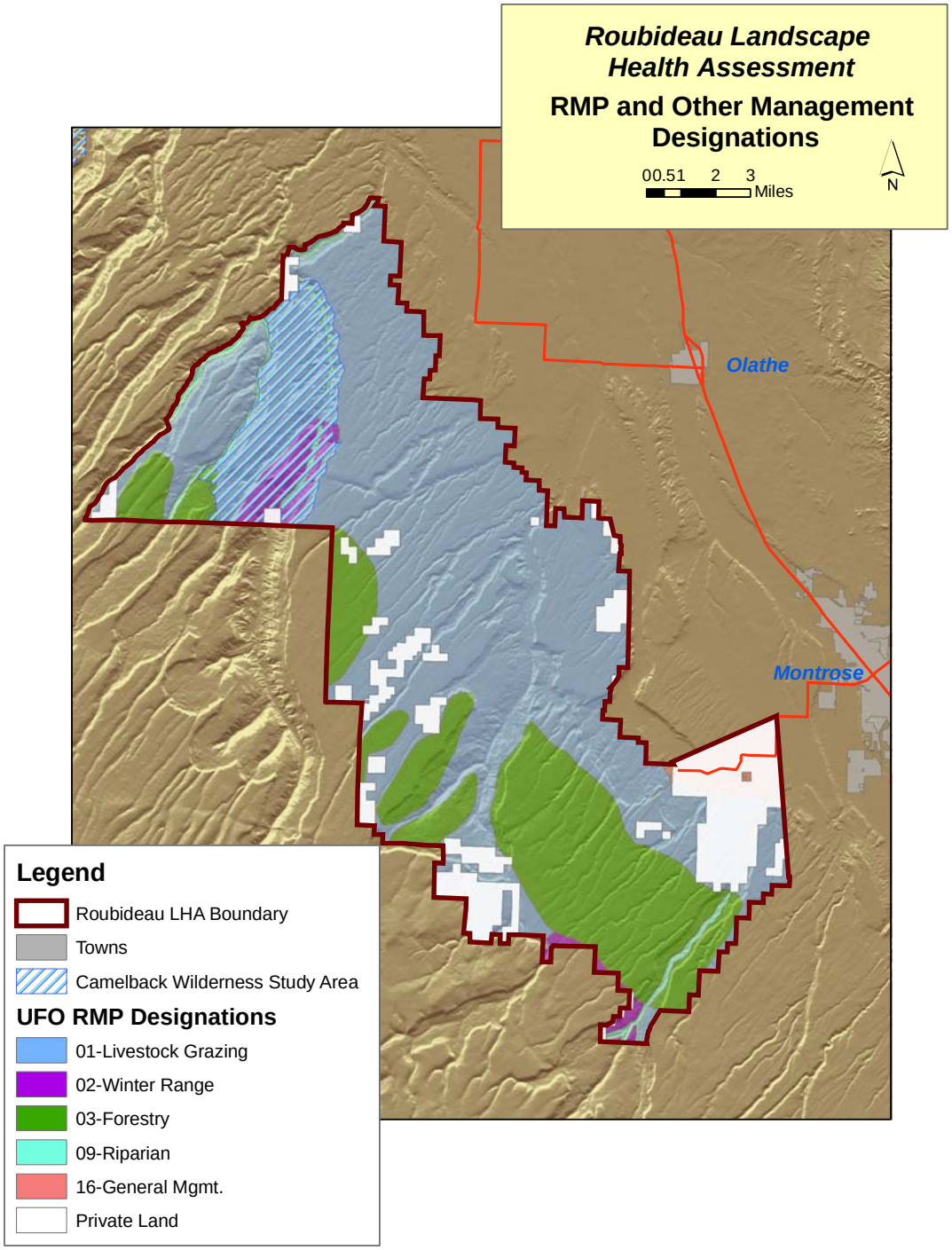


Figure 1.4 Roubideau LHA Area grazing allotment boundaries.

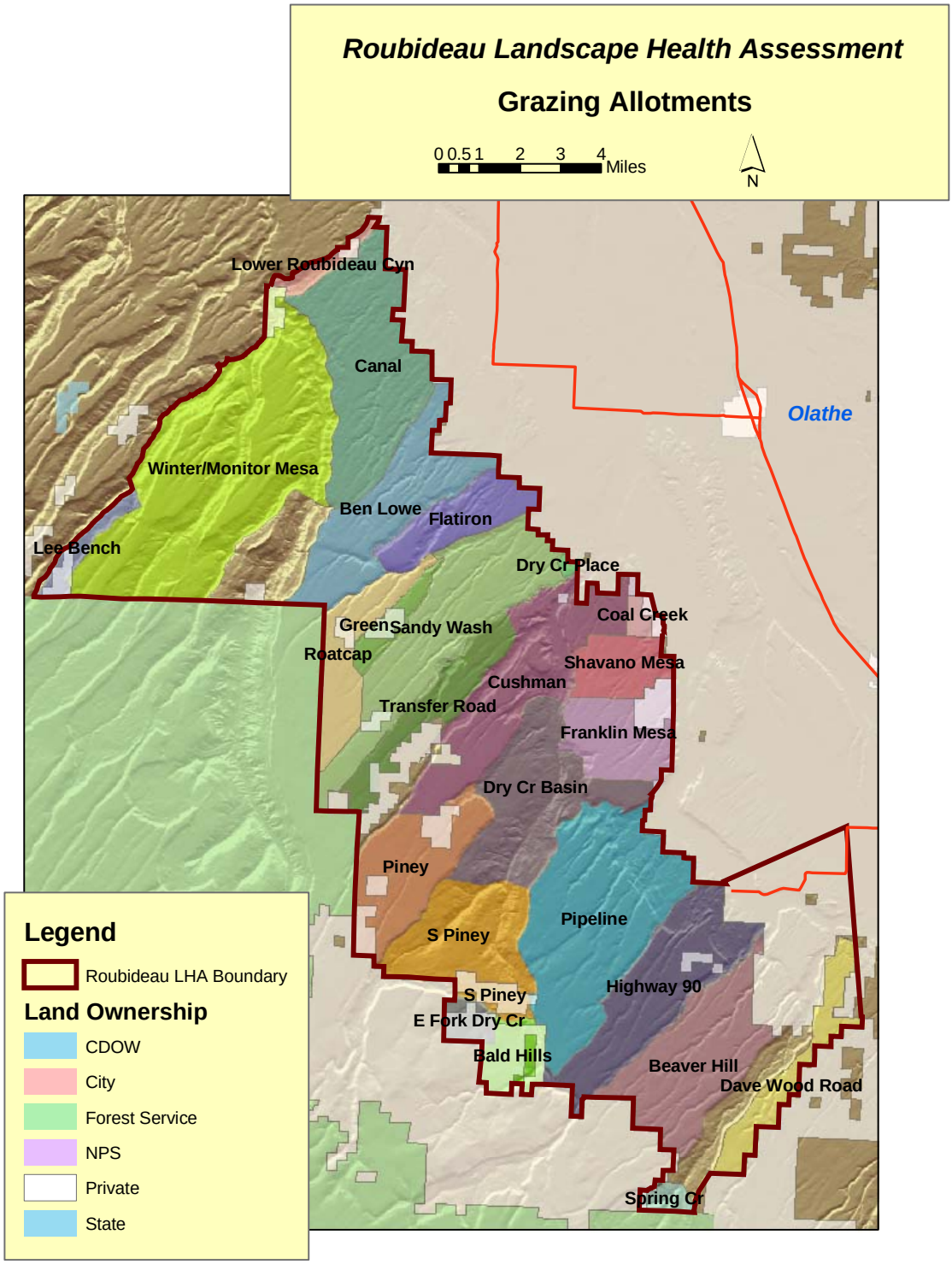


Table 1.1 Grazing Allotments and Management.

Allotment Name and Number	**Class**	**Season**	**Comments**
14010 Winter-Monitor Mesa	Cattle	Fall	Livestock are trailed through the allotment in the spring on the way to a Forest Service Allotment. Pasture rotations with the Forest are coordinated. Motorized access to Winter Mesa is authorized to allow maintenance of range improvements.
14012 Canal	Sheep	Winter	Used in conjunction with several other allotments during the November to March period. Use is varied based on precipitation distribution and forage availability.
14013 Ben Lowe	Cattle	Fall	
5501 Flatiron	Sheep	Fall or Winter	The class of livestock on this allotment will be sheep until the base property lease is not renewed at which time it will revert to cattle use. Used in conjunction with several other allotments during the November to March period. Use is varied based on precipitation distribution and forage availability.
5503 Green	Cattle	Spring or Fall	
5504 Roatcap	Cattle	Spring or Fall	
5505 Transfer Road	Cattle	Fall/Spring	Period of use is determined in coordination with Grand Junction BLM. Spring use is limited to no more than 20 days every other year.
5506 Cushman	Sheep	Winter	Used in conjunction with several other allotments during the November to March period. Use is varied based on precipitation distribution and forage availability.
5507 Pipeline	Cattle	Spring or Fall	
5509 Coal Creek	Cattle	Spring	Use is limited to a two week (14 day) period between the dates of April 1st and (ending no later than) May 30th 2 out of every three years. Full season rest will be required in the third year.
5510 Bald Hills	Cattle	Summer	
5511 Shavano sa	Sheep	Winter	Used in conjunction with several other allotments during the November to March period. Use is varied based on precipitation distribution and forage availability.
5512 Franklin Mesa	Cattle	Spring or Fall	
5513 Dry Creek Basn	Cattle	Spring or Fall	
5514 E Fork Dry Creek	Cattle	Summer	Use is limited to a three week (21 day) period between the dates of June 1st and (ending no later than) August 30th 2 out of every three years. Full season rest will be required in the third year.
5515 South Piney	Cattle	Spring or Fall	
5516 Piney	Cattle	Summer or Fall	
5517 Spring Cr	Cattle	Summer or Fall	
5521 Highway 90	Sheep	Winter or Spring	
5522 Beaver Hill	Sheep	Spring or Fall	
5525 Dry Creek Place	Cattle	Spring	Varying grazing dates, intensity of grazing, and duration of grazing by means of electric fence or other strategies may be required.
5518 Dave Wood Road	Sheep	Spring or Fall	Used in conjunction with several other allotments during the November to March period. Use is varied based on precipitation distribution and forage availability.
5502 Sandy Wash	Sheep	Winter	Used in conjunction with several other allotments during the November to March period. Use is varied based on precipitation distribution and forage availability.

Landform and Topography

Elevations range between 5,040 feet in the northern tip of the unit along the Roubideau Drainage to 8,000 feet along the southern part (Figure 1.5). The gently sloping uplift of the Uncompahgre Plateau is the dominant landform in the unit (Figure 1.6). The unit lies across the middle portion of the eastern side of the Uncompahgre Plateau. It is dissected by several major canyons that create isolated mesas, which together form the unit's secondary landforms.

Geology

The LHA is located in the Colorado Plateau Geomorphic province on the eastern slopes of the Uncompahgre Plateau. 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 formations that outcrop on the mesa tops are the Dakota or Burro Canyon sandstones, outcropping on the slopes is the Jurassic Morrison formation and the remaining formations outcrop along drainage channels (Figure 1.7). The geologic formations exposed in the area range in age from Mesozoic to recent alluvial deposits. They are the Triassic Chinle formation, the Jurassic Entrada, Summerville and Morrison formations, the Cretaceous Dakota Sandstone, Burro Canyon and Mancos shale formations as well as quaternary alluvium, colluvium and landslide deposits. Precambrian rock formations may be found at depth, but are not exposed in the area. Paleozoic rocks were eroded from the Uncompahgre Plateau and therefore do not out crop or occur at depth in the area.

Soils

Soils on public lands in the LHA area reflect the diverse geology of the area. Soils are described in detail in the unpublished Order 3 Ridgway Soil Survey (NRCS, 2005). Within the surveyed area, 26 different soil mapping units are found on public lands in the Roubideau LHA area (Figure 1.8). Of these, only twelve encompass 1,000 acres or more. These dominant soil map units are listed in Table 1.2 below. The majority of soils in the unit have relatively low potential for plant production, and are highly vulnerable to erosion, particularly by water.

There were several soil problems the staff was aware of prior to the LHA evaluation. Primary among these are the many roads that have been developed over time. These not only disturb soils by exposing the road surface to erosion, they also often alter drainage patterns which can cause gullying off of the road surface. Many off road areas are also perceived to be highly vulnerable to soil erosion because of lack of adequate plant basal cover and high levels of bare soil.

Figure 1.5 Roubideau LHA Area elevations, from Digital Elevation Model (USGS).

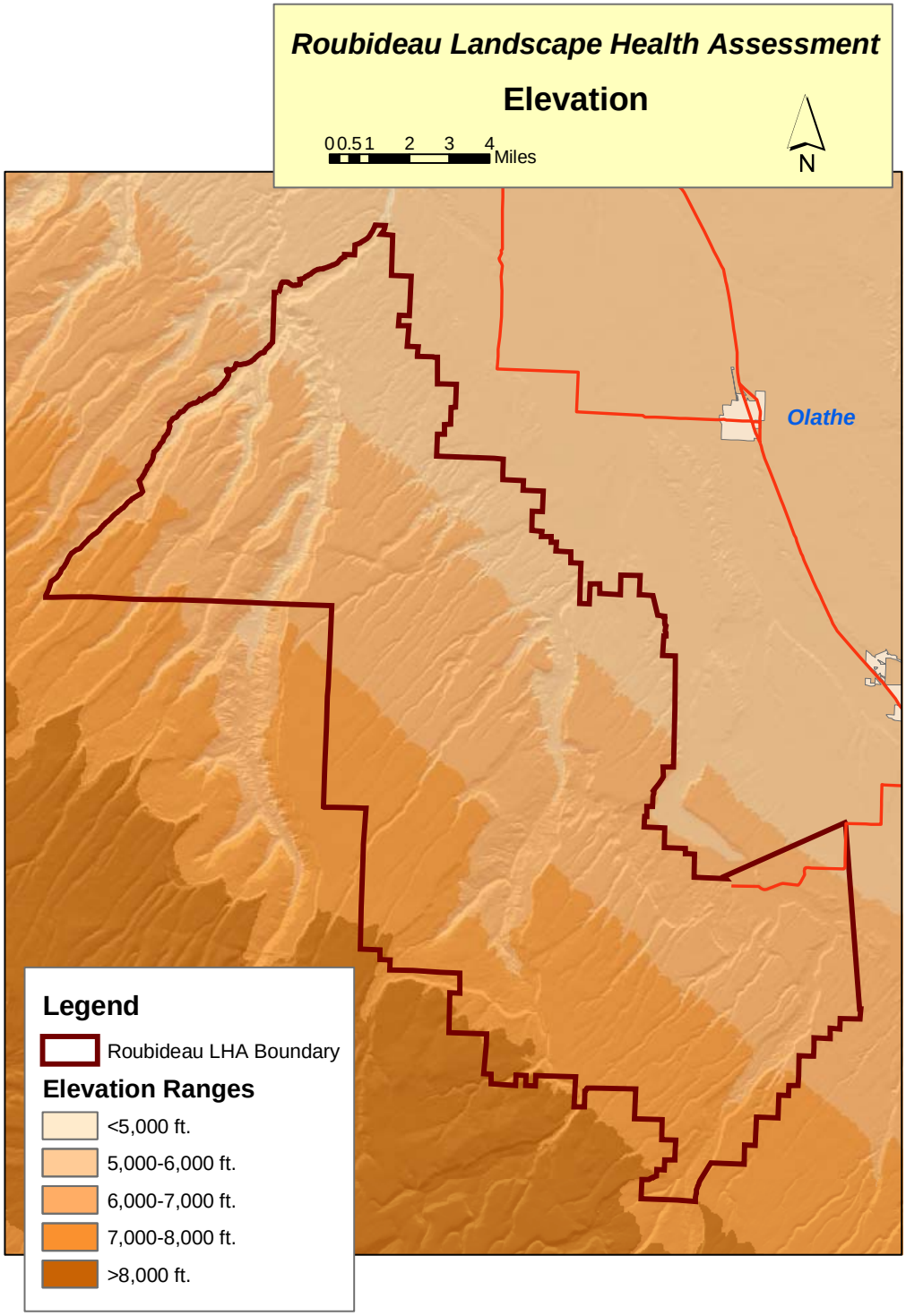


Figure 1.6 Roubideau LHA Area slopes and landforms. From Digital Elevation Model (USGS).

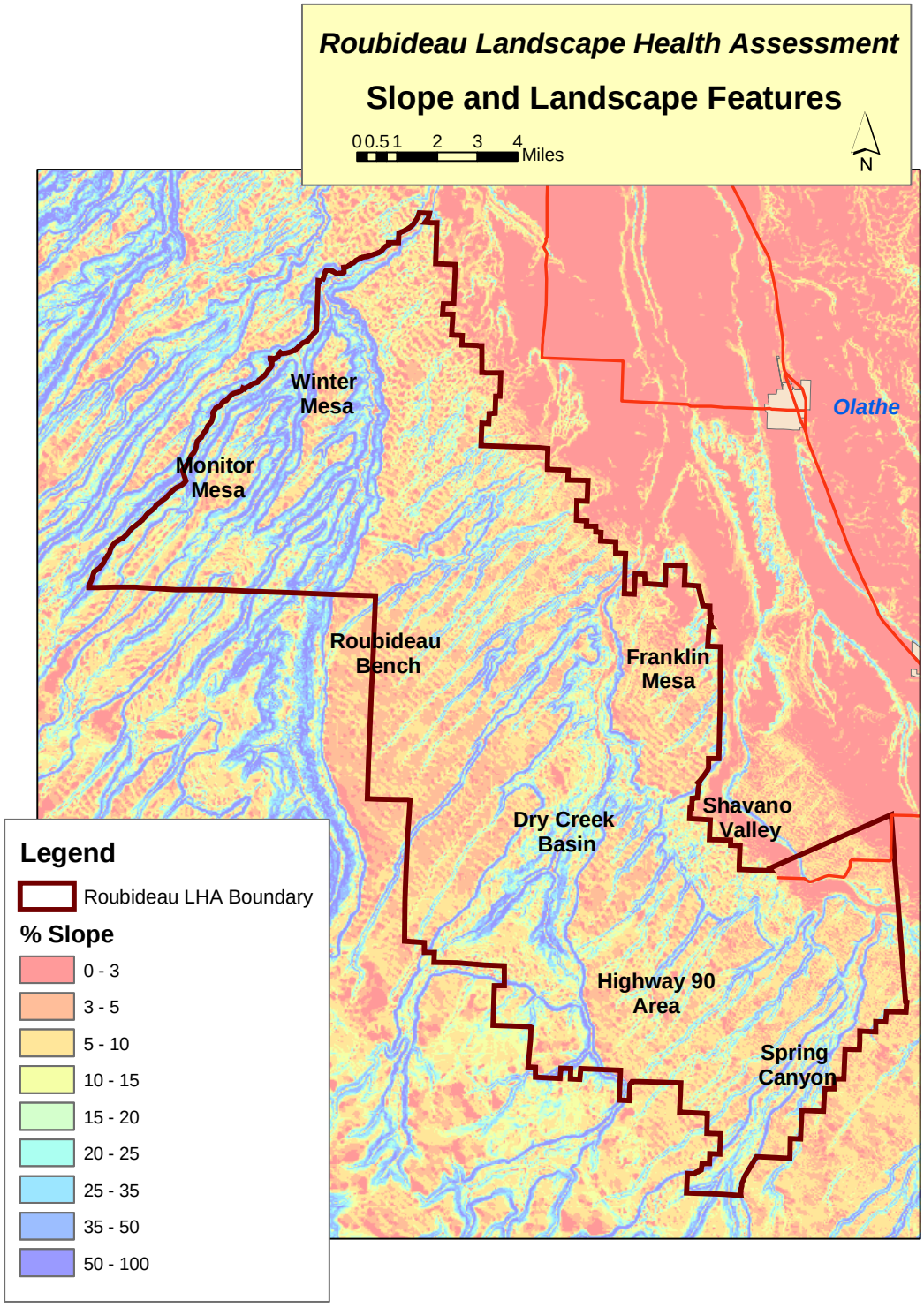


Figure 1.7 Geology of the Roubideau LHA area.

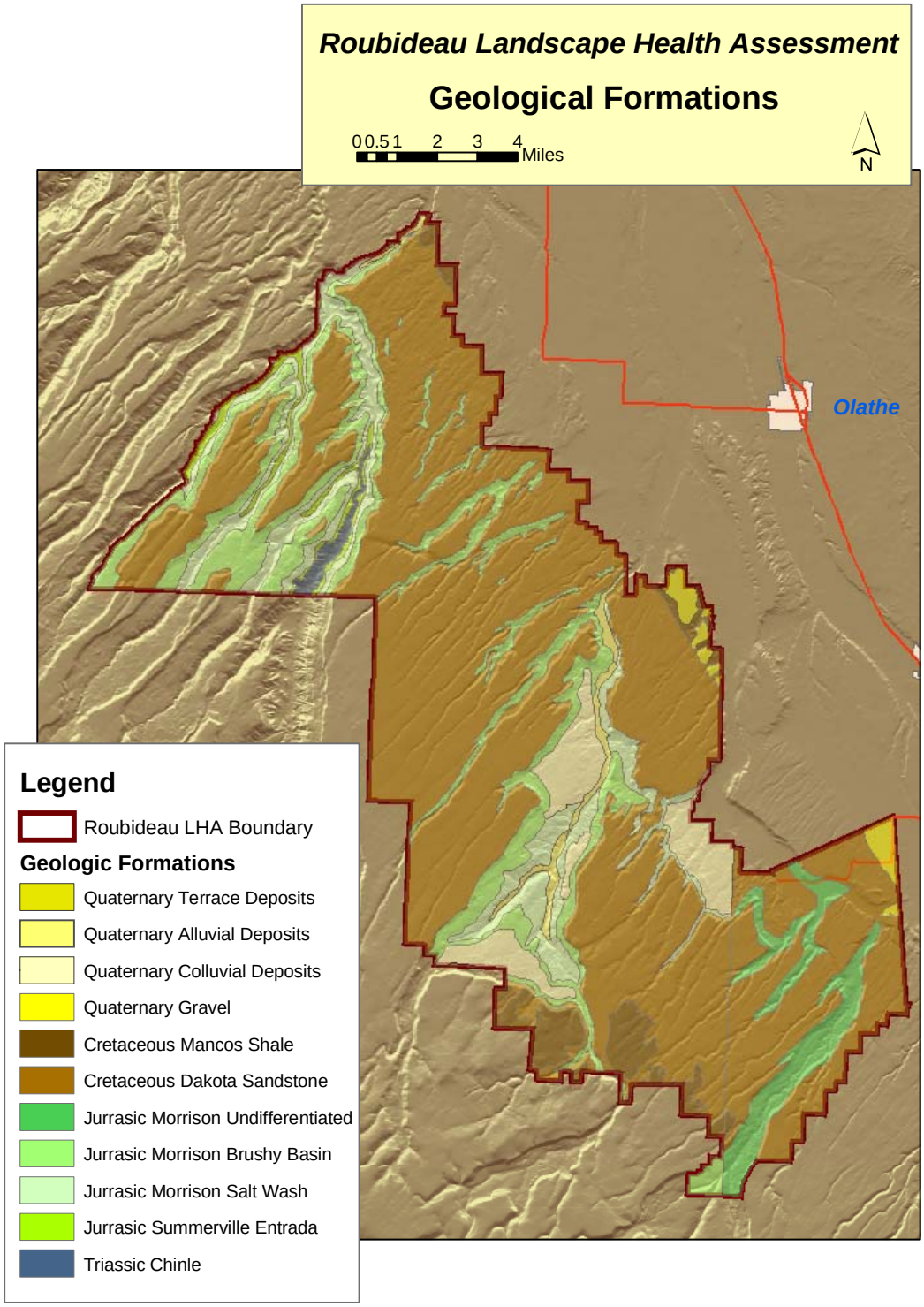


Table 1.2 Important soil map units in the Roubideau area and descriptions of their characteristics.

Soil Map Unit	Name	BLM Acreage in Unit	Characteristics
R3	Rock Outcrop, Ustic Torriorthents and Aridic Haplustepts soils, 25 to 200% slopes	17,715	Located on escarpments on mesas and cuestas.. The soils are moderately deep very channery fine sandy loam and deep, gravelly fine sandy loams. The soils have low to very low available water capacity, and high runoff potential. Ecological site: Ustic Torriorthent (Stoney Saltdesert), Aridic Haplustepts (unspecified)
262	Arabrab-Evpark-Parlelei complex, 3 to 20% slopes	17,373	Located on summits on mesas, and dipslopes on cuestas, consisting of bedrock and cap rock intermixed with shallow to deep, well drained soils, typically stony loam, with low to very low available water capacity, and high to very high runoff potential. Ecological site: Loamy Foothills
30	Barboncito-Rock outcrop complex, 3 to 20% slopes	15,481	Located on summits on mesas, and dipslopes on cuestas , shallow, well drained sandy loams. Very low available water capacity, high runoff potential. Ecological Site: Semidesert Loam
X31M	Walknolls-Rock outcrop complex, 20 to 60% slopes	11,160	Located on valley sides on cuesta valleys, and summits on mesas, shallow, well drained very channery sandy loams. Very low available water capacity and very high runoff potential. Ecological Site: Shallow Clay Loam, Pinyon Pine-Utah Juniper Forest Type #110
X14	Woodist-Gapmesa-Rock outcrop complex, 3 to 25% slopes	11,075	Located on dipslopes on cuestas, shallow to moderately deep, and well drained loams, intermixed with exposed bedrock. The soils have very low available water capacity, and very high runoff potential. Ecological Site: Semidesert Juniper.
X30	Barboncito-Gapmesa complex, 3 to 15% slopes	10,344	Located on summits on mesas and dipslopes on cuestas, shallow to moderately deep and well drained sandy loam and gravelly sandy loam., low to very low available water capacity and high runoff potential. Ecological Site: Semidesert Loam
B31	Mags-Lazear-Rock outcrop complex, 3 to 50%slopes	5,189	Located on summits on mesas, dipslopes on cuestas, and structural benches.The Mags soil is a deep fine sandy loam with a high available water capacity high runoff potential. The Lazear soil is a shallow, sandy loam with a very low available water capacity, and a very high runoff potential. Ecological Site: Mags soil (Semidesert Loam), Lazear soil (Shallow Clay loam, Pinyon Pine-Utah Juniper forest type #110)

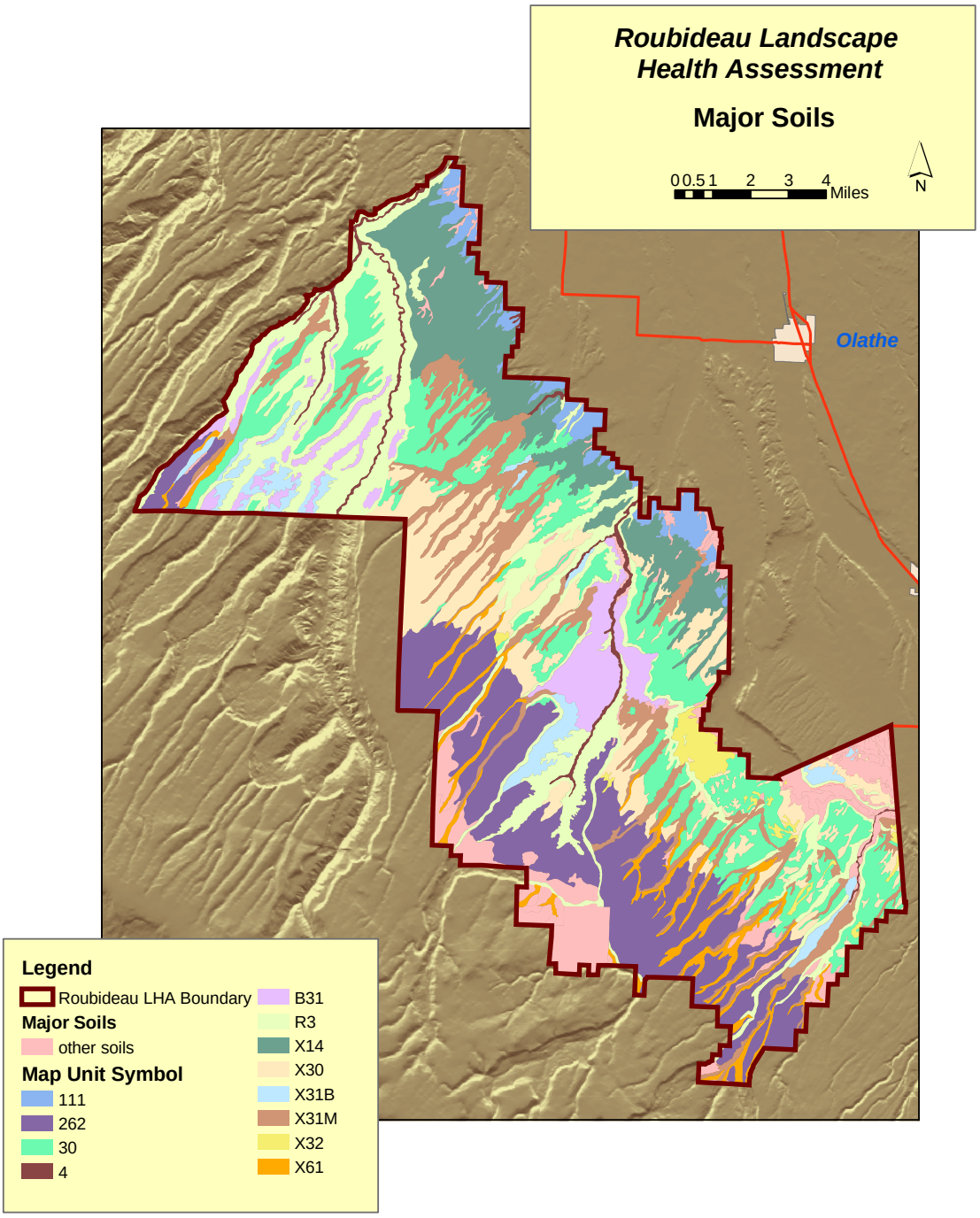
X61	Moento-Beje-Rock outcrop complex, 5 to 35% slopes	3,691	Moento soils are located on shoulders on mesas, structural benches, and cuestas. Beje soils are located on hills on mesas, dipslopes on cuestas. Moento soils are moderately deep clay loam with a low available water capacity., and a high runoff potential. Beje soils are shallow, channery, sandy loams, with a very low available water capacity, and very high runoff potential. The surface horizon of Beje soils is moderately decomposed plant material. Ecological Site: Pine Grasslands
111	Roatcap Hoovers complex, 1 to 12% slopes	2,824	Located on summits on mesas and dipslopes on cuestas. Shallow to moderately deep channery fine sandy loam and very flaggy loam. The soils have very low available water capacity, and medium to high runoff potential. Ecological Site: Loamy Saltdestert
X31B	Lazear-Blancot-Rock outcrop complex, 3 to 25% slopes	2,669	The lazear soil is located on summits on mesas and dipslopes on cuestas. The soils are shallow sandy loams with a very low available water capacity and very high runoff potential. The Blancot soil is is located on summits on mesas, structural benches, and valley sides on cuesta valleys. The soils are deep fine sandy loams with a moderate available water capacity, and medium runoff potential. Ecological Site: Semidesert Loam
X32	Blancot-Gapmesa complex, 3 to 20% slopes	1,431	The Blancot soil is is located on summits on mesas, structural benches, and valley sides on cuesta valleys. The soils are deep fine sandy loams with a moderate available water capacity, and medium runoff potential. The Gapmesa are located on dipslopes on cuestas. The soils are gravelly sandy loam with a low available water capacity, and a high runoff potential. Ecological Site: Semidesert Loam
4	Aridic Ustifluvents, 0 to 3% slopes	1,321	Located on floodplains and cuesta valleys. These soils are moderately deep to deep sandy loams, with a low available water capacity, and very low runoff potential. Ecological Site: Semidesert Loam

Vegetation

At least 20 distinct vegetation classes occur in the landscape unit. These are tied to soil type as well as elevation and precipitation (Figure 1.9). Of the 20 classes, seven cover substantial acreage, or are otherwise notable within the LHA unit.

The drainages with intermittent or perennial water contain riparian vegetation, which can be subdivided into shrub-dominated or cottonwood communities. Riparian vegetation is most prevalent along the streams with perennial flow—the Roubideau, Dry Creek and Spring Creek drainages. Small pockets of riparian vegetation are also present along some of the emphemeral drainages. The cottonwood vegetation class includes Rio Grande cottonwood trees (*Populus deltoides ssp.Wislizenii*) at lower elevations and narrowleaf cottonwood (*Populus angustifolia*) at higher elevations with occasional hybrids between these two occurring in small stands. Sandbar willow (*Salix exigua*), thinleaf alder (*Alnus tenuifolia*), and water birch (*Betula occidentalis*) are the main shrub species near the water's edge. On higher terraces, skunkbush sumac (*Rhus aromatica*), silver buffaloberry (*Shepherdia argentea*), wood rose (*Rosa woodsii*), seep willow

Figure 1.8 Soils of the Roubideau LHA Area (From Draft Ridgway Soil Survey NRCS 2005).



(*Baccharis salicina*) and clematis (*Clematis ligusticifolia*) are the most common species. Common reed grass (*Phragmites australis*) is present in some areas. Ephemeral drainages are often dominated by tamarisk and seep willow.

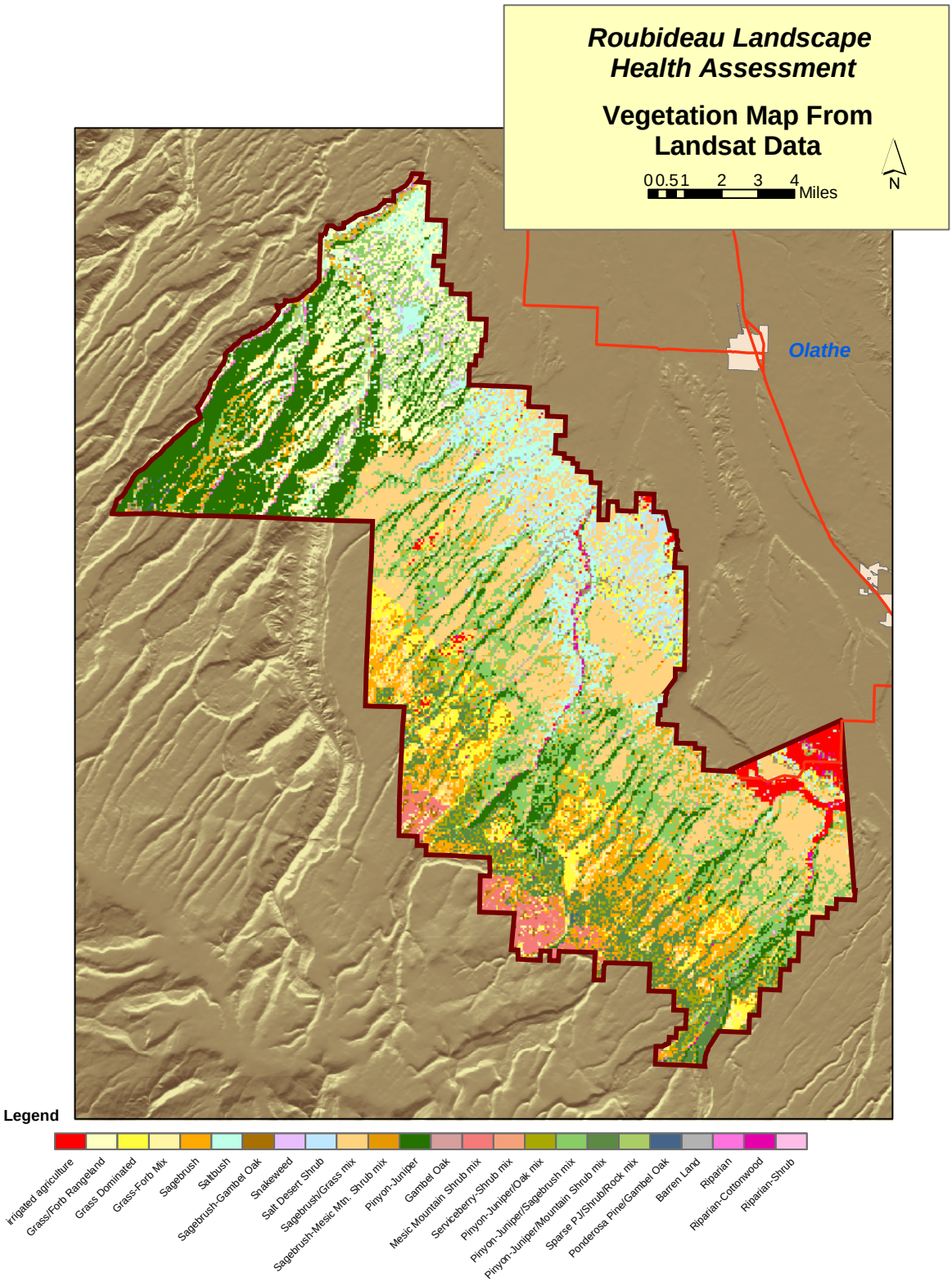
Several drought tolerant vegetation classes occur at the lowest elevations of the LHA unit. These include salt desert shrub, saltbush, snakeweed and grass-forb vegetation classes. Shrubs found in these classes include shadscale (*Atriplex confertifolia*), black sage (*Artemesia nova*), winterfat (*Krascheninnikovia lanata*), Bigelow sage (*Artemesia bigelovii*), four-wing saltbush (*Atriplex canescens*), snakeweed (*Gutierrezia sarothrae*) and prickly pear cactus (*Opuntia polycantha*) in varying amounts. Galleta grass (*Hilaria jamesii*) is the most common perennial grass species found in these classes, with bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Oryzopsis hymenoides*), needleandthread grass (*Stipa comata*), sandberg bluegrass (*Poa secunda*), and blue grama (*Bouteloua gracilis*) commonly occurring as well. Many different forbs occur, but some of the most common are rose heath (*Chaetopappa ericoides*), scarlet globemallow (*Sphaeralcia coccinia*), Navajo tea (*Thelesperma subnudum*), basin daisy (*Platyschkuhria integrifolia*), and cleftleaf wild heliotrope (*Phacelia crenulata*).
With increasing elevation and precipitation, the saltdesert shrub zone grades into pinyon-juniper woodland on shallower, steeper soils and sagebrush on the deeper soils. This zone contains many of the vegetation classes shown on the map—various mixes of sagebrush, pinyon and juniper, grass, and mountain shrubs. The pinyon-juniper woodland is dominated by Colorado pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with a sparse and variable understory that may contain green Mormon tea (*Ephedra viridis*), black sage, yucca (*Yucca harrimanii)*, snakeweed, potato cactus (*Opuntia fragilis*), muttongrass (*Poa fendleriana*), and bottlebrush squirreltail. The sagebrush community appears to be dominated by various crosses between Basin big sage (*Artemesia tridentata tridentata*) and Wyoming big sagebrush (*Artemesia tridentata wyomingensis*). 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. At lower elevations, pinyon-juniper woodland occurs together with sagebrush on many sites. These may be areas with a mixture of shallow and moderately deep soils that are subject to tree invasion in wet climatic cycles, and tree death during drought cycles, or they may be a successional stage that follows fire or other major natural disturbance.

At higher elevations, the pinyon-juniper community contains birchleaf mountain mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchior utahensis)*, and Gambel oak (*Quercus gambelii*). With increasing elevation, pinyon trees drop out of the community, and the mountain shrubs dominate the vegetation, with a productive understory of forbs and grasses such as elk sedge (*Carex geyeri*), Junegrass (*Koeleria macrantha*), Kentucky bluegrass (*Poa pratensis*) and lupine (*Lupinus* spp.).

Small areas of ponderosa pine (*Pinus ponderosa*) woodland occur in the very highest parts of the LHA area. These often have an understory of Gambel oak, and varying levels of the same grasses and forbs found in the mountain shrub communities.

Many of the native vegetation communities and classes listed above contain some level of invasive, nonnative species as well. The most widespread are Eurasian annuals, chiefly cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola kali*), burr buttercup (*Ceratocephala testiculaa*), Jim Hill mustard (*Sysimbrium altissimum*) and filaree (*Erodium cicutarium*). In areas where there have been past vegetation treatments--especially chainings-- crested wheatgrass

1.9 Roubideau LHA Area vegetation derived from Landsat imagery.



(*Agropyron cristatum*) is a common species, with alfalfa (*Medicago sativa*), and yellow sweet clover (*Melilotus officinale*) also present. State listed noxious weeds are scattered across the unit, with Russian knapweed (*Acroptylon repens*) the most widespread. This species is heavily concentrated on the upper and lower terraces along the entire length of Roubideau Creek, especially in those areas where livestock concentrate near cross fences in the stream bottom. Montrose County has sprayed the knapweed in this drainage downstream of the Potter Creek confluence for several years, and in 2004 spraying upstream of Potter Creek was initiated. Tamarisk (*Tamarix chinensis*) is present in many drainages, and spotted knapweed (*Centaurea biebersteinii*) a growing problem along Highway 90.

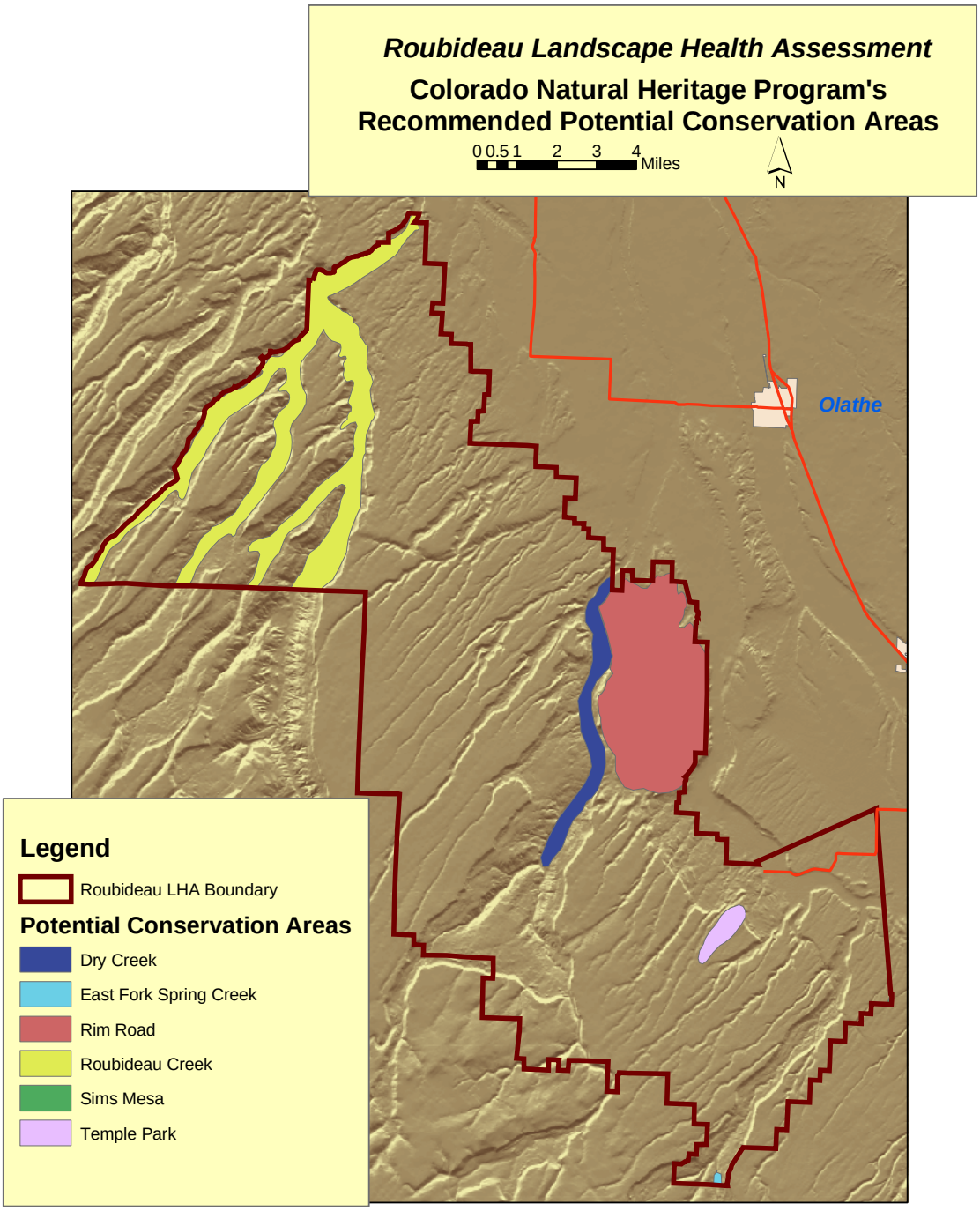
Prior to the land health assessment, the staff has considered the extent of noxious weeds and invasive species to be a substantial vegetation problem in the area. BLM has worked with weed spray contractors to spray some weeds over the past three years. The UFO staff also believes that fire suppression, extensive chaining treatments and historic grazing have impacted the vegetation, leading to age class distribution problems. A number of habitat improvement projects have been completed in the LHA area. These were designed to improve habitat for big game, reduce fuels, and protect the powerlines. The Spring Creek/Dry Creek Vegetation Management Strategy 2003), which has only partly been implemented, lays out a comprehensive list of treatments needed to meet vegetation mosaic objectives. These have resulted in more early and early-mid successional (age class) patches across the landscape, and less acreage of middle age classes. These projects have also targeted browse stands in an effort to improve 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 seed.

Colorado Natural Heritage Program Potential Conservation Areas (PCAs)

The Colorado Natural Heritage Program (Lyon, et.al.1999) has identified a number of sites that contain high quality plant communities, or assemblages of rare plants, and/or animals that they feel warrant protection and management. Each PCA was ranked for its biodiversity values, protection urgency, and management urgency. Figure 1.10 shows all six PCA's displayed on a map of the assessment area. Table 1.3 shows the important resource values in each of the PCA's, and their relative ranking in terms of conservation importance.

At the present time, the Uncompahgre RMP, as amended, does not place any of these PCA's into special management categories that directly benefit the specific resources of the PCA. All of these areas are open to off highway vehicle use, mineral material disposal, locatable mineral activity, location of rights-of-way, and all are subject to livestock grazing. This assessment did not set out to evaluate these sites, but there are some known problems on the sites. The inference of the PCA designation is that these sites are good quality examples of a specific community or they contain occurrences of rare plant or animal species that are thought to be of statewide or global importance. The PCA's are not considered to be problem free by BLM. For example: The Rim Road PCA has identified problems with low plant diversity (Figure 4.2), low percentages of cool season perennial grasses (Figure 4.3), and sites with low percentages of perennial warm season grasses (Figure 4.4) and some problems with low perennial forb cover (Figure 4.5). The Roubideau PCA has a substantial problem with noxious weed infestations in the form of Russian knapweed and tamarisk.

Figure 1.10 Roubideau LHA Area Potential Conservation Areas (PCAs) Recommended by the Colorado Natural Heritage Program.



The Sims Mesa PCA barely intrudes into the LHA area in the southeastern corner, with a total of about 30 acres. This entire PCA is an estimated 12,000 acres.

The East Fork of Spring Creek PCA, as mapped, includes Colorado River cutthroat trout habitat upstream and downstream of the known occupied habitat on USFS lands. The USFS sampled this stream in 2004, and found no fish of any kind, a situation that could be the result of prolonged drought. This stream is not identified as one which contains a Conservation Population for this species (Chris James, 2005), consequently at this time there is some doubt as to the validity of this proposed conservation area.

Table 1.3, CNHP Potential Conservation Areas in the Roubideau LHA Area

PCA Name	Resource Values	Biodiversity Rank [1]	Management Urgency Rank [2]
Dry Creek (this PCA has minimal acreage in this LHA araea)	Saline bottomland shrublands, and Narrowleaf Cottonwood/Skunkbrush riparian forests	B3	M3
East Fork Spring Creek	Colorado River Cutthroat Trout	B4	M5
Rim Road	Xeric pinyon/juniper woodland, Sage sparrow, Black-throated sparrow, Northern harrier, White-tailed antelope ground squirrel	B3	M3
Roubideau Creek	Narrowleaf cottonwood riparian forest, Grand Junction milkvetch, Good neighbor bladderpod, Foothills riparian shrubland, Narrowleaf cottonwood/skunkbrush riparian forest, Montane riparian forest, Lower montane riparian forest, Xeric pinyon-juniper woodland, Coyote willow/mesic graminoid, Northern leopard frog	B2	M2
Sims Mesa	Gunnison Sage Grouse, Sagebrush bottomland shrubland, Gray vireo, sage sparrow	B2	M3
Temple Park	Good neighbor bladderpod	B4	M3

[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 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.

Wildlife

The Roubideau LHA area supports a large variety of upland, riparian, and aquatic wildlife species. Table 1.4 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 year-long 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.

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 Uncompahgre Plateau. 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, however, the extent of competition is unknown. The Colorado Division of Wildlife has classified nearly all the LHA area as winter range for mule deer and about two thirds of the LHA area as winter range for elk. CDOW's mapping of severe winter range, and winter concentration areas for these two species are shown on (Figure 1.11). The severe winter range and winter concentration areas constitute BLM's crucial winter range. Winter habitat condition on much of the LHA area, where the vegetation has not been recently treated to reset succession is in poor and declining condition, specifically the browse stand condition and the arrangement of feeding and cover areas. Both the number of acres supporting browse, and the quantity of forage being produced are declining. Plant communities that provide winter browse plants are aging, resulting in fewer, older browse plants, and less annual forage production. The influence of maturing plant communities on productivity and diversity can be demonstrated by measuring the responses of a site before and after disturbance. 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 1.5 & 1.6).

Table 1.4. A list of the Roubideau 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.
Desert Bighorn Sheep	Canyon benches, mesa tops, and valley bottoms	Uncommon, present in the Roubideau Creek drainage
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

Species (Common Name)	Habitat Type	Occurrence
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
Gunnison sage grouse	Sagebrush; sagebrush/grass	Uncommon, 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

Table 1.5. A comparison of Uncompahgre Plateau browse stand condition on untreated and treated BLM areas. Treatment ages ranged form 3 to 40 years. Data were collected in 1988. The weight estimate method was used.

Treatment Class	Average Number Species	Age Class - % Seedling	Young	Mature	Decadent & Dead	Crown Sprouts	Hedging* % Moderate and Severe	Plants per Acre
Untreated	2.7	1.9	5.1	67.2	25.1	0.7	51.4	2460
Treated	3.4	3.7	6.9	79.3	8.9	1.2	46.9	3048
Difference	+0.7	+1.8	+1.8	+12.1	-16.2	+0.5	-4.5	+588 (+24%)

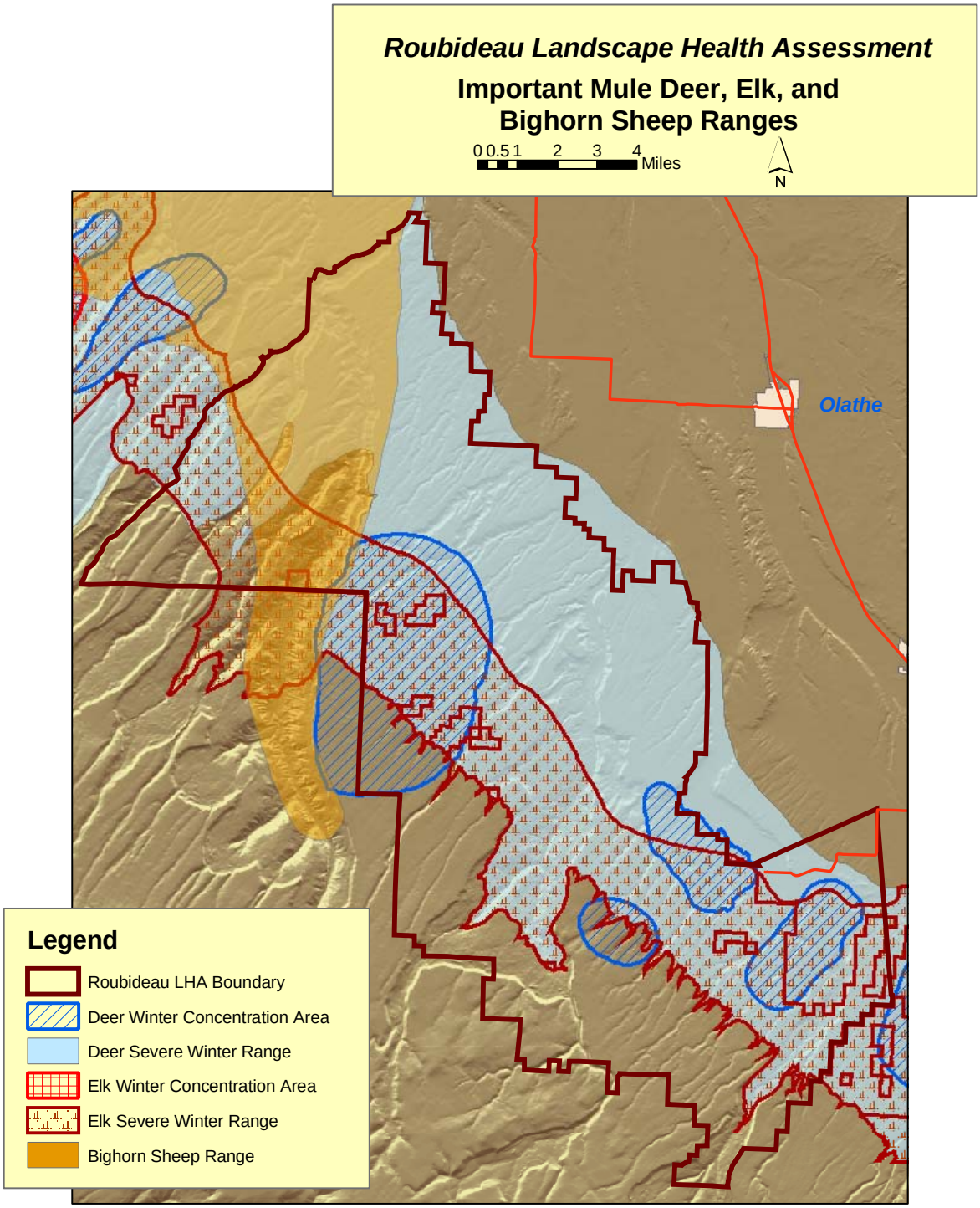
*Hedging is the form taken on by the browse plants due to foraging by animals over several years. It is judged in classes of light, moderate, and heavy.

Table 1.6. A comparison of annual herbaceous vegetation production (lbs/ac), and % vegetative class composition on untreated and treated BLM areas on the Uncompahgre Plateau. Treatment ages ranged from 3 to 40 years. Data were collected in 1988. The weight estimate method was used.

Treatment Class	Grass (%)	Forb (%)	Shrub (%)	Total
Untreated	84 (18.7%)	55 (12.2%)	310 (69.1%)	449 (100%)
Treated	262 (39.1%)	68 (10.1%)	340 (50.8%)	670 (100%)
Difference	+178 (212.0%)	+13 (24.0%)	+30 (10%)	+221 (+49%)

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 (GMUs). The Roubideau LHA area is within DAU E-20(elk) & D-19(deer), and GMU 62, which is the east side of the Uncompahgre Plateau. Unit 61, which is a special draw unit on the west side of the Uncompahgre Plateau, is also, in the same Data Analysis Unit (DAU). In contrast, Unit 62 has been managed as an unlimited, over the counter license unit for bull elk, and a less restrictive limited draw for bucks. In recent years Unit 62 has been one of the most heavily hunted units in the state. E-20 ranks among the top DAU's in the state for elk harvest and hunting pressure.
Since 1980, the Uncompahgre Plateau mule deer population trend is down, and the elk population trend is up (Figure1.12). Deer numbers have declined 31% since the early 1980's, while elk numbers have doubled. Mule deer mortality was extremely high during the severe winter of 1983-1984. The recent deer increase, and the elk decline is probably a reflection of

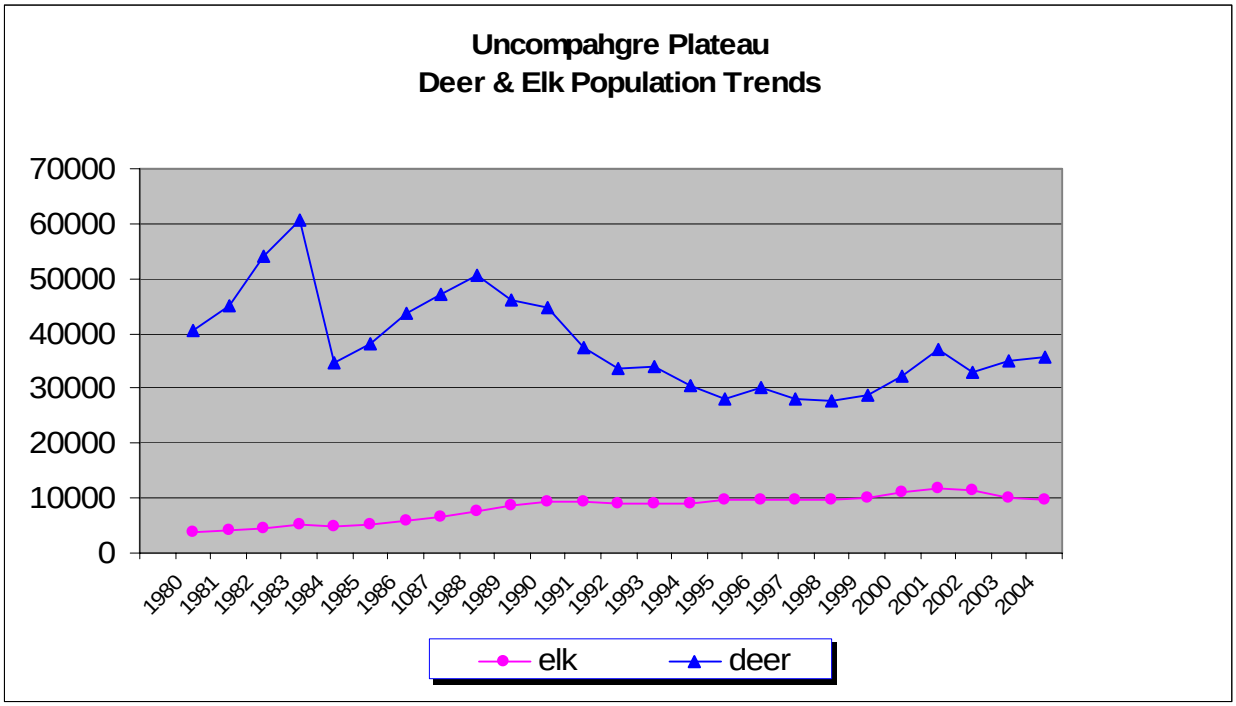
Figure 1.11 Roubideau LHA Area mule deer and elk crucial winter ranges and overall bighorn sheep range.



more restrictive hunting regulations for mule deer and more liberal hunting regulations for elk. The levels of mule deer and elk use on the Roubideau LHA area are believed to be at least proportional to that for the entire DAU.

The Roubideau LHA area may provide some mule deer fawning habitat at the higher elevations in the oak/serviceberry vegetation, while only a relatively few elk calve in this area. Most elk calving occurs off the area to the north on the Uncompahgre Plateau. The CDOW's current elk and mule deer population management targets on the Uncompahgre Plateau are between 8,500 – 9,000, and 38,500 respectively.

Figure 1.12. Mule deer and elk population trends 1980 – 2003.



At the present time there is an established desert bighorn sheep population in Roubideau Canyon. It is unknown whether this population is interacting with the desert sheep in the Escalante Canyon area, but it is highly probable. To date, in spite of the close proximity of domestic sheep, there have been no known cases of pneumonia, scapies, blue tongue, and other pathogens in this population.

Merriam turkey habitat within this LHA area is limited mostly to the higher elevations along the west side of the area, 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. Since the 1880's there has been a long history of great fluctuations in turkey numbers on the Uncompahgre Plateau. Turkeys were reported to be plentiful before settlement, but disappeared in the mid 1880's from several hard winters in a row, and disease contracted from domestic fowl. In the 1930's, turkeys were re-introduced, and did well until the mid 1960's, when again a significant decline occurred. And, again the cause of decline was hard winters and "micoplasma" a bacterial disease causing respiratory problems, and which is passed from hens to their eggs, or through direct contact with

other birds. In the 1980's turkeys were again transplanted, which have resulted in the current recurring high population. No specific mapping of seasonal use areas, or assessment of habitat quality is available for this species at this time.

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. Black bear primarily use the major drainages with well developed riparian vegetation, and the higher elevation oak/serviceberry areas, especially during spring, late summer, and fall for feeding. Black bear densities and total numbers on the Uncompahgre Plateau may be the highest in Colorado. Cougars probably use nearly all of this area at some time or another while hunting, or raising young. The number of cougars present is probably very low, limited mostly to the ones who have established their territories, or parts of their territories in this area. There appears to be suitable denning habitat in the rocky cliffs and drainages that are distributed throughout the LHA unit. While the exact status of these predator populations are unknown, they are all believed to be doing well. An in-depth lion population study was started by the CDOW in 2004, but results will not be available for a year or more.

White Tail Prairie Dogs are found in the lower elevation areas of the Roubideau 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. 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 limited to perennial streams and some intermittent streams (see Standard 2 for locations of perennial streams and more information on functional condition). Native fish species including white sucker, speckled dace, longnose sucker, etc., are known to be present in Roubideau Creek. The speckled dace is also found in Potter Creek. The non-native brown trout, rainbow trout and brook trout are found in Roubideau Creek. In the East fork of Dry Creek brown trout are present and in the West fork of Dry Creek rainbow trout are present. Some frogs, including northern leopard frogs, toads, and snakes are known to be present, but their status is unknown.

Riparian habitat is present along the perennial and intermittent streams listed in the above sections, and is extremely important for many of the wildlife species, especially small birds, mammals, reptiles, and raptors. However, the status of most of these species is unknown. Most public land riparian systems are in fair condition, but flow alterations for irrigation and other uses, along with the invasions of salt cedar, and Russian knapweed have degraded the usability of some areas for native wildlife, especially non-game birds. Most tributary streams are also incised--likely due to historic events--and many of them are still in the process of maturing; establishing a wider flood plain, and riparian system.

Tamarisk has established itself on most tributary streams, irrigation canals, BLM water impoundments, and other locations where runoff water may be temporarily detained. In addition to the establishment of Tamarisk, Russian knapweed has also become heavily established along Roubideau Creek, further decreasing habitat quality for terrestrial native species. Spraying of the knapweed on the portion of the creek below Potter Creek was done in cooperation with Montrose County for several years. Most of the kapweed populations in that area were eliminated or significantly reduced. Spraying of knapweed, from mules, on the portion of the stream within

the WSA (upstream of Potter Creek) was initiated in 2004, and continued in the fall of 2005. If funds are available, follow up spraying on BLM lands and treatment of weeds on the National Forest will continue for several years. Weed spray contractors also found small stands of cheatgrass and near the Forest boundary they also found Russian olive.

The limited amount of ponded open water within the analysis area limits its potential for waterfowl production. There are small numbers of waterfowl, including mergansers, Canada geese, mallards, green wing teal, etc. that utilize the area seasonally and some nesting may occur along major streams.

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). A list of those federally listed species evaluated for this document, is located in the Field Office' 6840 file. Based on the above list, the inventory data maintained by the Uncompahgre Field Office, and inventory data available from the Colorado Natural Heritage Program, the special status species shown in Table 1.7 below are found or potentially found within the analysis area. Habitat for additional species such as the Canada lynx and the boreal toad can be found within the area managed by the Field Office, but habitats for these species are not found within the analysis area.

Table 1.7 Potential Special Status Species in Roubideau LHA Analysis Area

Threatened Endangered and Special Status Species			
Common Name	Scientific Name	Status[1]	Occurrence
Black-footed Ferret	*Mustela nigripes*	FE, SE	Not known to occur, but prairie dog host is present in the analysis area.
Bald Eagle	*Haliaeetus leucocephalus*	FT, ST	Winter foraging and some concentrations along the Uncompahgre River.
Mexican Spotted Owl	*Strix occidentalis*	FT, ST	Potentially in the deep canyon areas, with closed canopy conifer forests on the canyon slopes or adjacent mesa tops.
Colorado Pikeminnow	*Ptychocheilus lucius*	FE, ST	Occupied and critical habitat downstream of analysis area in the lower Gunnison River.
Razorback Sucker	*Xyrauchen taxanus*	FE, SE	Occupied and critical habitat downstream of analysis area in the lower Gunnison River.
Bonytail Chub	*Gila elegans*	FE, SE	Occupied and critical habitat downstream of analysis area in Colorado R.
Humpback Chub	*Gila cypha*	FE, ST	Occupied and critical habitat downstream of analysis area in Colorado R.
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	FT	Present within the LHA area at the northern end, usually in salt desert shrub communities

Clay-Loving Wild Buckwheat	*Eriogonum pelinophilum*	FT	Not known in the LHA area, confined to nearby Mancos shale.
BLM Sensitive Species and Other Special Status Animals			
Common Name	Scientific Name	Status[1]	Occurrence
Yellow-billed Cuckoo	*Coccyzus Americanus*	FC, BLMS	Potential habitat along the lower elevation cottonwood gallery riparian communities.
Gunnison Sage Grouse	*Centrocercus minimus*	FC, BLMS	May occur in the extreme southeastern end of this LHA area on Sims Mesa. Elsewhere in the LHA, historic habitat is possible
River Otter	*Lutra canadensis*	SE	Not known to occur within the LHA area.
Townsend's Big Eared Bat	*Corynorhinus townsendii*	BLMS	Potentially present
BLM Sensitive Species and Other Special Status Animals--continued			
Common Name	Scientific Name	Status[1]	Occurrence
Big Free-tailed Bat	*Nyctinomops macrotis*	BLMS	Potentially present
Fringed Myotis	*Myotis thysanodes*	BLMS	Potentially present
Yuma Myotis	*Myotis yumanensis*	BLMS	Potentially present
Western Burrowing Owl	*Athene cunicularia*	ST	Dependent on prairie dog colonies, potential breeder in the area. BLM has not mapped prairie dog colony distribution within this LHA area.
Peregrine Falcon	*Falco peregrinus anatum*	SC	Known to breed in Roubideau Canyon.
Ferruginous Hawk	*Buteo regalis*	BLMS, SC	Present during migration, no nesting in the LHA area.
Flannelmouth Sucker	*Catostomas latipinnis*	BLMS	Found in the Uncompahgre River and some tributary streams.
Roundtail Chub	*Gila robusta*	BLMS, SC	Found in the Uncompahgre River and some tributary streams.
Bluehead Sucker	*Catostomus discobolus*	BLMS	Found in the Uncompahgre River and some tributary streams.
Midget Faded Rattlesnake	*Crotalus verities concolor*	BLMS	Present in PJ, rocky areas, greasewood/sage and sagebrush/rabbitbrush
Northern Leopard Frog	*Rana pipiens*	BLMS SC	Ponds and irrigation canals

Canyon Tree Frog	*Hyla arenicolor*	BLMS	Major canyon bottoms
BLM Sensitive Plant Species and Other Special Status Plants			
Common Name	Scientific Name	Status[1]	Occurrence
Grand Junction milkvetch	*Astragalus linifolius*	BLMS	Steep slopes, canyon benches, and talus slopes on sandy clay soil in PJ, sage communities. (Most likely a misidentification, in this area, this is probably San Rafael Milkvetch)
Long flowered cats eye	*Cryptantha longiflora*	CNHP	Not known to occur within this LHA, but known from adjacent PJ communities
Giant Helleborine Orchid	*Epipactis gigantea*	CNHP	Riparian areas, wetlands and seeps

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

Sources: A Natural Heritage Assessment,, Colorado, Bald Eagle Inventories, BLM, 1980, BLM Rare Plant inventories, Various Years, Federal Register: December 28, 2000 (Volume 65, Number 250), Colorado Natural Heritage Program, Spatial Data for the Uncompahgre Field Office, Colorado Division of Wildlife, Breeding Bird Atlas, CDOW Web Site

The field work for the assessment did not include a specific mission to identify new locations of rare plants or animals. If conflicts with rare plants and activities on public land had been noted, they would be documented here.

From early December through early April, wintering bald eagles forage throughout the LHA, Helicopter and ground surveys, conducted by BLM in the early 1980's, did not locate communal night roost sites within this LHA area on public land. There are no known nest sites on public land in the analysis area. 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).

A pair of peregrine falcon nests exists in lower Roubideau Canyon. These nests are the only known nests in the area, however, there is additional suitable habitat in other portions of the canyon. It is possible that more nests are located in Roubideau Canyon.

Black-footed ferrets have not been documented in the area, and BLM has not done extensive mapping of the distribution of prairie dogs within this LHA area. It is unlikely that there are black-footed ferrets in this area at this time.

Although the riparian corridor of Roubideau Creek and Dry Creek provides suitable habitat for yellow-billed cuckoo, the species is not known to nest here (Colorado Breeding Bird Atlas, 1998).

Historic and potential habitat for the Gunnison sage grouse exists in the Roubideau LHA area. The location of the habitat is Sims Mesa, which is in the southern portion of the LHA area

Sims Mesa was historically active habitat for the sage grouse, but the current status in unknown, although very little or no current use by grouse is suspected based on fairly recent work by CDOW.

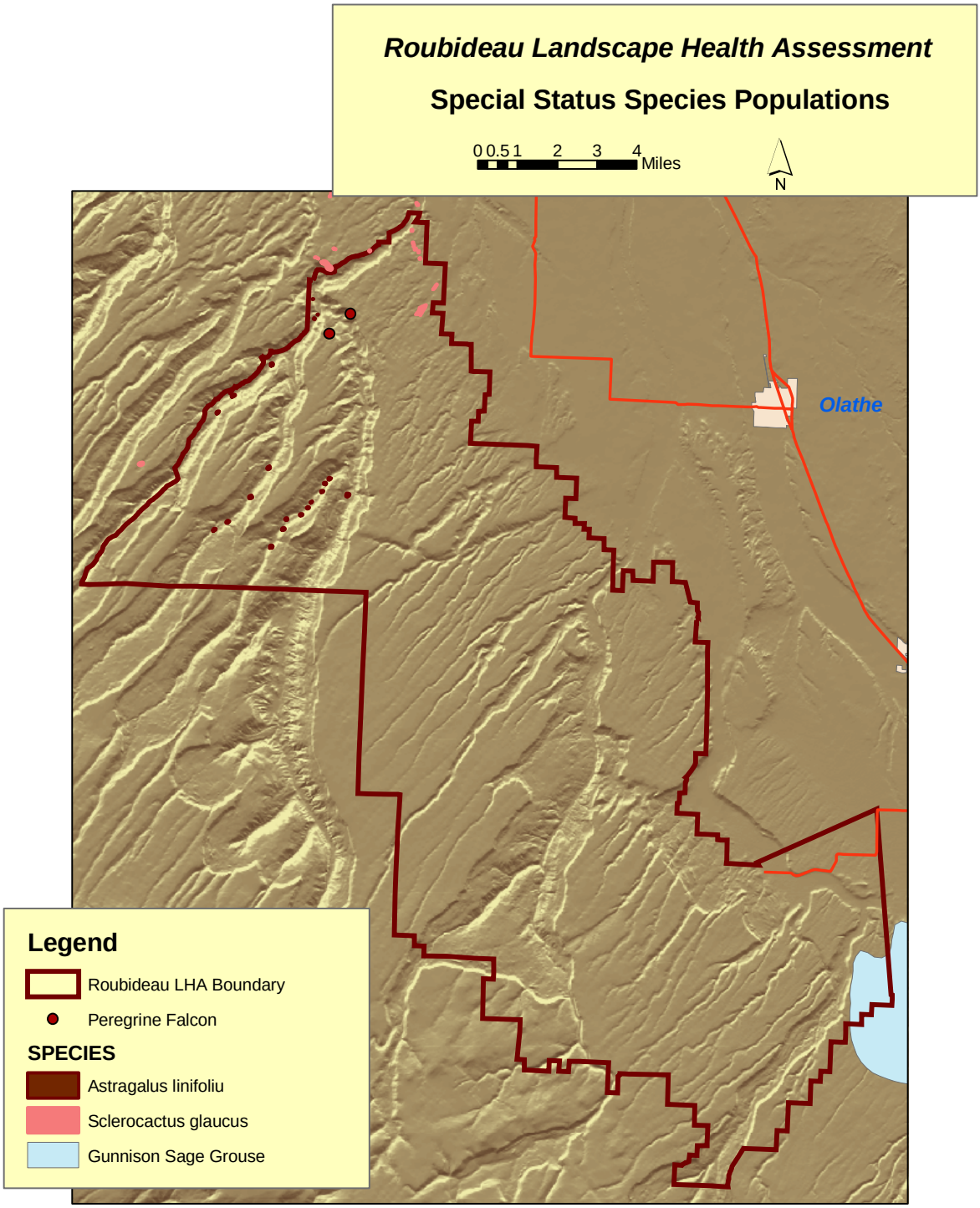
There is one special status fish species in Roubideau Creek--the roundtail chub. Non-native fish are present in Roubideau Creek and the East and West forks of Dry Creek, and may impact the ability of special status fish to utilize this river system. This BLM sensitive fish has been negatively impacted by the incision of stream channels, and the establishment of tamarisk and Russian knapweed. At this time the only management activities that are potentially impacting sensitive fish would be upstream water diversions, and livestock grazing impacts on the lower portion of Roubideau Creek.

Burrowing owls may be found within the prairie dog colonies in this area. BLM has no records of this bird being sighted within this LHA, and there were no breeding individuals found during the work done for the Breeding Bird Atlas (1998). Populations of this species are believed to be declining throughout its range (CDOW, 2001). The species is vulnerable to human disturbance, avian and mammalian predation, dogs and reductions in prairie dog colony size and density.

Ferruginous hawks are known to occur in the area during migration, but there is no evidence that this species nests in the area or over-winter here. Midget faded rattlesnakes and northern leopard frogs are present, but no data is available on population health or trends.

The Grand Junction milkvetch is known to occur within the LHA area. This species is not typically impacted by livestock grazing on open rangelands. The BLM sensitive good neighbor bladderpod is also known to occur within the LHA area. It is typically found associated with sagebrush and/or Pinion-Juniper communities. In addition to the above mentioned species the Uinta Basin hookless cactus is also present with the Roubideau LHA boundary, primarily in the salt desert shrub communities. The long-flowered cat’s eye has potential habitat over a fairly wide range within the state; however; no locations of the long flowered cat’s eye are documented in the LHA area.

Figure 1.13 Roubideau LHA Area known populations of special status species.



Water and Watersheds

The Roubideau Landscape Unit is entirely with the Gunnison River Basin but includes portions of two 4th field Hydrologic Units, 14020005 (Lower Gunnison) and 14020006 (Uncompahgre). Table W1 shows the Hydrologic Unit subdivision of the LHA area to the 5th field watershed level and the associated area included in this assessment.

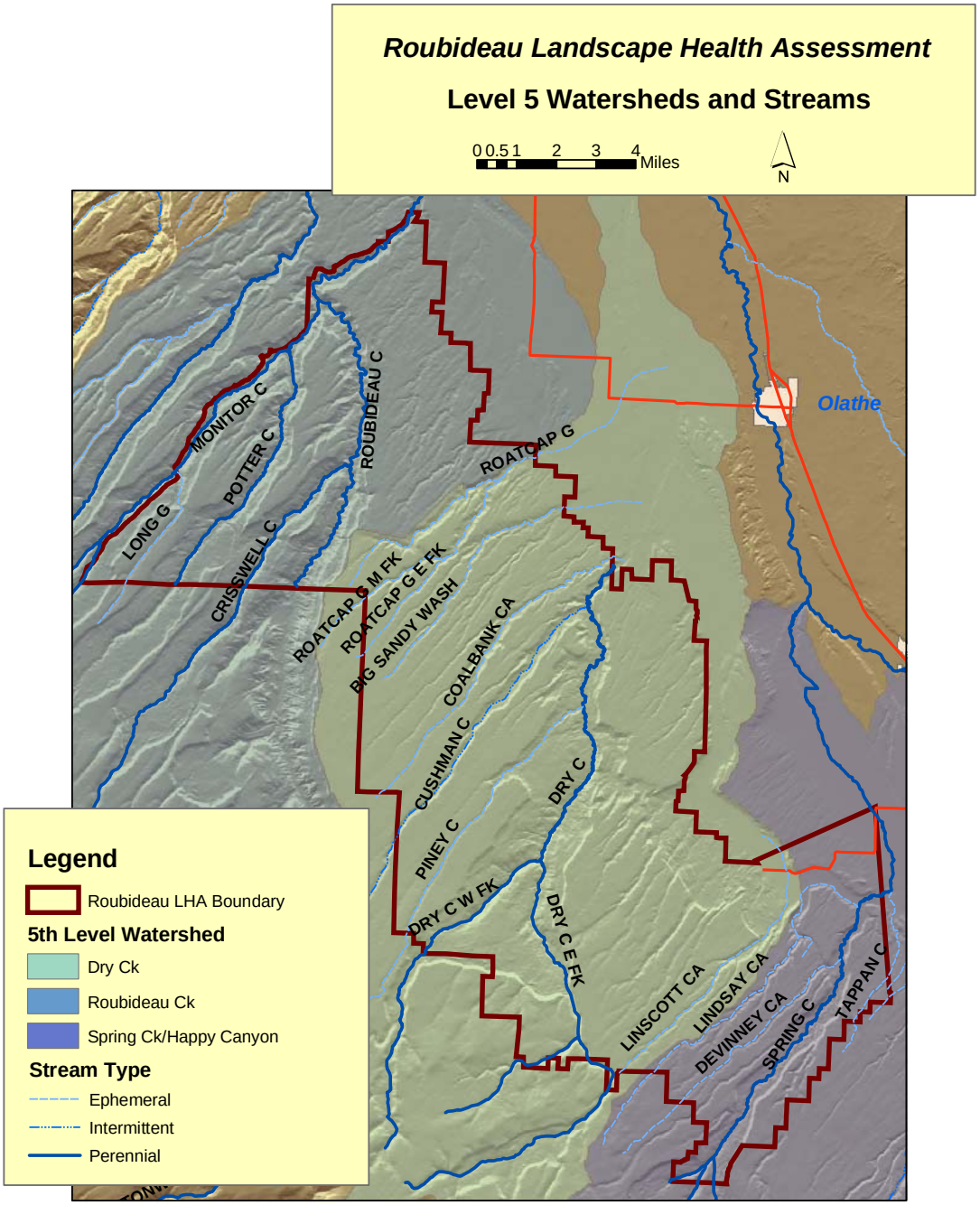
Table 1.8 Watershed Subdivisions (Hydrologic Unit Codes) and Water Quality Classifications, and Standards for the Roubideau Landscape Unit.

5th Field Watershed	*Land Status Acres*		*Stream Segment*	*Stream Designation*	*Stream Classification*
	BLM	*Other*			
1402000650 Dry Creek			Dry Creek	Use Protected [5]	Aquatic Life Cold 2 [1] Recreation 1a [2] Agriculture [3]
			East and West Forks of Dry Creek	Use Protected	Aquatic Life Cold 2 Recreation 2 Agriculture
			tributaries to Dry Creek	Use Protected	Aquatic Life Warm 2 Recreation 2 Agriculture
1402000577 Roubideau Creek			Roubideau Creek above Potter Creek, Monitor Creek		Aquatic Life Cold 1 Recreation 1a Water Supply [4] Agriculture
			Roubideau Creek from Potter to mouth		Aquatic Life Cold 1 Recreation 1a Agriculture
			Other tributaries to Roubideau Creek	Use Protected	Aquatic Life Cold 2 Recreation 2 Water Supply Agriculture
1402000640 Spring Creek/Happy Canyon			Spring Creek	Use Protected	Aquatic Life Cold 2 Recreation 2 Agriculture
			tributaries to Spring Creek	Use Protected	Aquatic Life Warm 2 Recreation 2 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 - Recreation 1a waters that are suitable for recreational activities, when the ingestion of small quantities is likely to occur, and Recreation 2 are waters that are not suitable for recreational purposes.
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.

The major waterways in the assessment area include: Potter, Roubideau, Dry, Monitor, and Spring Creeks (Figure 1.14). Roubideau and its tributaries, Potter and Monitor Creeks, drain into the Gunnison River. The remaining portions of the landscape unit are tributary to the Uncompahgre River. The major drainages in the landscape unit experience high flows from both snowmelt and rainfall events. The snowmelt is typically generated from the high elevations of

Figure 1.14 Roubideau LHA area streams and 5th level watersheds.



the Uncompahgre Plateau. 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 less than 10 inches at the lower elevations to more than 20 inches at the higher elevations. From 25 to 40% 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.

Many of the canyon drainages within this landscape unit are prone to rare but intense flash floods. Flooding occurs partly as a result of the trending drainage direction and long linear shape of the drainage basin, in relation to the dominant storm track. Moist monsoonal airflow is orographically lifted to the southwest of the landscape unit as it crosses over the Uncompahgre Plateau. This effect increases the storm intensity. Additionally, the magnitude of flooding is increased as storms commonly track in the downstream direction, with precipitation occurring and traveling with the flood peak.

None of the stream or river segments within the landscape unit are on the state's 303(d) list for impaired water quality or the Colorado Monitoring and Evaluation List for suspected impairment. However, both the Uncompahgre and The Lower Gunnison Rivers, which receive runoff from the LHA area, are on the Colorado States 303(d) for potential impairment from Selenium, and the Monitoring and Evaluation List for suspected impairment from excessive sediment.

The Colorado's Unified Watershed Assessment, 12/1998, ranked both 14020006 and 14020005 4th field watersheds as Category 1, defined as "Watersheds in Need of Restoration". Only portions of these 4th field watersheds are within the boundary of the landscape unit, and water quality issues that apply mostly to lands outside of the BLM portions of these drainages, were the rationale for the Category 1 ranking.

Table 1.9 Colorado Unified Watershed Assessment Ranking

4th Field Watershed	**Category Rank***	**Category Ranking for BLM Portion of Watersheds**	**Rationale for ranking**
14020006 Uncompahgre	1	BLM lands not ranked	- mainstem from Montrose to Delta high priority segment on the 303(d) list - EQIP project area - Lower Gunnison Salinity Control Project
14020005 Lower Gunnison	1	4	- mainstem is medium priority segment on the 303(d) - BLM is major land manager - newly occupied by native fish due to fish ladder @ Redlands - EQIP project area - Lower Gunnison Salinity Control Project

* Unified Watershed Assessment ranking are defined as Category 1: watersheds in need of restoration;
Category 4: Watersheds with insufficient data to make an assessment

Ground water occurrence in the LHA area is primarily limited to bedrock aquifers associated with both the Dakota and Morrison formations. These aquifers are recharged from snowmelt and stream flow waters in the higher elevations of the Uncompahgre Plateau. Occasional springs and seeps occur within the LHA, especially where canyon forming erosion processes have intercepted saturated sections of the aquifers mentioned above. The chemical water quality of these aquifers is dominated by sodium-bicarbonate, and total dissolved solids can range from several hundred to over 3,000 parts per million.

In addition to the state's water quality designations, classifications and numeric standards, all surface waters of the State are subject to the Basic Standards (Colorado Water Quality Control Commission), which in part read: state surface waters shall be free from substances attributable to human-caused point or nonpoint source discharge in amounts, concentrations or combinations that can settle to form bottom deposits detrimental to the beneficial uses (e.g. silt and mud), are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life, or produce a predominance of aquatic life.

METHODS

The land health assessment was conducted on public lands in the Roubideau LHA Unit during the months of August, September, October and November of 2004. The following procedures were used:

1). The area was first broken apart into 67 different polygons. Polygons were based on ecological sites (NRCS-USDA 2002) derived from soil mapping units and allotment boundaries. Polygons ranged from 110 to 7,700 acres in size.

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 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. Nearly every point was 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 2002 or 2003. 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 2002 and/or 2003 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 Roubideau LHA area was conducted in the summer of 2002. 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.

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 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, noxious weeds, or litter retention; or for scores of less than average for soil cover, plant cover or vigor attributes. The ID team judged each polygon as to whether it was meeting the standard (no evident problems at any site in the polygon), not meeting the standard (problems at one half or the majority of sites in the polygon), or meeting with problem areas (problems at less than half of the stops in polygon), based on a preponderance of evidence. The "meeting with

problem areas" category has been used in past land health assessments, and denotes polygons which on balance meet a health standard, but have some indicators or locations within them that the ID team would like to see tracked and managed for improvement. Reasons for the rankings, and likely causes were documented. Riparian Functioning at Risk ratings were directly translated into "Meeting With Problems", as they had been in past land health assessments.

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			
45,905	45,186	9,616	1,651	1,775

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 four areas in the central and 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. As with pedestals and gullies, runoff drainage problems were comparatively minor across the unit (Figure 2.3). However, several areas had multiple sites with runoff drainage problems. While some of these areas were on steep slopes which typically decrease infiltration and increase 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 Standard 1 Polygon Ratings.

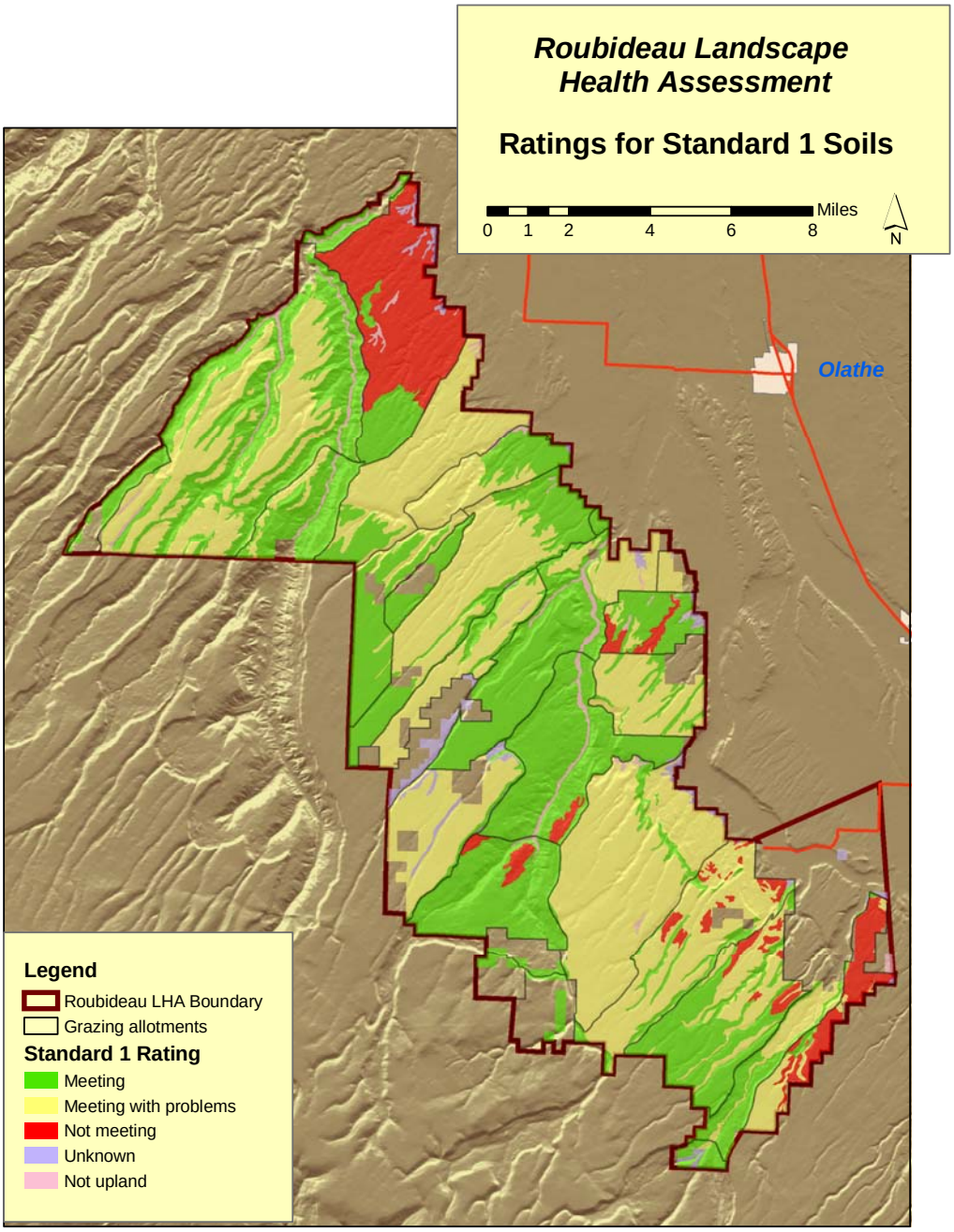


Figure 2.2 Roubideau LHA Area soil erosion problems: map shows all sites with gully activity (Rosgen type F and G channels), and soil pedestals (sites with scores of 1 or 2 on the Rangeland Health Indicators data sheet).

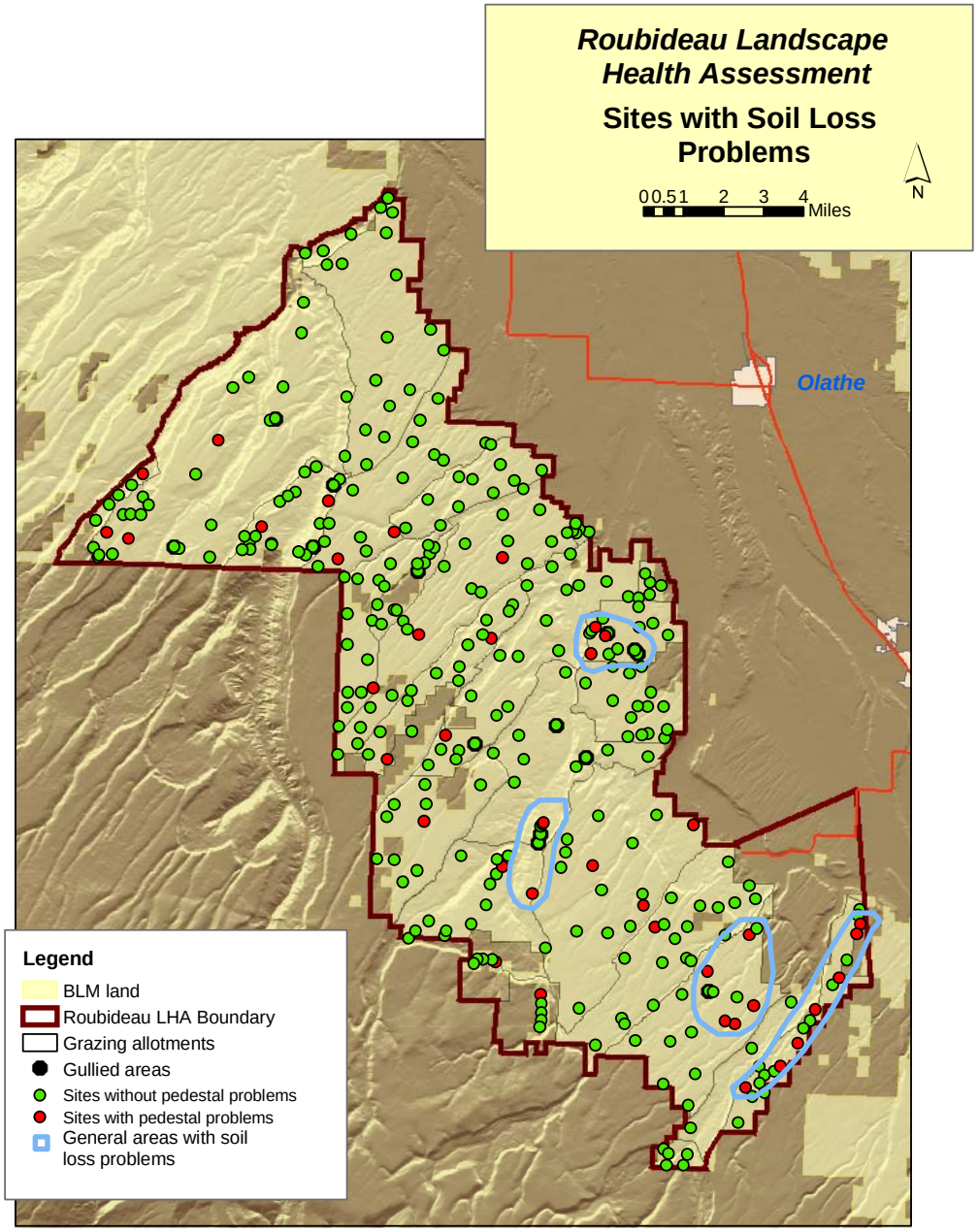
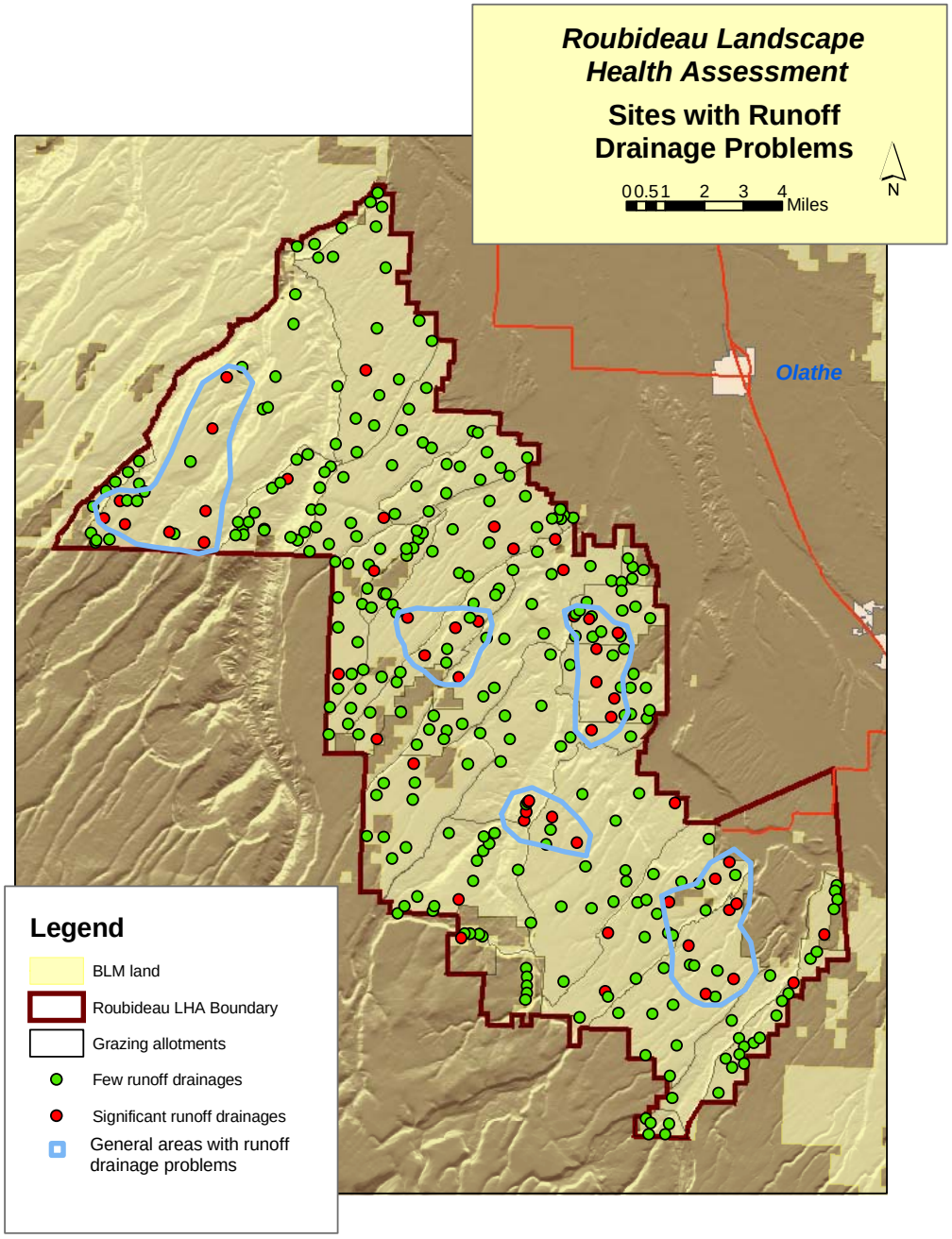


Figure 2.3 Roubideau LHA Area runoff related problems. Sites with erosion associated with overland flow: runoff drainage scores of 1 or 2 on the Rangeland Health Indicator sheet are considered problem sites.



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. Excessively high 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 on Figure 2.4.

High Soil Erosion Hazard

High erosion hazard ratings indicate areas that are especially vulnerable to soil erosion. Erosion hazard combines soil texture with the amount of bare soil and slope to create an index of vulnerability. Very few high and a scattering of moderate risk sites were found across the LHA area (Figure 2.5). The great majority of sites evaluated were at relatively low erosion risk.

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 is a widespread problem across the unit (Figure 2.6), where large areas were characterized by sites having substantially lower than average plant basal cover.

Low Litter Cover

Litter cover is another plant-related source of soil protection. Although fine litter tends to be less permanent that plant basal cover, it serves to protect the soil surface and enhance water infiltration by slowing movement of overland flow 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 2.7). 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 Roubideau LHA Area sites vulnerable to soil erosion because of high levels of bare soil. On this map red dots denote sites with bare soil more than 10% higher than average for the ecological site.

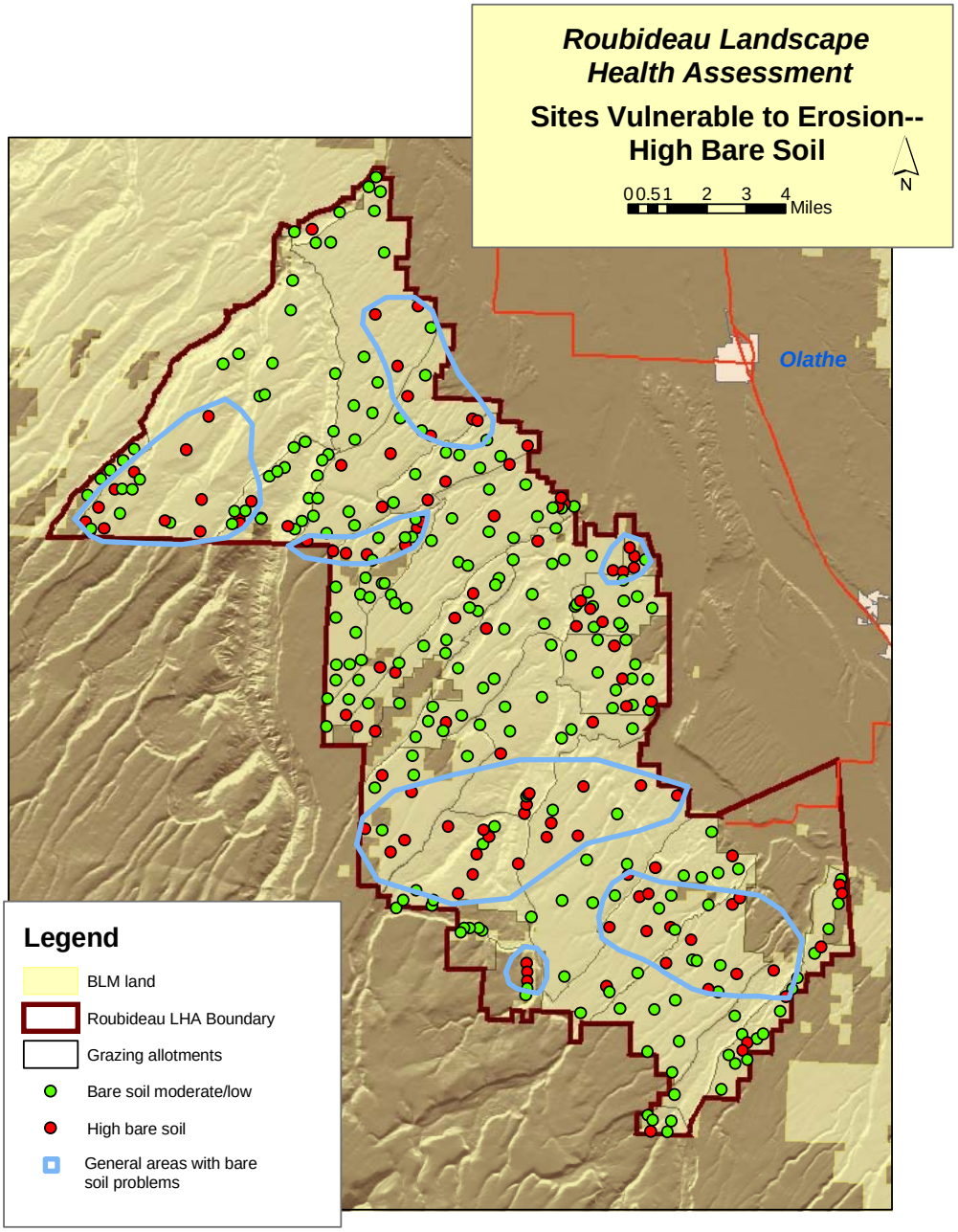


Figure 2.6 Roubideau LHA Area sites with low plant basal cover. On this map red dots denote sites with basal area cover 10% or more less than average for the ecological site.

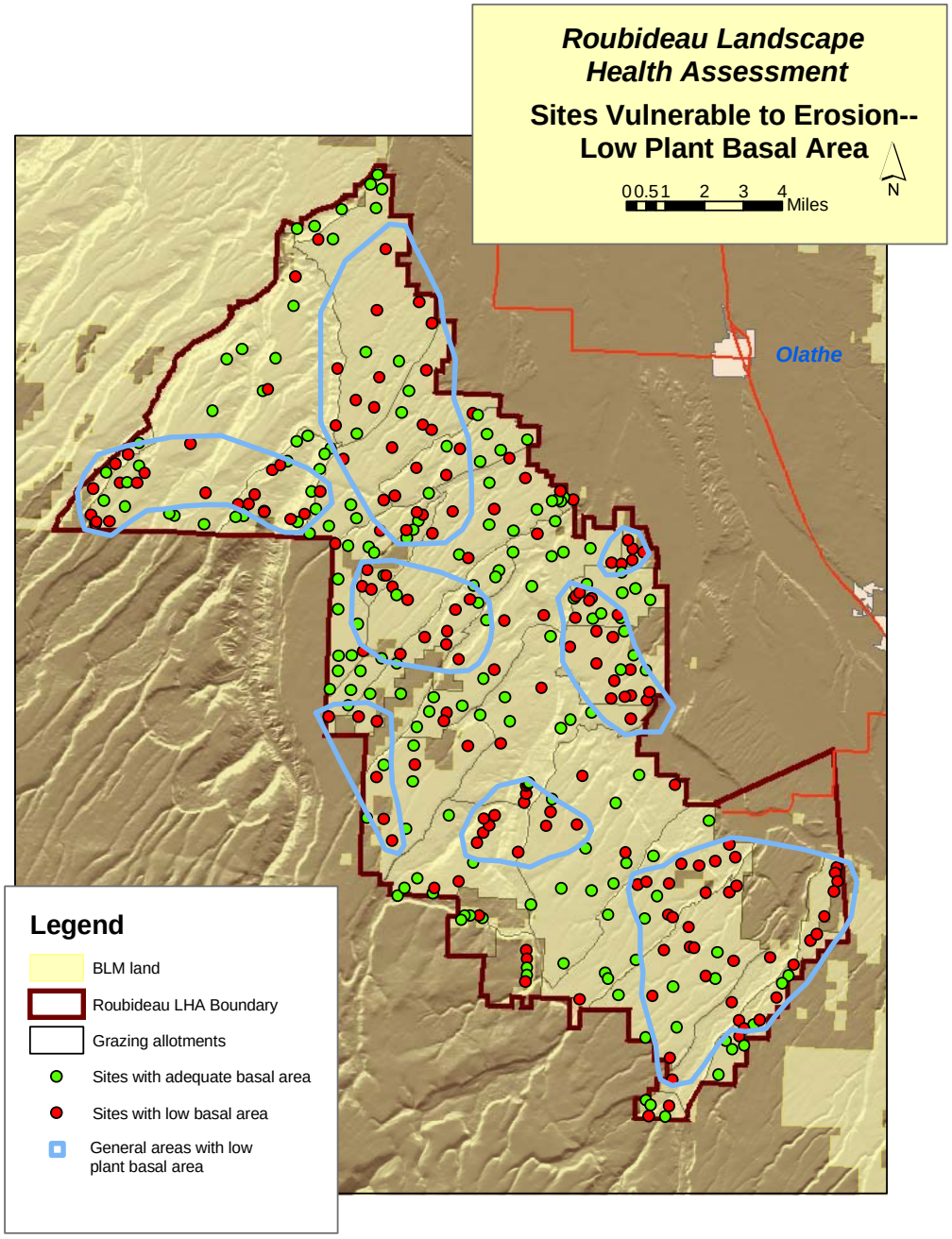
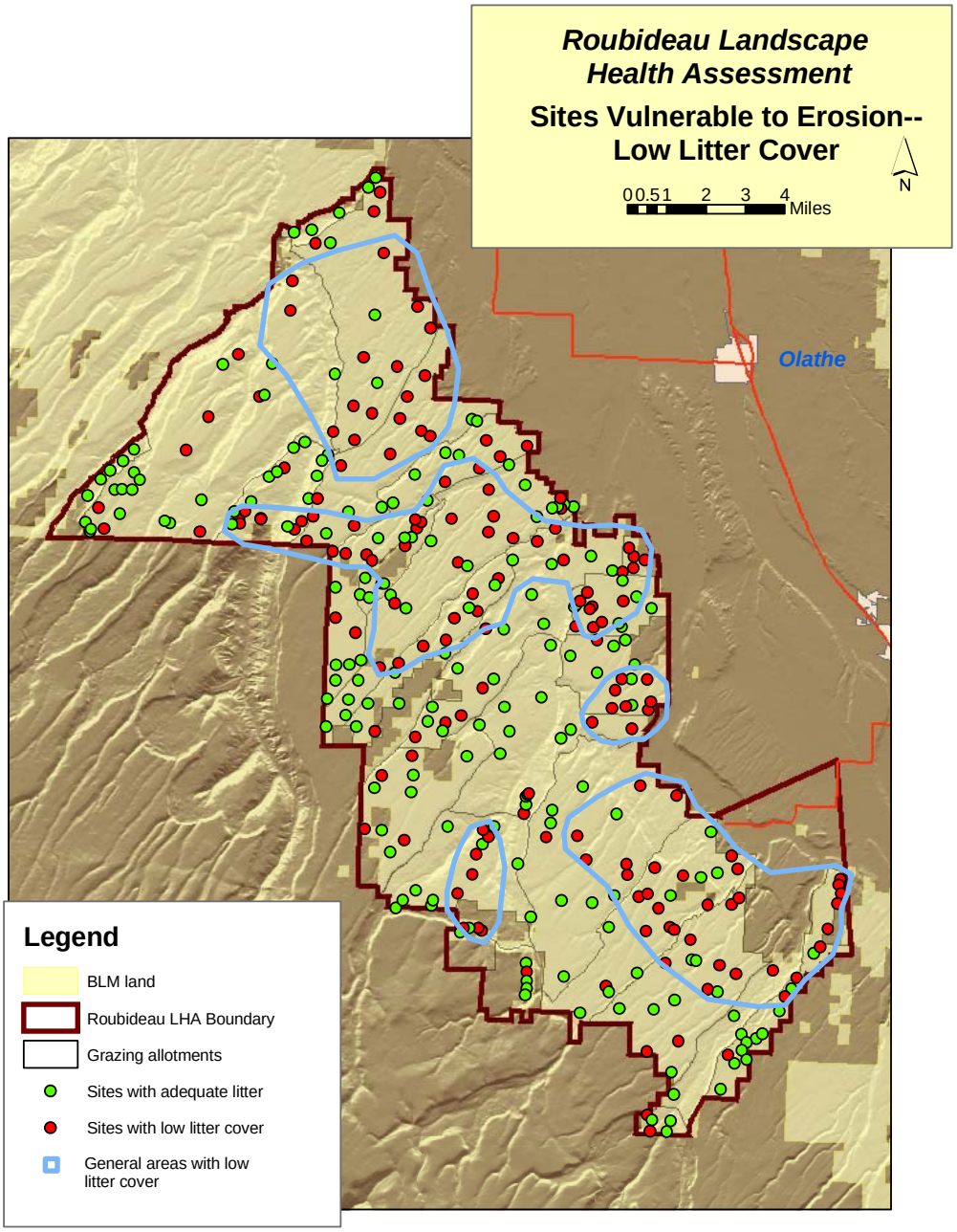


Figure 2.7 Roubideau LHA Area sites with low litter cover. On this map, red dots denote sites with litter cover over 10% less than average for the ecological site.



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		
54.3 miles	12.9 miles	0 miles	0.4 miles

See figure 3.1 for stream segment ratings.

Specific Problems

The majority of riparian areas on public land in the landscape unit fully met Standard 2, having no evident problems with hydrology, vegetation, or excessive erosion and deposition from either stream channel or from the watershed. Another 12.9 miles were rated as "functioning at risk", which we have translated into "meeting Standard 2 with problem areas". The minor problems encountered along these reaches are discussed below. There were no stream reaches that did not meet Standard 2.

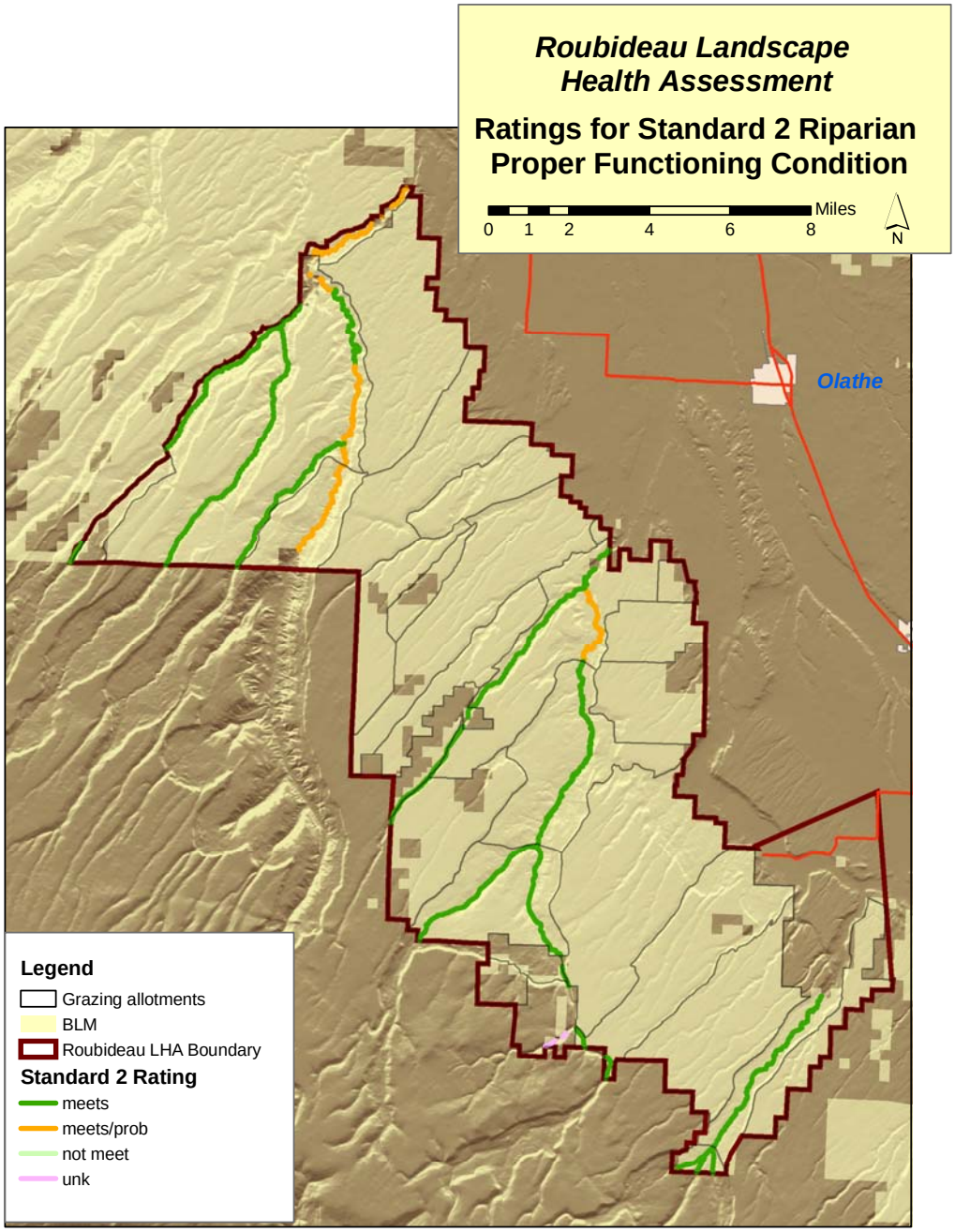
Roubideau Creek

The entire lower reach of Roubideau Creek below its confluence with Potter Creek (2.8 miles) was rated as "Meeting Standard 2 with Problems". The channel was wide relative to its depth, and riparian vegetation was sparse and inadequate to protect the stream banks during high flows. Some tamarisk and extensive stands of Russian knapweed are also present, representing an additional threat to the riparian community. During the knapweed spraying project on upper Roubideau during the fall of 2005 some Russian olive and cheatgrass were also documented. The short reach of Roubideau immediately above Potter Creek (0.6 miles) was also given the same rating because of lack of riparian vegetation in some areas and abundant Russian knapweed. At the upper end of Roubideau Creek, 6.2 miles of stream were also rated as meeting with problems because of an overly wide channel and substantial amounts of tamarisk and Russian knapweed.

Dry Creek, lower reach

About 3.1 miles of Dry Creek above the confluence with Cushman Creek were rated as "Meeting Standard 2 with Problems". Although the channel and overall riparian vegetation were in good condition, a substantial amount of noxious weeds including tamarisk, Canada thistle and cocklebur were present. A number of beaver dams had failed along this reach, leaving large areas of bare soil which could be invaded by these weeds.

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



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

Indicators used to assess this standard include: native plant and animal communities distributed adequately to assure sustainability, age class diversity to sustain recruitment and mortality fluctuations, adequate habitat connectivity, 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			
17,403	66,437	16,867	1,651	1,775

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 more survival and reproductive strategies and capabilities are present than in monocultures. Figure 4.2 shows that diversity problems are localized across the Roubideau landscape unit with only a few locations having several or more sites with low diversity.

Cool Season Grass Cover

Perennial grass is an important if not dominant plant type in most of the plant communities occurring in the unit. It is also one of the plant community components most reduced by historic and present day uses, especially grazing. 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 takes 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 use the same growing period as cheatgrass, and can compete with it. The percent canopy cover of cool season perennial grass was used as an indicator of plant community health and wildlife habitat quality.

Problems with low cool season grass cover were widespread across the unit (Figure 4.3). Several broad areas having communities lacking adequate cool season perennial grasses were found in throughout the unit. It is reasonable to expect that these sites have the capability of

Figure 4.1 Roubideau Creek LHA Area Standard 3 ratings.

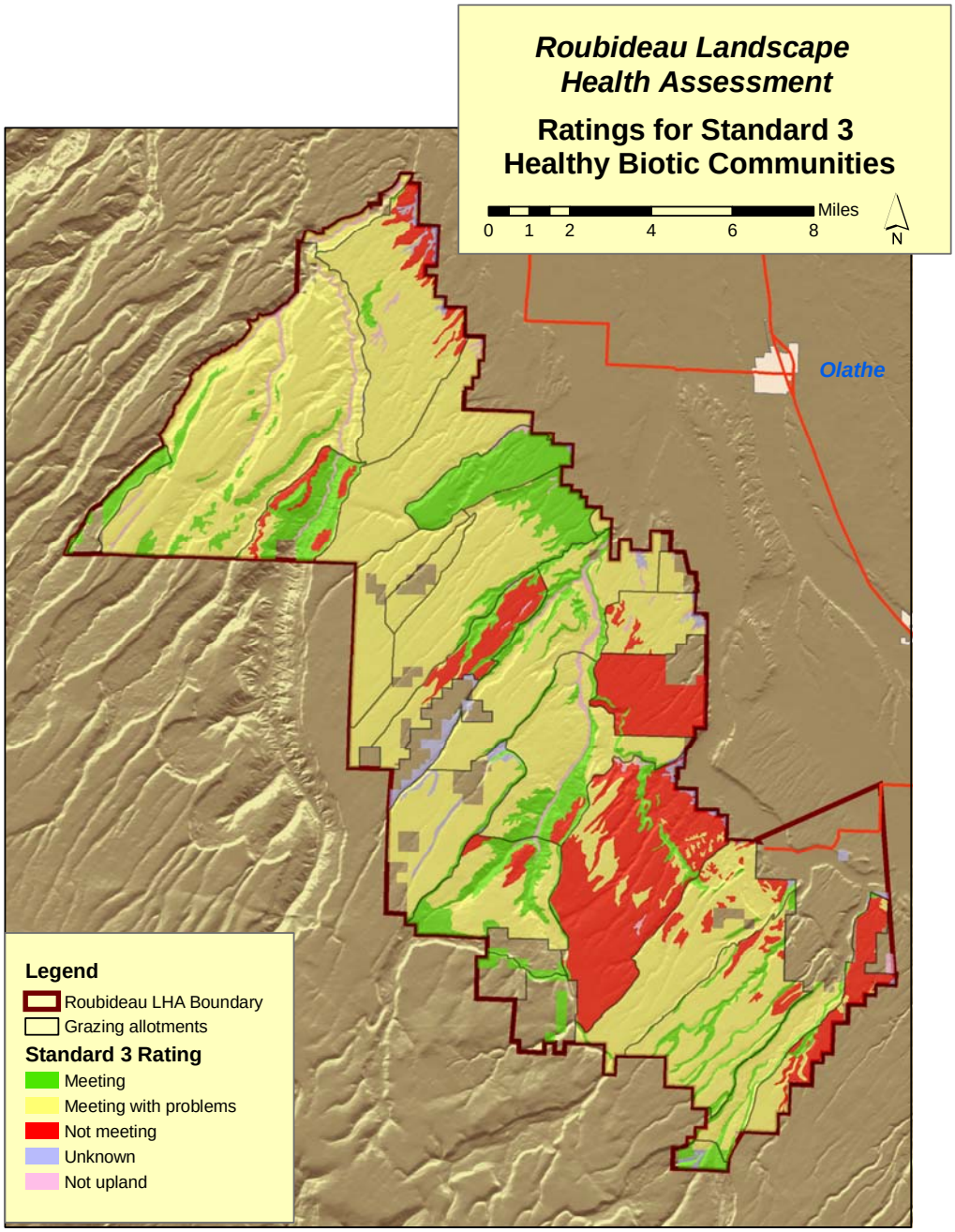


Figure 4.2 Roubideau LHA Area plant diversity. This map shows sites with Rangeland Health Sheet scores of 1 or 2 as diversity problem sites, scores of 3, 4 or 5 as adequate to good diversity.

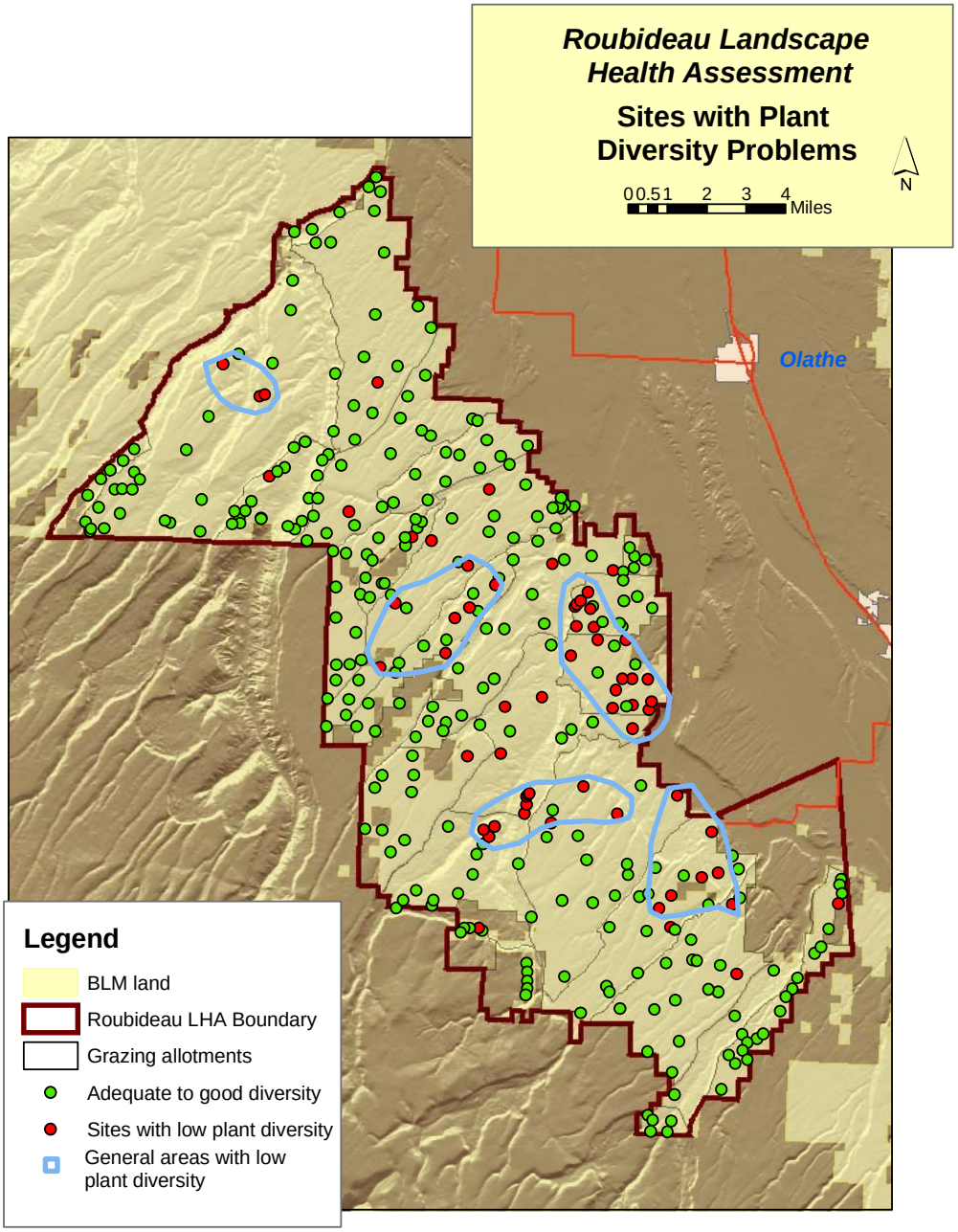
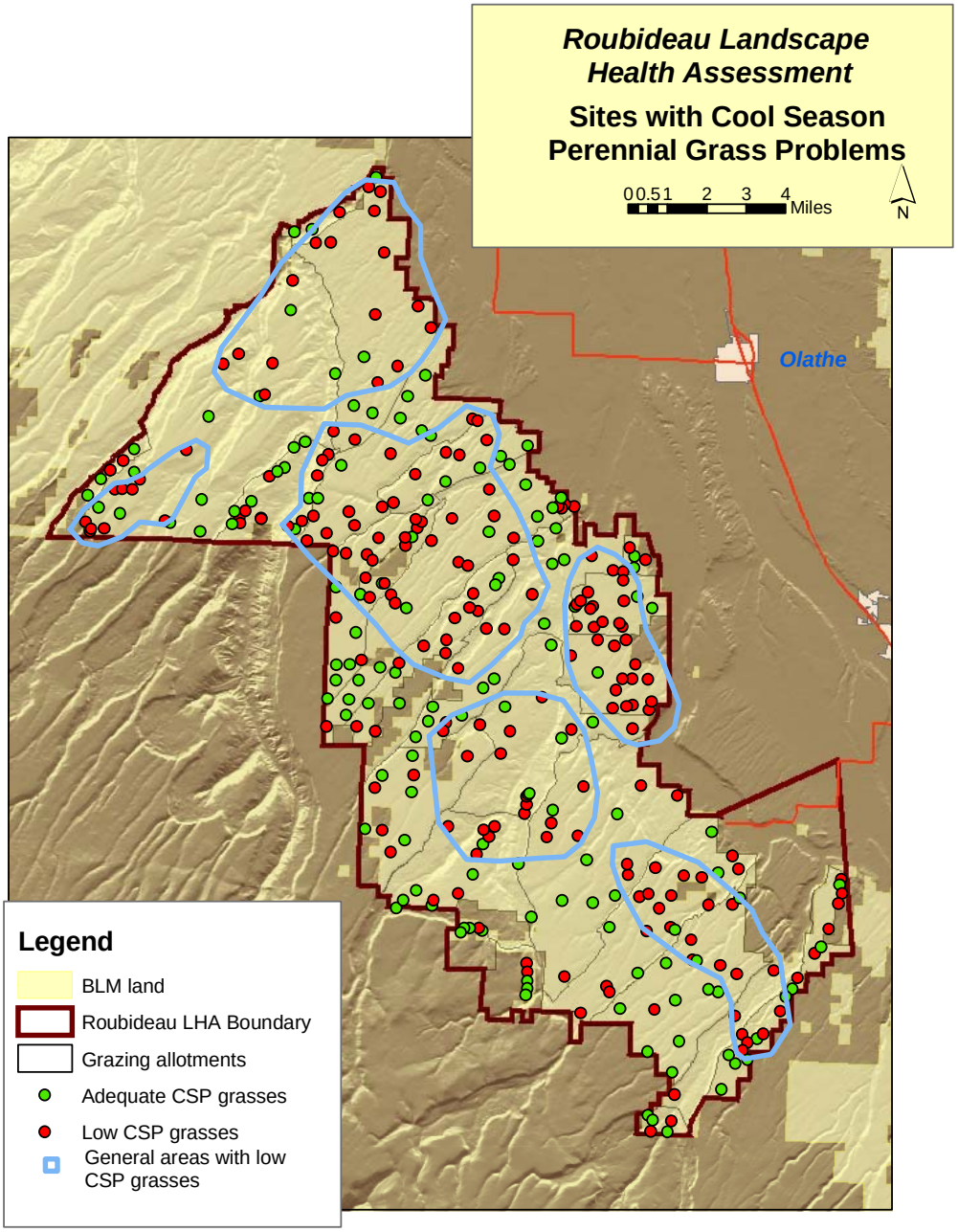


Figure 4.3 Roubideau LHA Area perennial cool season grass cover. In this map red dots denote sites with perennial cool season grass canopy cover more than 10% below the average value for the ecological site.



producing more cool season grass based on NRCS ecological site descriptions and comparison areas.

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 few BLM lands are grazed. Vegetation treatments have reduced warm season grasses in many areas, however. Widespread problems with warm season grasses were observed throughout the LHA unit (Figure 4.4). Most locations were dominated by sites that had below normal levels of warm season grasses.

Perennial Forb Cover

Perennial forbs are a source of diversity, nectar, seeds, varied photosynthetic periods and root morphologies. These characteristics increase a community's water and sunlight capturing capabilities, 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. 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). 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 to produce 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 area for millennia. However, historic photos and tree stand structure indicate that in some areas on the Uncompahgre Plateau 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 at many sites throughout the unit (Figure 4.6), and was occurring both as tree establishment in non-woodland communities, and increases of pinyon within existing woodland stands.

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 the Roubideau unit, pinyon decline was used as an indicator of health, and captured by evaluating pinyon tree vigor at each site. Pinyon decline was observed at many sites across the unit, and was especially prevalent in the southern part of the unit.

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

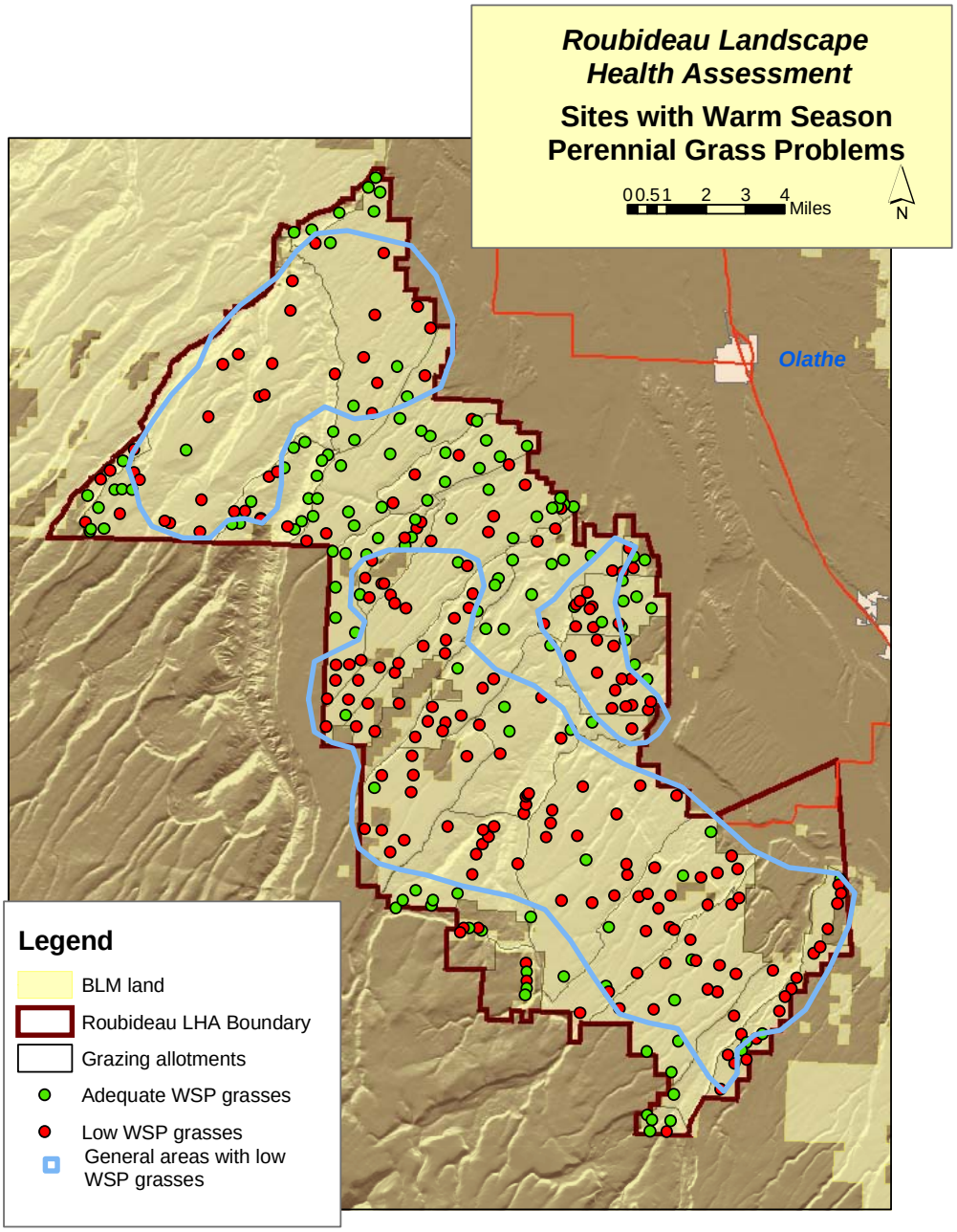


Figure 4.5 Roubideau LHA Area perennial forb cover. On this map red dots denote sites with perennial forb canopy cover values more than 10% below the average value for the ecological site.

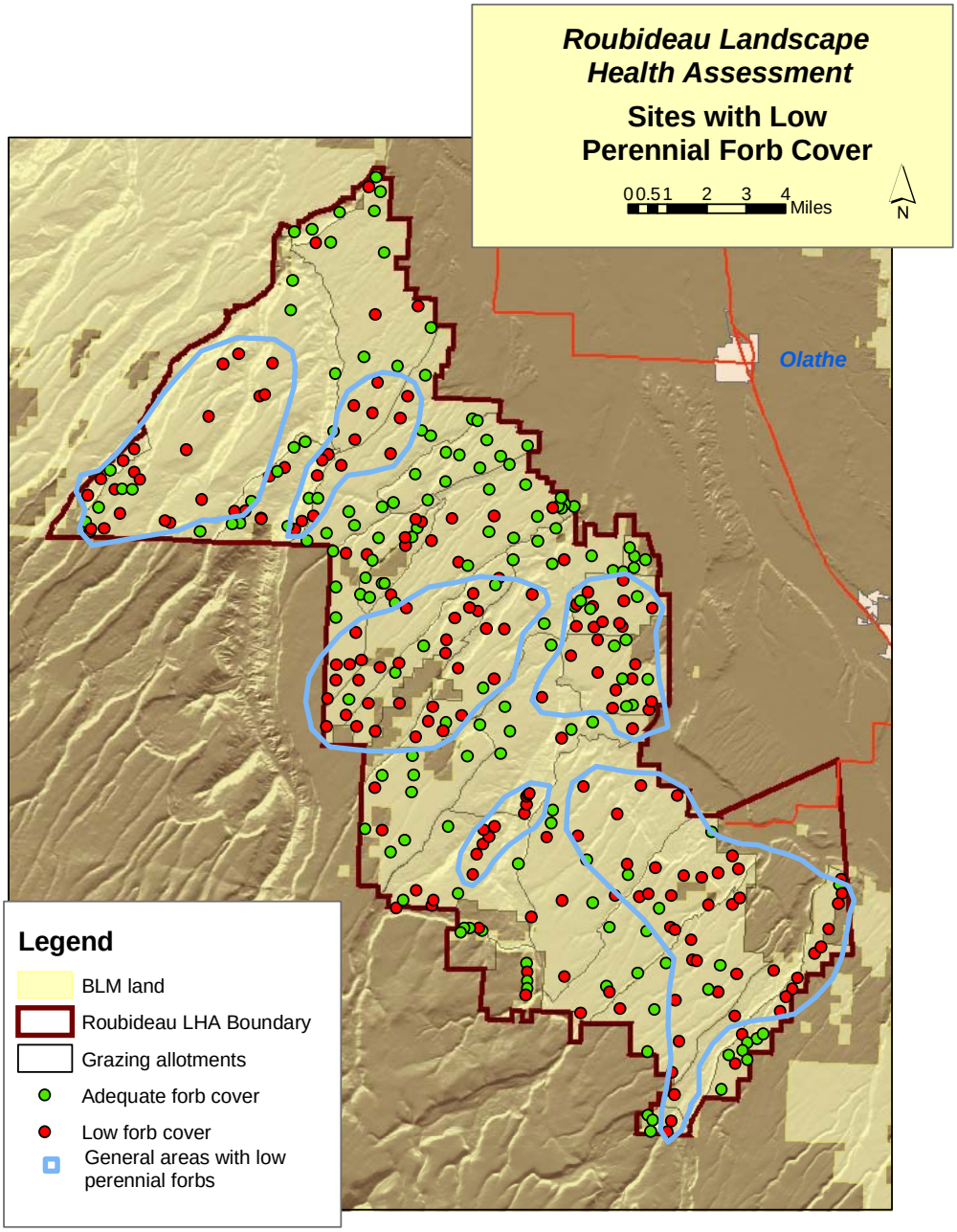
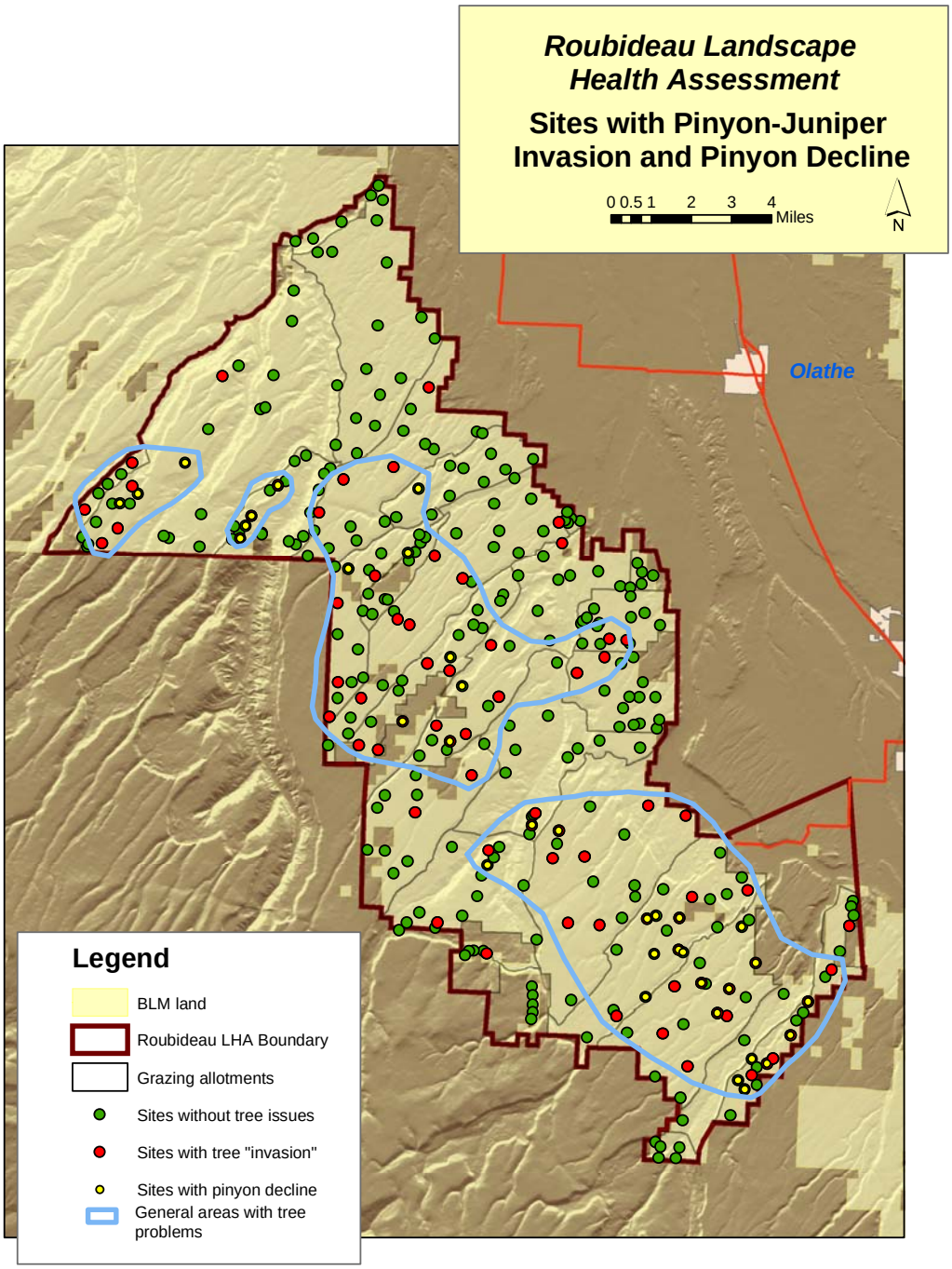


Figure 4.6 Roubideau LHA Area pinyon-juniper invasion and pinyon decline. Red dots denote sites where young age classes of either pinyon or juniper were the dominant tree age classes on the site. Yellow dots denote sites where most pinyon were in a state of low vigor.



Exotic Plant Cover

Exotic plants are those species which were not present in the region prior to European settlement of the area, and were brought in from other countries or regions. Therefore, they have not co-evolved with the plants and animals that are native to the area. In some cases, this provides the exotic plants with a competitive advantage allowing them to push out native species. In other cases, the exotics are weedy species associated with disturbance of the native plant community or soil. Prevalence of exotic plant species was used as an indicator of plant community health and wildlife habitat quality. Exotics--primarily cheatgrass (Bromus *tectorum*), alyssum (*Alyssum minus*), blue mustard (*Chorispora tenella*), Russian thistle (*Salsola kali*), Jim Hill mustard (*Sysimbrium altissimum*), filaree (*Erodium cicutarium*), halogeton (*Halogeton glomerata*), and the seeded species crested wheatgrass (*Agropyron cristatum*), Russian wildrye (*Psathyrostachys juncea*), small burnett (*Sanguisorba minor*) and sweet clover (*melilotus alba*)--were present at significant levels in the native plant communities at 37% of the sites visited (Figure 4.7). These sites were found scattered across the LHA area, with the central and southern parts of the unit having the most problems.

Noxious Weed Infestations

Noxious weeds are those exotic species which are formally designated by the state of Colorado as noxious. They include: Russian knapweed, spotted knapweed, Canada thistle, musk thistle, field bindweed, whitetop, and tamarisk. Weeds were fairly widespread across the unit (Figure 4.8). Many of the ephemeral washes, seeps, ponds and drainages were found to be infested with tamarisk. Stock ponds, watershed stabilization projects, roads and drainages were typically infested with Russian knapweed. Infestations tend to be isolated although frequent across the landscape. For most of the landscape apart from drainages, noxious weeds are not a dominant species, and usually not even present in the natural plant community.

Shrub Utilization

Hedging is the alteration of a shrub's growth form into a compact, dense growth of twigs. Hedging on shrubs is caused by repeated browsing by wildlife or livestock, and can result in reduced productivity and vigor of the shrub, or even death. Hedging is indicative of the balance between browsers and habitat carrying capacity. It is used here as one indicator of plant and animal community health. Problems with shrub hedging were found to be widespread across the unit (Figure 4.9) indicating an imbalance between the 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. Many of the palatable shrubs were in low vigor, and these were widely spread across the unit (Figure 4.10). Wyoming big sagebrush was probably the most widespread shrub species having problems with vigor.

Figure 4.7 Roubideau 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.

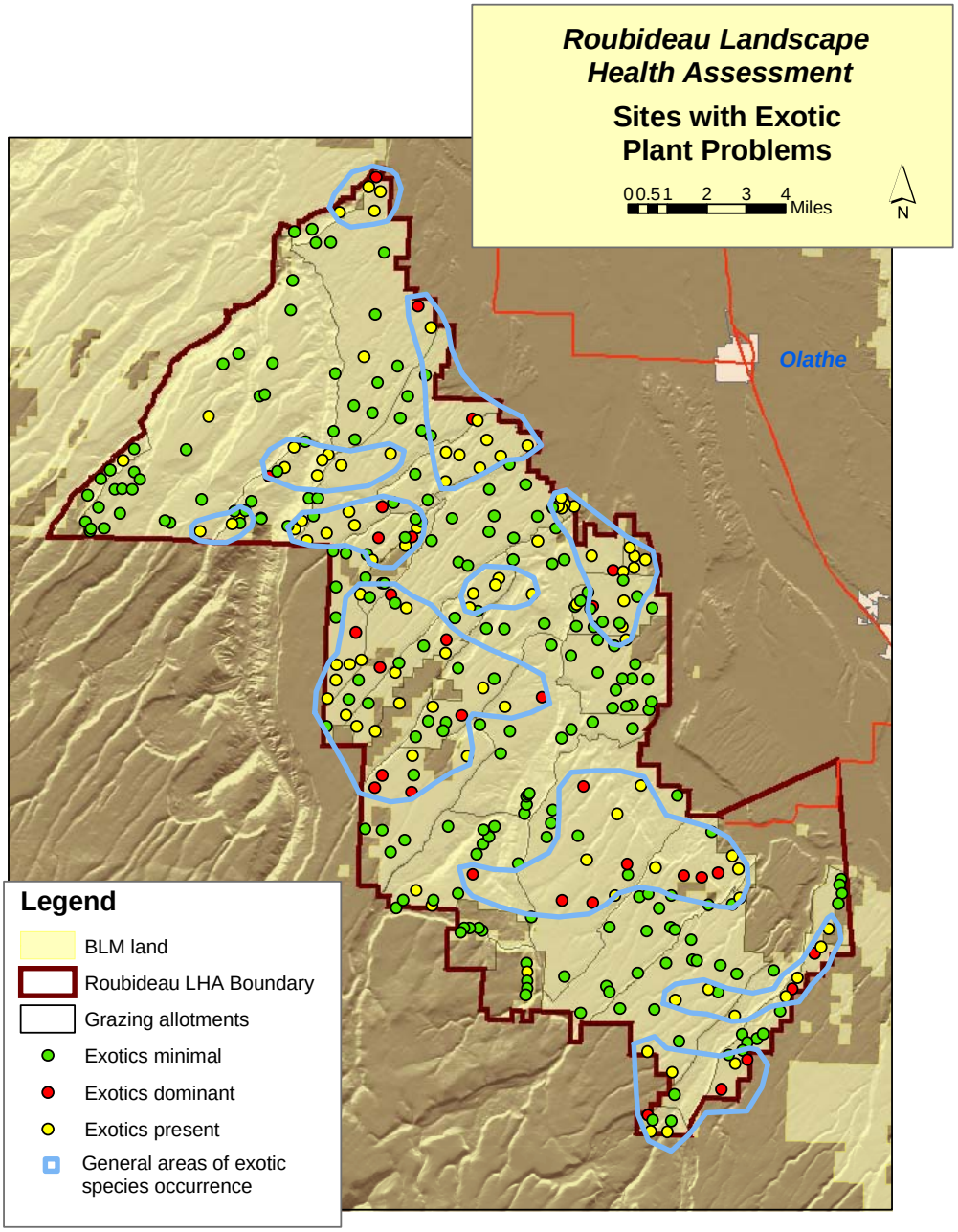


Figure 4.8 Roubideau LHA Area noxious weed occurrences. This data comes from two sources-a comprehensive weed inventory which maps patches and linear weed infestations and small point infestations. The LHA exercise also generated some weed data points and these are shown in the legend as (LHA).

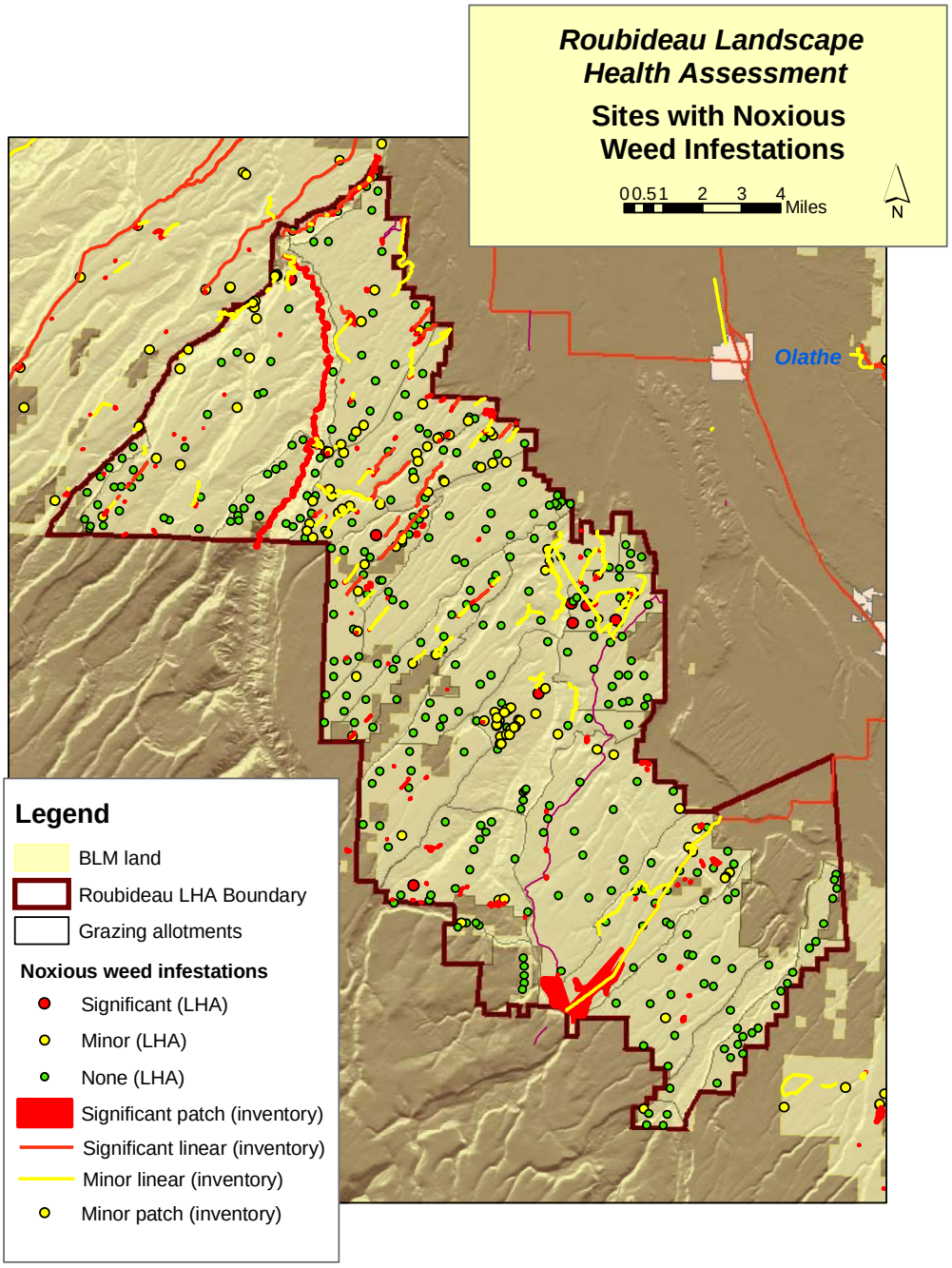


Figure 4.9 Roubideau LHA Area shrub utilization and hedging. Sites with shrubs falling in hedge classes 3 or 6 depicted as seriously hedged, sites with shrubs in hedge class 2 or 5 are moderately hedged, and sites with shrubs in hedge class 1 or 4 are not hedged.

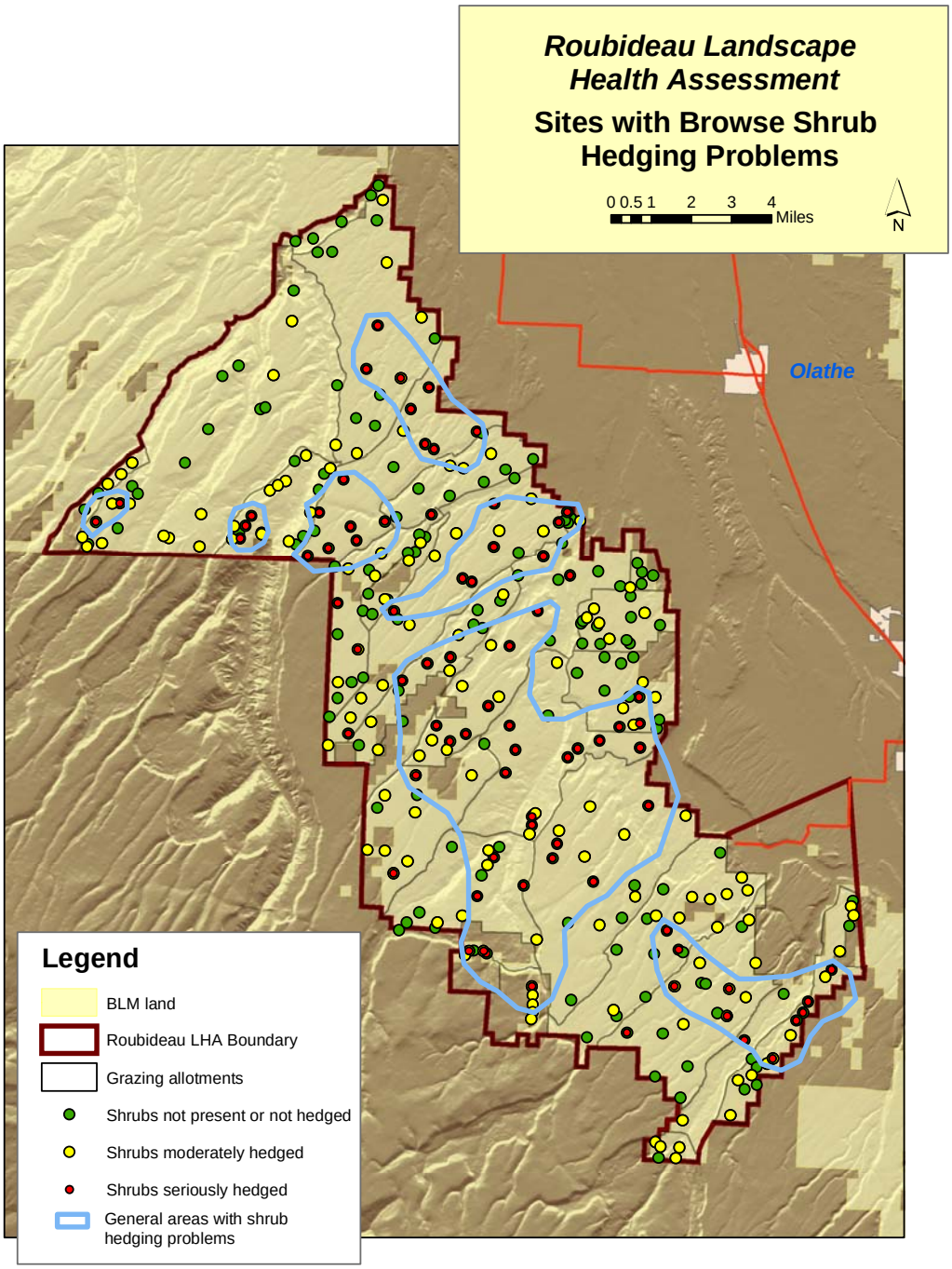
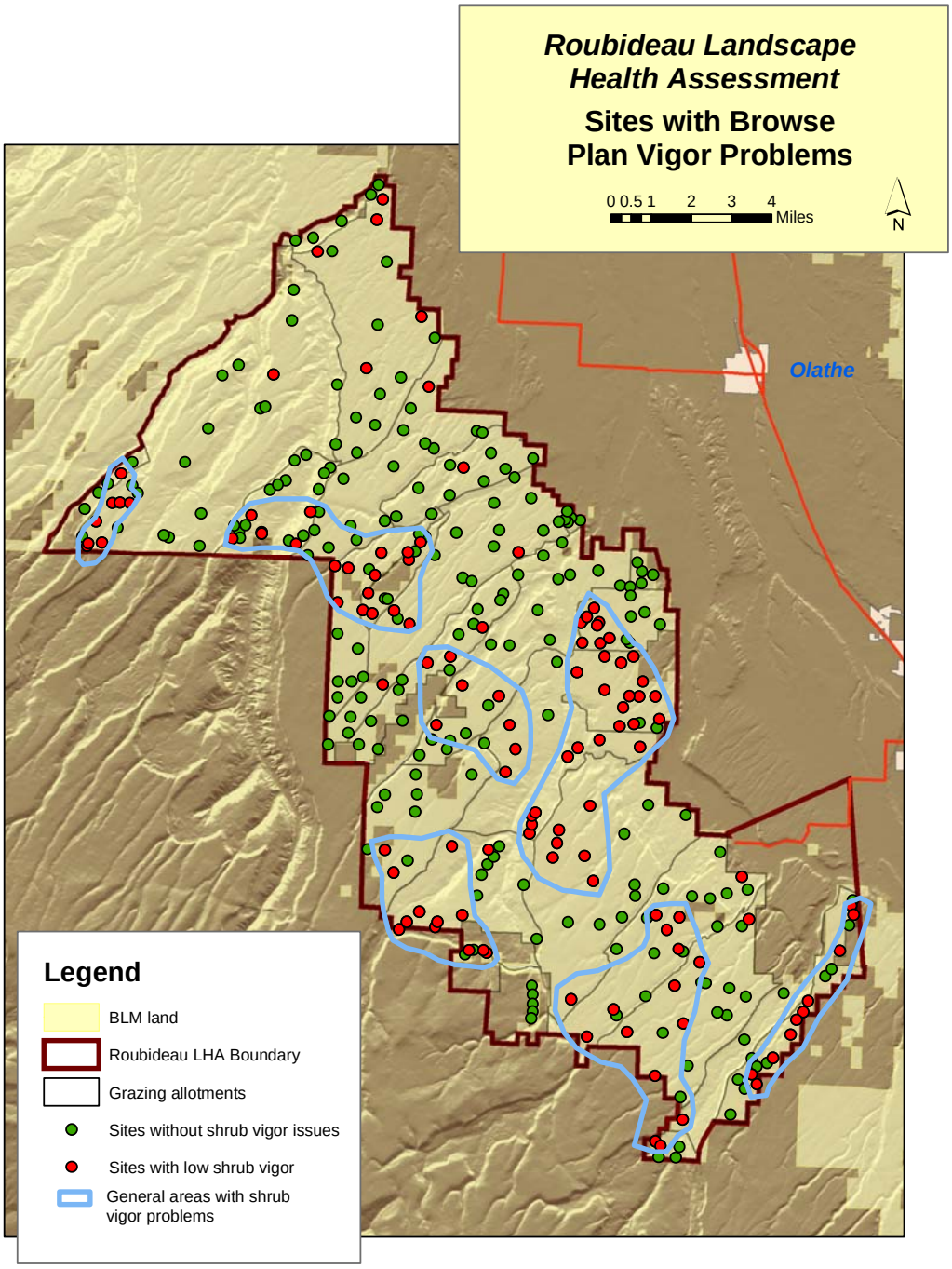


Figure 4.10 Roubideau LHA Area browse plant vigor. Red dots denote sites with at least one major browse shrub species that is in predominantly low vigor across the site.



Native Plant Distribution

One hundred seven different plant species were found to occur in the unit. This does not reflect all of the species seen, only those which occurred in significant amounts on at least one site. The very inconspicuous or sparsely scattered species are not reflected on this list. Utah juniper, a widely occurring native tree, was the most widespread species found as a significant part of the plant community on 146 out of a total of 345 sites where data was collected. Wyoming big sage was the second most widespread species occurring in significant amounts on 134 sites, with Colorado pinyon the third most common on 107 sites, then broom snakeweed at 102 sites. Sandberg bluegrass, a small native cool season perennial bunchgrass was the most common cool season grass occurring as a significant part of the plant community on 45 sites. The most common warm season perennial grass was galleta grass at 115 sites. And the most common perennial forb was rock goldenrod which was significant on 47 sites. Thirty six species occurred at substantial levels on only one site, and another 38 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 Morrison-derived shale soils on canyon side slopes support substantially different plant species than the sandy and loamy soils found on the mesa tops and along drainages. Deeper soils typically support some different species than shallow and rocky soils, although many species also occurred on both soil types. Elevation and aspect also affected plant distribution, with the more moist, higher elevations and aspects typically supporting a greater variety of species.

The most obvious problems observed with plant populations were associated with the ongoing drought. Most evident was the die off occurring among the Colorado pinyon which are being affected by drought and associated insect and pathogen problems across the LHA area. This is occurring in large patches, bur living pinyons are still distributed throughout the area, even in communities where pinyon die-off is extreme. Wyoming big sagebrush was also in very low vigor across the unit, in part due to the drought. Many of these plants have recovered somewhat with increased moisture over the past two winters. The drought typically killed parts of most sagebrush shrubs, but not too many entire shrubs within a stand.

At the level of data collection, it appeared that the major plant species appropriate to soil and elevation were 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.

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

Specific problems or changes:

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

Habitat changes that are occurring in the unit, and much of the adjacent landscape that affect the wildlife habitat quantity and quality are: vegetation seral stage is advancing, the average patch size is getting larger, the amount of "edge" is decreasing, the size and quality of browse stands are declining, human development is expanding causing fragmentation of key habitats for several species, and the abundance and amount of area supporting exotic and noxious vegetative species is increasing. In general, this area, as well as much of the adjacent landscape, is declining in overall quality for many species, and is becoming more favorable for species that require larger patch sizes of later seral stage vegetation, and with less diversity. This ecosystem is becoming more stable, with fewer natural disturbances—in particular large scale fire--occurring. For example, the comparatively small Spring Creek fire in 1993 and the Tappan fire in 2004 have been the only two fires of any notable acreage to occur over the last 12 years in the LHA area.

2. The mule deer population trend is declining in the LHA area and the region (Uncompahgre Plateau, GMUs 61 & 62), which is consistent with declines in mule deer populations in adjacent areas and throughout the west. Although erratic annual fluctuations in mule deer numbers are typical, the 15-20 year trend is downward. The CDOW's desired mule deer population level for this area is 38,000. During the early 1980's the population was estimated at over 50,000, and the 2003 estimate was just over 35,000 (Figure 1.12).

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

In this unit mule deer depend heavily upon sagebrush for winter forage. For mule deer to utilize sagebrush without ill effects they need an abundance of herbaceous vegetation. Mule deer do not do well when their diets consist of >30-35% sagebrush. Our assessment data shows widespread low shrub vigor and annual growth on most of the shrubs which are largely sagebrush. Current levels of use did not appear to be very high. Also, assessment data shows

widespread low presence of cool season grasses and perennial forbs, which help to explain the low present day utilization on sagebrush, and perhaps is a factor in the decline of mule deer numbers.

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

The highest potential value of the LHA area to mule deer and elk is winter range; a large portion of the unit is severe winter range. There is abundant summer range at higher elevations of the surrounding areas. Presently, too much of the shrub area, especially the sagebrush stand, is too old and decadent, and lacking a good herbaceous under-story of cool season grasses and forbs. Also, not enough sites of early to mid seral stages, supporting sagebrush and/or mountain shrubs are interspersed throughout the area.

4. The elk population is increasing slightly on the LHA area, and is consistent with increasing elk populations throughout Colorado, and most of the west. Elk have a greater capacity to increase in this unit above current numbers due to intentional heavy hunting pressure to control population growth. Unchecked, the elk population growth would likely have greater affects on the mule deer population status.

The CDOW's desired elk population level in this area is 8,500-9,000. From 1980 to 2000 elk numbers on the Uncompahgre Plateau increased steadily from 4,000 to 12,000. Then with heavy hunting pressure it was decreased to near 9,000 in 2003 (Figure 1.12). Habitat changes resulting in larger areas of more mature vegetation, especially on their summer range is believed to be a significant factor in this increase. Without continued high levels of harvest to this population, it would increase rapidly. This potential of the elk population to increase is a good indicator that the wildlife community is changing to meet the conditions created by changing vegetation.

5. Several Neo-Tropical Migrant Bird species show population trend declines, or have inadequate data for making trend determinations in the Western Colorado region (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. In Montrose County, there are six full or partial BBS transect survey routes. These routes are 24.5 mile roadside transects with stops occurring every mile. The observer documents, by sight and sound, the species present for a 5 minute interval.

Fourteen species (Table 4.1) show population trend declines in both the 10 and 26 year population trend Breeding Bird Survey datasets. 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. Many other NTMB species are present in this area, but their status appears to be stable at this time. 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.

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

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 Mesa Creek LHA area based on Breeding Bird Atlas information.

Connectivity

Not much information is available, nor are we aware of formal procedures that are outlined for assessing connectivity of habitat in dry woodland or semi-desert shrubland vegetation types, particularly in very rough terrain. Because the canyon and mesa country 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 4.11). Possible barriers and dispersal routes are outlined below.

Steep rock outcrops and rocky slopes: Steep rocky areas are typically found just below the tops or on the sides of mesas scattered throughout the unit. These barriers are most abundant in the northern part of the unit, above the drainages of the Roubideau stream system. Usually these are not continuous bands that completely cut off movement from mesa top to drainage bottom, but they tend to funnel movement of larger animals into the few passable areas and make movement more difficult. These rocky areas probably reduce large ungulate and carnivore use of some mesa top areas which would otherwise be suitable habitat.

Rivers, streams, and dams: There are no rivers within or immediately adjacent to the Roubideau unit. 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 (which is often a source of weeds) in the riparian zone. Tamarisk has become firmly established throughout the lower elevation streams across the unit. Russian knapweed has numerous infestations throughout the LHA unit, and seems to become established along and drainage corridors and where livestock ponds have been built. It is a particular problem along Roubideau Creek. Russian knapweed has been treated with herbicide for the last two years along these streams.

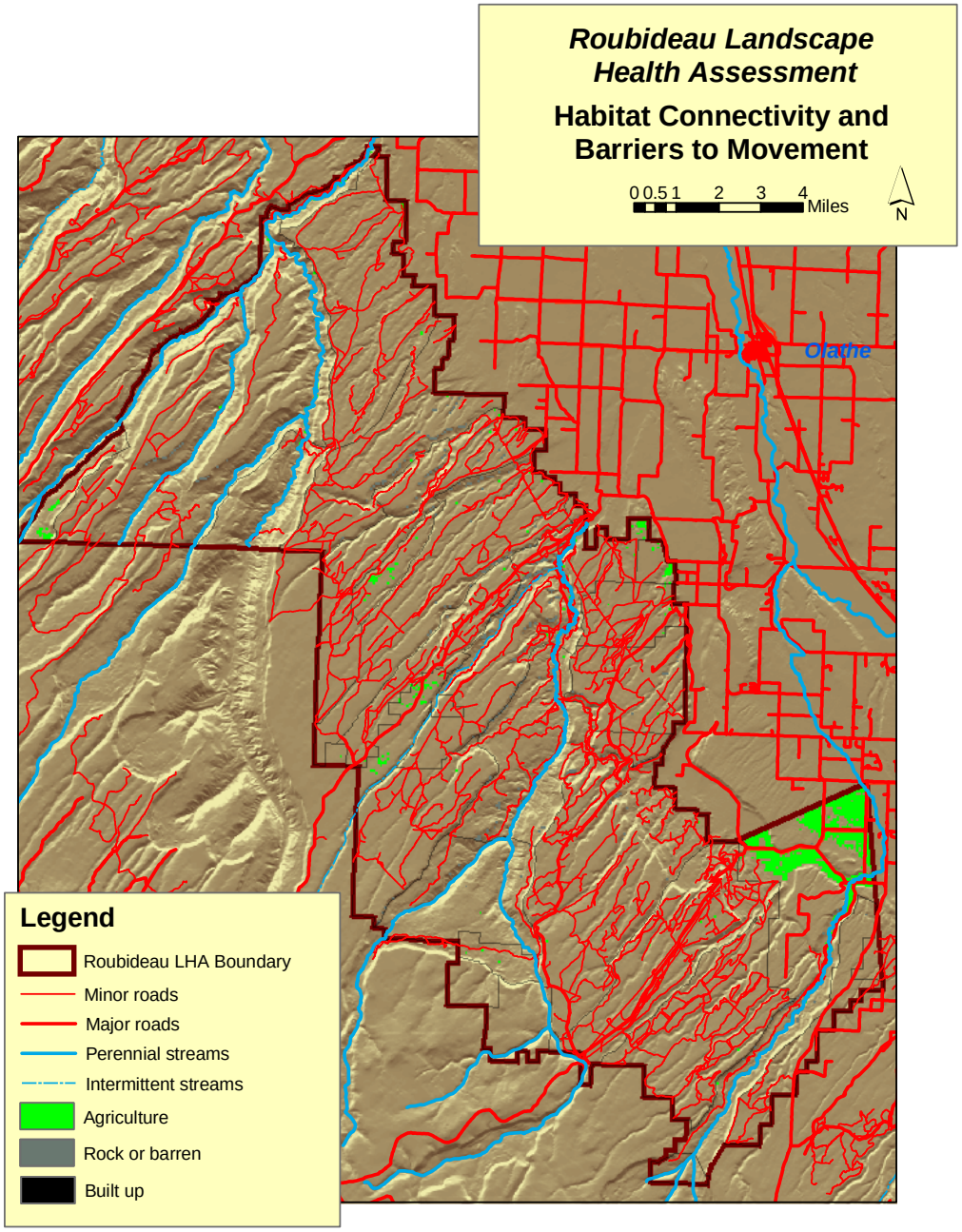
Agriculture and intensive human land uses: Agriculture and residential use of land can act as a barrier to movement by species that don't use the nonnative vegetation, tolerate the presence of humans and domesticated animals like dogs, need hiding cover, or cannot travel long distances in unsuitable 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, cats, burdock and Russian olive, and Siberian elm are probably spreading and utilizing parts of the unit as a result of agricultural and human land uses adjacent to the unit. 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 along the eastern boundary of the unit, and residential development on large lots has occurred on many private lands in the southern part of the unit. The increased human presence and altered plant communities in these developed areas is certainly affecting the native plant and animal communities on adjacent BLM lands. Additionally, vegetation is being treated to reduce fuel loading and fire spread on these BLM lands in the Wildland-Urban interface, further altering the plant and animal communities.

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 significant road in the unit is Dave Wood Road, on the southern boundary. It passes through the wildland-urban interface zone, and receives commuter traffic going to the resort town of Telluride. Highway 90 crossing the southern part of the unit receives a moderate amount of traffic as does Transfer road which traverses the middle of the unit. Because of relatively gentle topography, proximity to Montrose and Olathe, and open travel designations, a very 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. To a lesser extent, people, their vehicles and their pets transport weed seeds in the same way. Livestock (cattle and sheep) graze on nearly all the lands in the unit. All of the herds spend some time on irrigated ground during the year. Deer and elk also occur across and move throughout the area. Domestic sheep, which are kept on some of the private lands in and around the unit may present a barrier to the occupation of suitable habitat, and the spread and long-term survival of desert bighorn sheep because of the repiratory viruses they have which are typically fatal to the wild sheep.

Figure 4.11 Roubideau 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)



The Vegetation Mosaic

Vegetation diversity in the Roubideau 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 also 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 activites 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) (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. These objectives have been updated by the Spring Creek/Dry Creek Vegetation Management Strategy (BLM 2003) for the southern 2/3 of the Roubideau LHA unit. In each 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), and input from fire ecologists (USDI Bureau of Land Management 2003) may cause the existing objectives to change quite soon, and reduce the amount of early and early mid seral stages prescribed. These adjustments will be made to this plan's recommendations if they come to pass.

The assessment area is broken into three vegetation management subunits: Camelback in the northwest, Sandy Wash in the northeast, and Spring Creek/Dry Creek in the south (Figure 4.13). These units are further subdivided into polygons, each representing different landscape mosaic objectives (Figure 4.12). The existing vegetation mosaic is shown in Figure 4.13. Table V1 in the Appendix compares the existing seral stage proportions with the desired amounts specified by the Fire Management Plan objectives the Spring Creek/Dry Creek objectives. Patch sizes for each of the vegetation management subunits in the Roubideau LHA area are also compared with objectives.

The majority of the Roubideau subunit is made up of the D4/C8, C6/D2, and the B1 vegetation mosaic objectives from the Fire Management Plan, and the salt desert, low elevation PJ/sage, high elevation PJ/shrub, wildland-urban interface in low elevation PJ, and sage grouse polygons from the Spring Creek/Dry Creek Vegetation Management Strategy (see table V1 in the Appendix for a more complete description of these polygons.)

The objectives for the D4/C8, C6/D2, salt desert, low elevation PJ/sage, and high elevation PJ/shrub mosaics are based on the assumption that fairly infrequent, but typically intense fire occurred prior to European settlement and fire suppression activities. This assumption is drawn

Figure 4.12 Roubideau LHA Area Vegetation management subunits and polygons within them that prescribe various desired vegetation mosaics. From BLM, 2002: UFO Fire Management Plan (northern 1/3) and Spring Creek/Dry Creek Vegetation Management Strategy 2003 (southern 2/3).

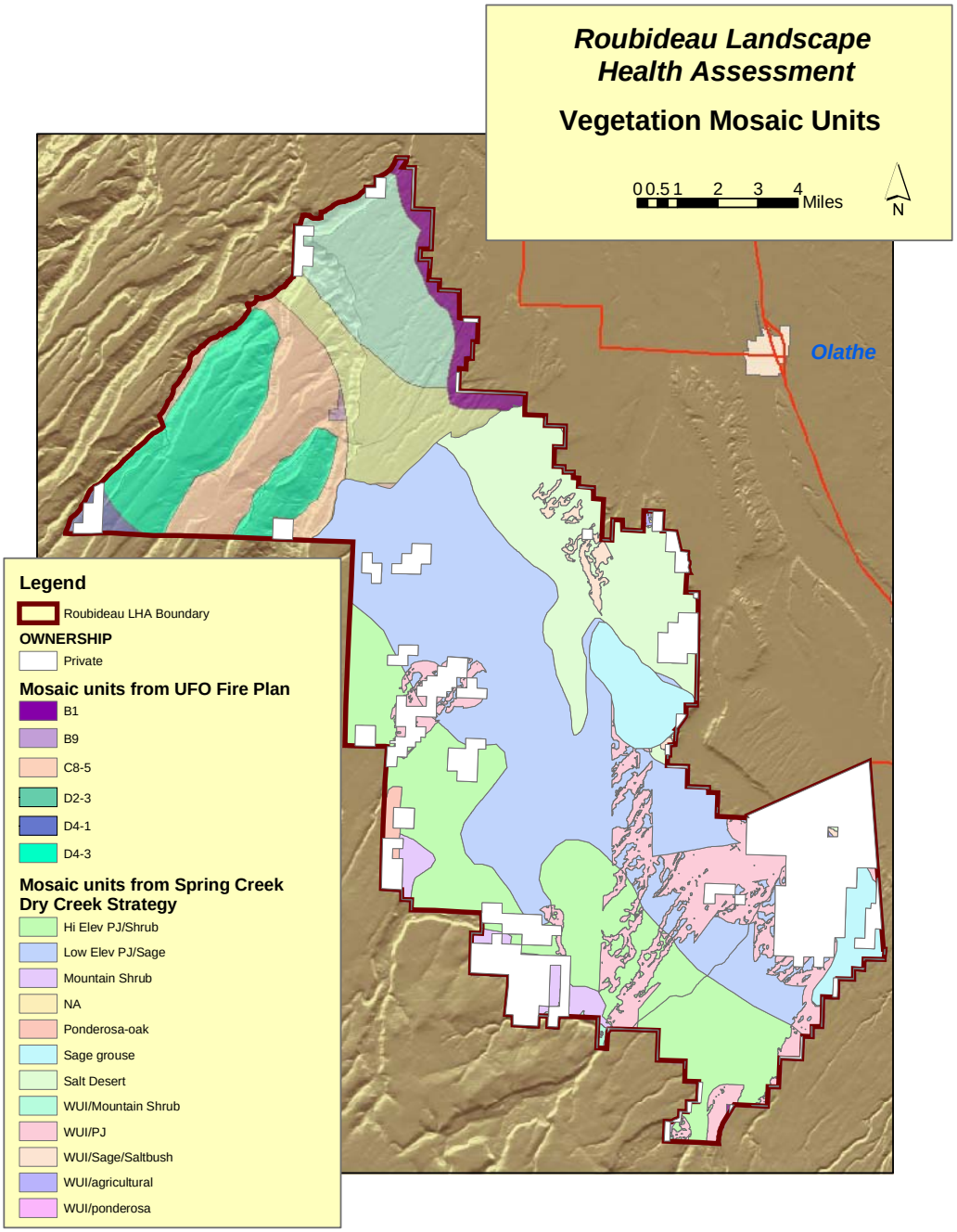
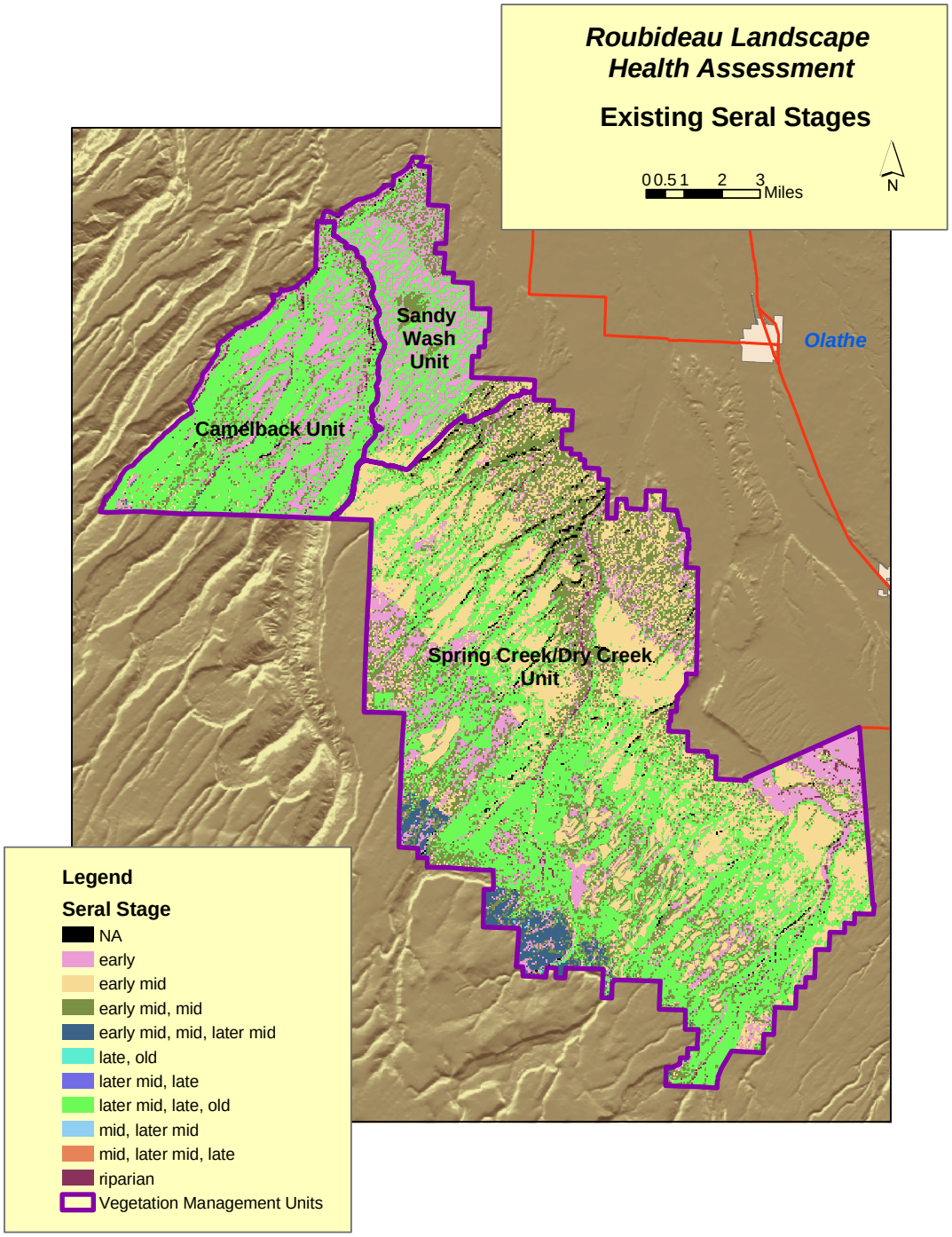


Figure 4.13 Roubideau LHA Area seral stages and vegetation mosaic prescription boundaries from Spring Creek Dry Creek Vegetation Management Strategy (USDI Bureau of Land Management, 2003), and UFO Fire Management Plan (USDI Bureau of Land Management, 2002).



from observations of the moderate levels of lightening strikes, few fire starts, and topography that is not conducive to fire spread on the eastern slope of this part of the Uncompahgre Plateau.

Note that the accuracy of the following estimates of existing vegetation proportions and arrangement may be limited, but we can be reasonably confident that the overall patterns are correct.

Camelback Unit In the D4/C8 polygon which aims to restore a natural mosaic for East Slope of Uncompahgre Plateau, most of the existing vegetation is in the late stages, roughly the amount specified in the objective for that unit. About 1,750 more acres of early mid seral stage are needed, most of which could come from the later stages. Much of the acreage mapped as early seral is on steep side slopes, which are not able to produce much vegetation. Additional early acreage on the mesa tops would bring the mosaic more in line with the mosaic objectives. Additionally, early and mid seral patches should be larger than they are now, and range between 50-200 acres.

The objective behind the C6/D2 polygon is to restore a natural mosaic for the salt-desert shrub zone in the Uncompahgre Valley. This polygon seems to be drawn too high across the slopes of the Plateau because it includes a lot of woodland vegetation in a late seral stage. The objective does not include this stage. Excluding the woodland, the early and early mid seral stages are imbalanced, with too much early seral relative to the early mid seral by about 650 acres. The early mid stage does not currently function as the matrix, while patches of the early stage are not as large on average as specified in the objective (>20 acres).

Sandy Wash Unit

The objective behind the C6/D2 polygon is to restore a natural mosaic for the salt-desert shrub zone in the Uncompahgre Valley. Again, the unit supports some woodland, which is not acknowledged in the mosaic objective. Leaving the woodland aside, there is too much early stage relative to the early mid stage by about 3,025 acres. The early mid stage is not presently functioning as the matrix. While patch size distribution for the early stage is about right, it is currently distributed as a matrix.

The B1 polygon objective is designed to reduce fire risk to nearby structures and resources. While the amount of later seral stage is close to meeting the objective, there is too much early seral stage by about 740 acres, and too little early mid seral by the same amount. The early seral patches are slightly smaller than specified by the objective. The early mid seral is presently not functioning as a matrix. The late seral stage patches are slightly larger than the objective values.

Spring Creek/Dry Creek Unit

The “Natural Mosaic for Low Elevation PJ-Sage” objective attempts to quantify a natural mosaic in this elevation zone. The distribution of existing vegetation does not match the desired seral stage percentages. The late mid, late and old stages are about 5,500 acres short of levels specified by the objective. There are about 8,500 more acres of early mid stage than the objective calls for. Middle stages are also short of the objective by about 2,900 acres. Patch sizes of early seral are smaller on average than those called for in the objectives. Patch sizes of early mid are within the range specified. The matrix at lower elevations is presently in early mid seral, and in late seral at the upper elevations, while the objective calls for late seral matrix across the elevation zone.

The “Natural Mosaic for High Elevation PJ-Mountain Shrub” objective also attempts to quantify the natural mosaic for this higher elevation zone, where fire behavior and frequency are thought to be different than in the lower PJ-Sage zone. The current vegetation mosaic does not match the objective well, with over 2,000 acres too much early seral, 2,250 acres too much early mid seral, 1,500 acres too much mid seral, and 6,400 too few acres in the late mid and late stages. While the present matrix stage is old, as the objective calls for, the average patch sizes of early, early mid and mid are too small, and probably do not realistically imitate the patterns natural wildfire would create.

The "Natural Mosaic for Salt Desert” objective again tries to quantify the mosaic that would occur under a natural disturbance regime, but at the lowest elevations in the LHA area. The early seral stage presently occurs in about the right proportions, but at smaller patch sizes than identified in the objective. The early mid stage occupies about 1,500 acres less than the objective calls for, and is not presently functioning as part of the matrix, as it should. The mid seral stage currently has about 1,700 more acres than is needed, and forms the matrix.

The objective “Wildland Urban Interface in Low Elevation PJ/Sagebrush” specifies a mosaic which breaks up fuel continuity and permits fire fighters to quickly establish control lines. Early seral stage is presently short of the objective by about 1,600 acres, but patch sizes appear to meet the objective. The early mid stage is about 630 acres short of the amount called for by the objective, and patches are larger than specified by the objective. The mid stage is about 700 acres short of the objective, with patch sizes smaller than the objective describes. The late stage currently has nearly 2,900 too many acres compared with the objective, and is functioning as the matrix, while the objective does not call for a matrix.

The objective for sage grouse identifies an optimal mosaic for Gunnison sage grouse habitat. Existing habitat has nearly 400 acres too little early seral stage, but patch sizes are within acceptable ranges. Early mid seral stage is more abundant than specified, by about 400 acres, but it does function as the matrix as it is supposed to. Mid and late seral are within the specified acceptable ranges, however these are not as useful to sage grouse, so could be reduced to create more early seral habitat.

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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		
103,683	450	0	0

Specific Problems:

All areas were considered to meet Standard 4 for Threatened, Endangered, and Sensitive species.

Analysis of indicators:

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

The Black-footed Ferret (*Mustela nigripes*), the only listed species having potential to exist in the LHA area, is not thought to have populations there 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 habitat quality for this species within the LHA area. The Mexican Spotted Owl (*Strix occudentalis*) is a federally threatened species with potential habitat in the canyons of this analysis area. Previous inventories of the major canyons by CDOW did not document any occurrences of this species within the analysis unit, or within any habitats on the Uncompahgre Plateau. There are documented Peregrine Falcon (*Falco perigrinus anatum*) nests in the northern portion of Roubideau Canyon. Other portions of this canyon offer suitable habitat

for nesting peregrines, but have yet to be surveyed. Ferruginous Hawks (*Buteo regalis*) utilize the area only during migration, and habitats in this unit are unlikely to be essential to this species.

The small amount of currently occupied habitat within this unit for Gunnison sage grouse is unlikely to be large enough to have a measurable effect on the potential to increase populations of this species on the Uncompahgre Plateau. However, it is probable that there are other areas within the LHA that have the potential to be managed for the expansion or reintroduction of this species into other areas within this unit or elsewhere on the Plateau. In fiscal year 2005, the Uncompahgre Field Office began an inventory of the entire Plateau to try to identify those areas. That work has not been completed for this LHA area.

Although previous inventories for yellow-billed cuckoos were conducted in Montrose and Delta Counties, no habitat condition inventories have been completed for riparian systems such as those in Roubideau Creek and Dry Creek.

Due to the distances from the LHA area to the habitats occupied by the endangered fish (Colorado Pikeminnow, Razorback Sucker and Bony Chub) it is doubtful that most management actions would have any detectable impact on endangered fish habitat. The Roundtail Chub (*Gila robusta*) is a BLM sensitive species known to exist in Roubideau Creek that could have the potential to be threatened by competition with non-native fish species also present in the system. Furthermore, the presence of weeds, poor channel morphology and stream bank stability along Roubideau Creek indicate potential negative effects to these sensitive fish. Approximately 450 acres of riparian habitat (9.6 miles of stream) are rated as Meeting Standard 4 with problems as a result (see the write up for Standard 2 for more information.)

The Uinta Basin Hookless Cactus (*Sclerocactus glaucus*), a Threatened species, is the only federally listed plant species known to exist within this management area. It is present at the Northern end of the LHA, but suitable habitat exists elsewhere within the study area. Current BLM management does not appear to be having an effect on this species.

Although there are a number of rare plants in surrounding areas that could potentially occur within this LHA unit, only the Grand Junction milkvetch (*Atragalus liniflorius*) is documented within the LHA area. There is no evidence to suggest that current management of public lands is having any impact on the health of this species. The milkvetch tends to grow on steep slopes which are typically inaccessible and not likely to be affected by livestock grazing or recreation. The good-neighbor bladderpod (*Lesquerella vicina*) is present in the Roubideau Canyon area, and in Temple Park. There is a high probability that this species is also present in other locations within the LHA area.

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

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

Acreage Figures: Stream Miles Evaluated Against Standard 5

Stream Type	**Meeting Standard 5**		**Miles Not Meeting**	**Unknown**
	Miles Meeting	**Miles Meeting but Problem Areas**		
Perennial	44.8	13.1	1.8	0
Intermittent	7.8	0	0	0
Ephemeral	39.1	11.1	6.4	0
Total	91.7	24.2	8.2	0

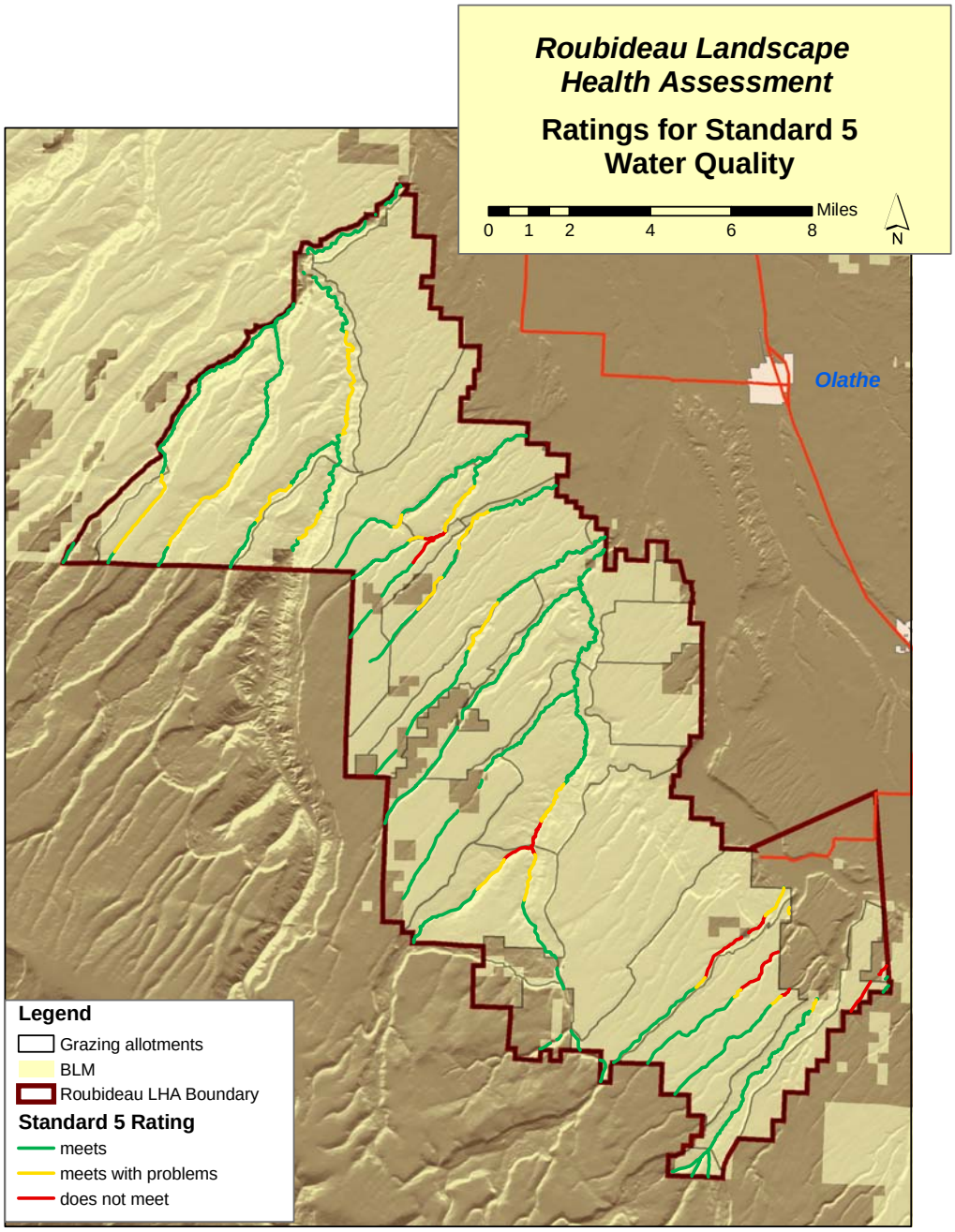
See figure 6.1 for map showing polygon ratings.

Specific Problems

Bacterial analyses (E. coli.) of flowing water bodies were collected in the spring of 2003 (see Table 6.1). The State Recreation Classification of 1a and 2 imposes an E.coli limit of 126 and 630 Colony Forming Units (CFU)/100 ml of sample, respectively. 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 sampling approach serves as a reliable indicator that these streams are in compliance with the state standards.

Tables W1 through W7 (appendix), show chemical water quality characteristics of the landscape area's surface waters (Potter, Roubideau, Dry, Monitor and Spring Creeks). For Potter, Roubideau and Dry Creeks, the first table in each set represents low flow chemistry and the second table, high flow chemistry. The only data available for Monitor and Spring Creek is recent high flow chemistry, as drought conditions from 2002-04 have resulted in no late season flow in either of these creeks. The water quality is relatively similar throughout the area, being dominated by Calcium-Bicarbonate during the high flow season and commonly shifting to sodium bicarbonate during the low flow season. The slight increase in some of the constituents when comparing the more recent data to the data collected in the 1980s is a result of the drought-

Figure 6.1 Standard 5 Polygon Ratings.



induced lower flows in the more recent years. Most constituents are in lower concentrations during the high flow season because of the dilution effect of snowmelt water. Nitrate and phosphate concentrations, being largely responsible for eutrophication of aquatic environments, are in relatively low concentrations in all streams sampled within the landscape 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. None of the mean values for either nitrate or phosphate within the landscape areas streams, sampled for water chemistry, exceed these average values. Although the water analyses in Tables W1 through W7 do not include all of the constituents listed by the state for numeric standards, the constituents that were analyzed are in compliance with the state standards.

Table 6.1 Bacterial Concentrations of the Roubideau LHA Area Surface Waters

Date	***Water Source***	***Uses Present***	***E. Coli CFU/100 ml***	***Temp. C***	***State Stnd. CFU/100 ml***
5/14/2003	Spring Creek UTM: 241933 4252253 NAD 83	no grazing, bankfull flow	4	6	630
5/24/2003	Dry Creek UTM: 755873 4269120 NAD 83	no grazing, high flow but post peak (est. 20 cfs)	20	15	126
5/24/2003	Roubideau Creek UTM: 744324 4280351 NAD 83	old grazing evidence, high flow (est. 40-50 cfs)	12	12	630
5/24/2003	Potter Creek UTM: 744118 4280384 NAD 83	no grazing sign, high flow but post peak	<4	18	630
5/24/2003	Monitor Creek UTM: 742967 4278297 NAD 83	old grazing evidence, high flow (est. 10-15 cfs), post peak	<4	15	630

The major streams in the LHA area were sampled for aquatic macroinvertebrates, which are commonly used to assess water quality conditions. Potter, Roubideau, and Spring Creeks were sampled in the spring of both 2002 and 2003, while Dry and Monitor Creeks were sampled only in the 2003 (Table 1.6). Unfortunately, extreme drought conditions persisted during the sampling period, which significantly altered both the abundance and species composition of the aquatic macroinvertebrates. As shown in the data in Table W1.6, a shift in the dominant insect family occurred in the three streams that were sampled in 2002 and 2003. These three streams were reduced to extremely low flow or went dry in the late summer of 2002. The dominant insect family shifted from Baetidae in 2002, to Chironomidae 2003. Baetidae are mayflies with a life cycle of a year or longer, while the Chironomidaes have much shorter life cycles, in the range of 3 to 9 months. Thus, the flow regimes favored the shorter life cycle species. It is expected that as drought conditions diminish the EPT abundance will increase somewhat, but remain below similar streams with more reliable flow regimes. The overall diversity of aquatic macroinvertebrates in all 5 streams in Table 1.6 is low compared to other, similar streams in the region. The low macroinvertebrate diversity could be a result of the recent, multiple year drought conditions, and low or no late summer season flow on Roubideau Creek resulting from a large upstream diversion.

Table 6.2 Stream Macroinvertebrates

Stream	***Date***	***Total Abundance[1]***	***EPT Abundance[2]***	***Dominant Family[3]***	***Taxa Richness[4]***	***EPT Taxa Richness[5]***
Potter Creek	5/21/2002	2724	1128	Baetidae	23	7
	5/20/2003	625	4	Chironomidae	11	2
Roubideau Creek	5/22/2002	2073	1437	Baetidae	14	6
	5/27/2003	616	20	Chironomidae	13	5
Spring Creek	5/30/2002	5222	3487	Baetidae	27	12
	6/2/2003	1733	453	Chironomidae	23	8
Dry Creek	6/2/2003	1219	473	Simuliidae	19	6
Monitor Creek	5/20/2003	3527	32	Chironomidae	17	4

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-Taxa Richness is the number of distinct macroinvertebrate taxa and usually decreases with degraded water quality.
5- EPT Taxa Richness is the number of distinct macroinvertebrate taxa among the insect Orders: Ephemeroptera, Plecoptera, and Tricoptera. This number usually decreases with degraded water quality.

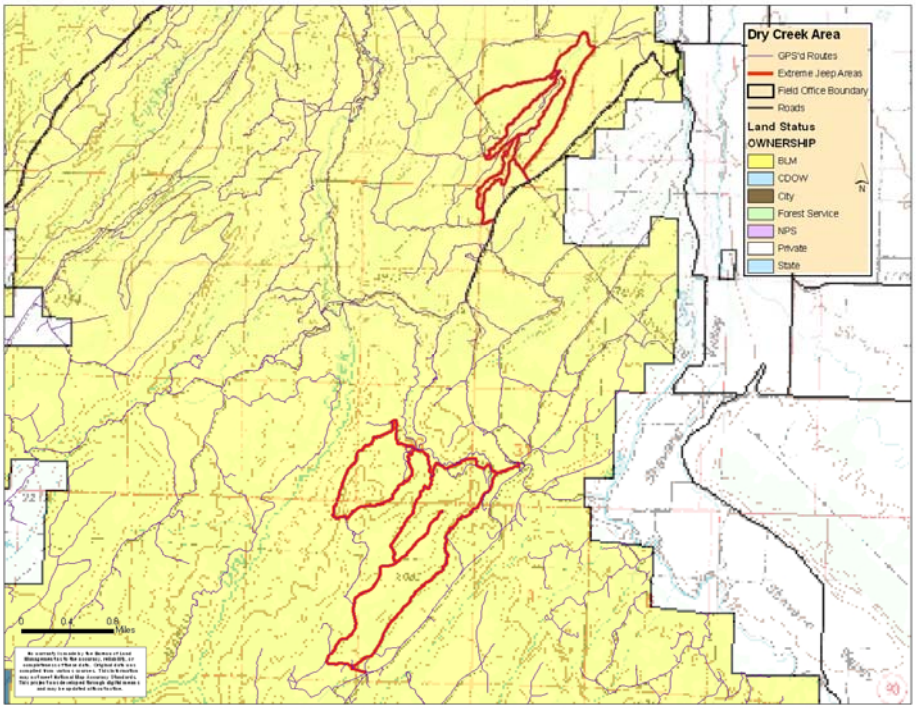
The potential non-point source water pollutants yielded from the landscape unit include sediment, nutrients, and biological pathogens (primarily bacteria and protozoan). Water quality analyses show that both nutrient loading and concentration of biological pathogens are at acceptable levels on the major drainages within the LHA area.

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 surface. Essentially all of the drainages in the LHA have one or more of the soil surface indicators showing problems. On watersheds that have two or less 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. Additionally, some drainage areas showed existing problems with accelerated soil loss, as evidenced by excessive soil pedestals and gullying. The drainages for these areas also do not meet standard 5.

An issue in the LHA area that was not specifically monitored with the methods described in this assessment is soil surface disturbance from OHV use. The entire LHA area is designated as open to OHV use in the Uncompahgre Basin RMP/EIS, dated 1987. With the LHA area being easily accessible to population centers in the Uncompahgre Valley, OHV use has significantly increased since the RMP was completed. Of special concern is the more recent development of extreme 4 wheeling areas. This activity started in the LHA area in 1999 in several ephemeral drainages that are tributary to Dry Creek. To date approximately 10 miles of extreme 4 wheel

drive trails exist (Figure 6.2), with use progressively increasing over time. Potential impacts from this uncontrolled activity include: accelerated soil erosion and sediment yield, loss of native vegetation, and increases in invasive weed species (Figure 6.3).

Figure 6.2 Extreme jeep areas and other GPSd roads and trails in the Dry Creek portion of the LHA unit.



Several of the drainage channels that are not meeting Standard 5 or meeting standard 5 with problems are first or second order ephemeral, unnamed channels. The rationale for identifying these smaller channels in the LHA, is their potential, cumulative influence on receiving streams, such as the Uncompahgre and Lower Gunnison Rivers, which are under being monitored for suspected impairment from excessive sediment.

Figure 6.3 Ingress/Egress point for Extreme 4 Wheel Trail in LHA Area

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 Roubideau LHA"

Recommendations

Standard 1 Soils

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

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

Finalize the Roubideau LHA area road and trail map, and identify the eroding segments. Combine this map with a map of high erosion risk areas to identify and prioritize areas for road maintenance and management, and identify unnecessary routes that are contributing to soil problems.

Implement more intensive monitoring of OHV use and potential soil surface impacts. The highest priority for monitoring is the extreme 4 wheel drive trails in the ephemeral drainages that are tributary to Dry Creek (Figure 6.2).

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 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 (aggressively implement the Spring Creek/Dry Creek Vegetation Strategy and the Uncompahgre Fire Management Plan).

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

Put into place a comprehensive series of monitoring transects (several per grazing allotment) to track soil cover and plant community changes over time, and to monitor effects of management on Standard 1.

Standard 2 Riparian

Continue to work on the control of tamarisk, knapweed and other invasive exotics that infest riparian communities in the LHA area. Follow a strategic approach to first contain spread then reduce existing infestations by developing a weed management plan. Utilize BLM's existing

partnership with Montrose and Delta Counties to help implement the strategy. Incorporate weed management responsibilities into grazing permits on allotments where BLM has done initial treatment.

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.

If necessary to establish riparian and channel morphology potential under existing flows, construct a grazing exclosure(s) along Roubideau Creek and other streams which were functioning at risk (meeting Standard 2 with problems) to evaluate the degree of grazing impacts and off-road recreation impact on stream channel and vegetation versus effects of the intermittent flow regime.

Complete an updated map of water rights and instream flows within the Roubideau 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.

Evaluate existing cross-fences on streams to determine if these are necessary, and if they are contributing to weed problems along the streams.

Standard 3 Native Plant and Animal Communities

Improve warm and cool season perennial grass and forb cover by adjusting livestock grazing where it is a contributing factor to low cover. 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 Roubideau LHA area road and trail map, and implement more intensive monitoring of OHV use and potential for loss of native plant and animal species, and increase in invasive plants, with the objective of improving road and trail managment. The highest priority for monitoring is the extreme 4 wheel drive trail network in the ephemeral drainages that are tributary to Dry Creek (Figure 6.2).

Reseed fires and similar disturbances with native, adapted species where weed invasion is likely, or the native community is depleted. 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.

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 findings by Eisenhart (2003) and retool mosaic descriptions in the UFO Fire Management Plan (USDI BLM 2002) for natural landscape conditions based on this new data.
2) Where new mosaic objectives are developed, reevaluate existing mosaic versus desired mosaics to develop acreage figure recommendations for treatment.
3) In the Camelback Vegetation Planning subunit's D4/C8 polygon, create about 1,750 more acres of early mid seral stage in 50-200 acre patches, mostly from the later seral stages. In the C6/D2 polygon, allow about 650 acres of early vegetation to advance to early mid seral stage, mostly in patches greater than 20 acres.
4) In the Sandy Wash Unit's C6/D2 polygon, allow about 3,025 acres of the early stage to mature to early mid vegetation, and allow early mid seral to form the matrix. In the B1 polygon, allow about 740 acres of early seral stage to mature to early mid stage, and allow this stage to form the matrix. Break up the late seral patches somewhat so that they do not form large areas of continuous, heavy fuels.
5) Continue to implement the planned projects identified by the Spring Creek/Dry Creek Vegetation Management Strategy to achieve the mosaic objectives. Evaluate impacts from drought and pinyon decline to determine if each project is still needed.

Work with UP, CNHP and academic partners (e.g. Eisenhart and Erie College), to better understand small mammals, herptiles, birds, and predators, their habitat needs and the existing condition of their habitats.

Promote 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 that were developed in the Spring Creek/Dry Creek Vegetation Management Strategy
3) Maintaining support for the Rocky Mountain Bird Observatory to continue with Breeding Bird Survey transects on BLM land

Improve weed management by

1) Continuing to work on the control of tamarisk, knapweed and other invasive exotics that infest native plant communities in the LHA area.
2) Following a strategic approach to first contain spread then reduce existing infestations by developing a weed management plan.
3) Utilizing existing partnership with Montrose County to help implement the strategy
4) Incorporating weed control responsibilities into grazing permits where BLM has initiated weed control. Eliminate spotted knapweed from unit while it is still a small population.

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

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. Establish surveys and monitoring for Mexican spotted owl, Peregrine falcon, good-neighbor bladderpod, and Uinta basin hookless cactus at a minimum. Conduct habitat inventories for yellow-billed cuckoo within the major riparian areas in the LHA area.

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

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:

Assess the condition of all in-channel structures for possible contribution of sediment to local drainages, and repair/reclaim as necessary.

Implement more intensive monitoring of OHV use and potential accelerated levels of sediment. The highest priority for monitoring is the extreme 4 wheel drive trails in the ephemeral drainages that are tributary to Dry Creek (Figure 6.2).

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 on roads 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.

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Appendix 1

Table W1. Low Flow Water Quality - Potter Creek at mouth

Parameter	***Units***	***1983-87 Minimum***	***1983-87 Maximum***	***1983-87 Mean***	***2002-03 * Mean***
Dissolved Solids	ppm	386	657	513	Dry
Conductance	Umhos/cm	530	980	782	Dry
Nitrate	mg/l	0.000	0.170	0.074	Dry
Selenium	mg/l	0.000	0.005	0.001	Dry
Bicarbonate	mg/l	169	277	224	Dry
Carbonate	mg/l	0.0	0.0	0.0	Dry
Sodium	mg/l	39.7	69.0	54.0	Dry
Calcium	mg/l	39	61	50	Dry
Magnesium	mg/l	18	48	36	Dry
Potassium	mg/l	6.2	9.0	8.0	Dry
Chloride	mg/l	7	19	14	Dry
Sulfate	mg/l	131	300	196	Dry
Ammonia	mg/l	0.060	0.800	0.394	Dry
Phosphate	mg/l	0.00	0.10	0.03	Dry
Turbidity	NTU	14	5000	1032	Dry
pH	SU	7.2	8.0	7.7	Dry
Flow	CFS	0.5	6.0	1.8	Dry
Temperature	Celsius	17	25	21	Dry

*Lack of flow in Potter Creek during these years was a result of a region wide, multi-year drought.

Table W2. High Flow Water Quality - Potter Creek at mouth

Parameter	***Units***	***1983-87 Minimum***	***1983-87 Maximum***	***1983-87 Mean***	***2003****
Dissolved Solids	ppm	96	156	115	124
Conductance	umhos/cm	100	205	160	188
Nitrate	mg/l	0.000	2.400	0.515	0.77
Selenium	mg/l	0.000	0.012	0.003	0.000
Bicarbonate	mg/l	49	72	60	64
Carbonate	mg/l	0.0	0.0	0.0	0.0
Sodium	mg/l	1.6	5.2	3.3	5
Calcium	mg/l	13	19	16	25
Magnesium	mg/l	3	8	5	5
Potassium	mg/l	1.2	11.2	3.7	1.5
Chloride	mg/l	1	12	4	6
Sulfate	mg/l	18	27	23	29
Ammonia	mg/l	0.000	0.990	0.476	0.28
Phosphate	mg/l	0.00	0.04	0.02	0.03
Turbidity	NTU	20	150	63	20
pH	SU	6.8	9.0	7.7	7.3
Flow	CFS	44	286	136	50
Temperature	Celsius	5.5	16	9.2	9

* Flow in Potter Creek during 2002-2003 was low due to drought conditions. Flow in 2002 was 1 gpm, data not included in the above data set.

Table W3. Low Flow Water Quality (late summer) – Roubideau Creek above Potter Creek Confluence

Parameter	***Units***	***1983-87 Minimum***	***1983-87 Maximum***	***1983-87 Mean***	***2003****
Dissolved Solids	ppm	391	768	562	Dry
Conductance	umhos/cm	520	1000	818	Dry
Nitrate	mg/l	0.000	0.238	0.099	Dry
Selenium	mg/l	0.000	0.005	0.001	Dry
Bicarbonate	mg/l	177	233	211	Dry
Carbonate	mg/l	0.0	0.0	0.0	Dry
Sodium	mg/l	48.9	126.0	73.8	Dry
Calcium	mg/l	39	78	58	Dry
Magnesium	mg/l	8	31	19	Dry
Potassium	mg/l	4.5	7.2	6.2	Dry
Chloride	mg/l	7	87	54	Dry
Sulfate	mg/l	99	300	163	Dry
Ammonia	mg/l	0.160	1.060	0.615	Dry
Phosphate	mg/l	0.00	0.16	0.04	Dry
Turbidity	NTU	10	3900	856	Dry
pH	SU	7.2	8.1	7.8	Dry
Flow	CFS	0.3	7.5	3.9	Dry
Temperature	Celsius	20	26	23	Dry

Table W4. High Flow (late May-early June) Water Quality – Roubideau Creek above Potter Creek Confluence

Parameter	***Units***	***1983-87 Minimum***	***1983-87 Maximum***	***1983-87 Mean***	***2003****
Dissolved Solids	ppm	88	116	105	124
Conductance	umhos/cm	110	180	145	170
Nitrate	mg/l	0.000	0.460	0.166	0.78
Selenium	mg/l	0.000	0.012	0.004	0.002
Bicarbonate	mg/l	58	73	65	68
Carbonate	mg/l	0.0	0.0	0.0	0
Sodium	mg/l	1.4	6.4	4.3	5.3
Calcium	mg/l	18	24	21	21
Magnesium	mg/l	3	7	4	5
Potassium	mg/l	1.2	9.9	5.8	1.2
Chloride	mg/l	3	9	5	7
Sulfate	mg/l	14	48	30	18
Ammonia	mg/l	0.000	0.490	0.218	0.10
Phosphate	mg/l	0.00	0.13	0.05	0.02
Turbidity	NTU	45	300	128	30
pH	SU	7.5	7.8	7.7	7.4
Flow	CFS	199	414	275	104
Temperature	Celsius	7.5	13	10	12

* Flow in Roubideau Creek during 2002-2003 was low due to drought conditions. Flow in 2002 was 0.4 cfs, and due to lack of ion dilution from snowmelt, data was not included in the above data set.

Table W5. Low Flow (late summer) Water Quality – Dry Creek

Parameter	***Units***	***1983-87 Minimum***	***1983-87 Maximum***	***1983-87 Mean***	***2003-2004* Mean***
Dissolved Solids	ppm	298	620	415	Dry
Conductance	umhos/cm	440	820	593	Dry
Nitrate	mg/l	0.000	0.291	0.110	Dry
Selenium	mg/l	0.000	0.001	0.000	Dry
Bicarbonate	mg/l	148	292	223	Dry
Carbonate	mg/l	0.0	16.9	3.4	Dry
Sodium	mg/l	21.6	70.0	42.1	Dry
Calcium	mg/l	24	75	50	Dry
Magnesium	mg/l	8	33	25	Dry
Potassium	mg/l	2.7	6.0	4.1	Dry
Chloride	mg/l	7	18	12	Dry
Sulfate	mg/l	18	200	95	Dry
Ammonia	mg/l	0.010	1.350	0.598	Dry
Phosphate	mg/l	0.00	0.10	0.03	Dry
Turbidity	NTU	27	260	79	Dry
pH	SU	7.1	8.1	7.7	Dry
Flow	CFS	0.1	6.6	2.4	Dry
Temperature	Celsius	18	21	19	Dry

Table W6. High Flow (late May-early June) Water Quality – Dry Creek

Parameter	***Units***	***1983-87 Minimum***	***1983-87 Maximum***	***1983-87 Mean***	***2003-04 Mean****
Dissolved Solids	ppm	110	162	138	140
Conductance	umhos/cm	120	210	161	200
Nitrate	mg/l	0.000	0.200	0.132	0.635
Selenium	mg/l	0.000	0.012	0.003	0.009
Bicarbonate	mg/l	58	100	75	93
Carbonate	mg/l	0.0	0.0	0.0	0.0
Sodium	mg/l	3.8	7.9	5.4	5.8
Calcium	mg/l	16	22	19	32.5
Magnesium	mg/l	4	9	7	4
Potassium	mg/l	1.0	9.0	3.0	1.6
Chloride	mg/l	2	7	3	5
Sulfate	mg/l	13	48	32	28
Ammonia	mg/l	0.000	1.650	0.610	0.495
Phosphate	mg/l	0.00	0.08	0.03	0.02
Turbidity	NTU	50	310	143	10
pH	SU	7.3	8.9	7.8	7.5
Flow	CFS	112	339	207	16
Temperature	Celsius	7	11	8	16

* Dry Creek high flows during the 2003- and 2004 were well below normal due to drought conditions and may be responsible for elevated levels of some constituents

Table W7. High Flow (late May-early June) Water Quality Monitor Creek

Parameter	***Units***	***2003***	***2004***	***Mean***
Dissolved Solids	ppm	167	374	270.5
Conductance	umhos/cm	270	560	415
Nitrate	mg/l	0.71	0.54	0.625
Selenium	mg/l	0	0	0
Bicarbonate	mg/l	92	217	154.5
Carbonate	mg/l	0	0	0
Sodium	mg/l	9.8	30	19.9
Calcium	mg/l	23	56	39.5
Magnesium	mg/l	12	18	15
Potassium	mg/l	2.9	5.4	4.15
Chloride	mg/l	5	10	7.5
Sulfate	mg/l	54	108	81
Ammonia	mg/l	0.11	0.42	0.265
Phosphate	mg/l	0.09	0.01	0.05
Turbidity	NTU	34	26	30
pH	SU	7.6	7.9	7.75
Flow	CFS	13	2.36	7.68
Temperature	Celsius	13	22	17.5

Table W8. High Flow (late May-early June) Water Quality Spring Creek

Parameter	***Units***	***2003***	***2004***	***Mean***
Dissolved Solids	ppm	161	78	119.5
Conductance	umhos/cm	221	104	162.5
Nitrate	mg/l	0.64	0.78	0.71
Selenium	mg/l	0	0	0
Bicarbonate	mg/l	82	47	64.5
Carbonate	mg/l	0	0	0
Sodium	mg/l	8.5	3.4	5.95
Calcium	mg/l	24	17	20.5
Magnesium	mg/l	9	1	5
Potassium	mg/l	1.8	1.6	1.7
Chloride	mg/l	3	3	3
Sulfate	mg/l	37	10	23.5
Ammonia	mg/l	0.14	0.32	0.23
Phosphate	mg/l	0.01	0.01	0.01
Turbidity	NTU	15	37	26
pH	SU	7.5	7.25	7.375
Flow	CFS	10	25	17.5
Temperature	Celsius	11	13	12

Table V1. Existing vegetation mosaic versus desired vegetation mosaic for major Fire Management Plan and Spring Creek Dry Creek Vegetation Management Strategy polygons in the Roubideau LHA area. 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. 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**
Camelback **D4/C8-Natural Mosaic for East Slope of Unc. Plateau** **15,916 acres**	84	20	20		20	40*	22----------1------8----------66----- **22 9 0 0 66**
Patch Sizes	Early seral patches range from >2-400 acres, and average 23 acres (with most patches under 70 acres), while the prescription calls for most of the early seral to be in 51-200 acre patches. Early mid patches range from >2-35 acres, but the average patch size is around 5 acres (most between 1 and 7 acres), while the prescription calls for most of the early mid to be in 51-200 acre patches. Late mid patches are essentially absent. Late stage makes up the majority of the unit and forms the matrix as called for in the mosaic prescription.						
Camelback **C6/D2-Natural Mosaic for Uncompahgre Valley** **2,827**	15	20	80*	NA	NA	NA	33----------14----------51----- **33 14 0 0 51**
Patch Sizes	Early seral patches range from >2-66 acres, and average 9 acres (most under 20 acres). Early mid patches are >2-24 acres and average around 4 acres (most under 8 acres). Mid and late mid are absent and late forms the matrix. The prescription calls for a matrix of early mid stage with early patches evenly divided between less than 20 acres and more than 20 acres. The prescription does not acknowledge the presence of later stage woodland in this zone, which seems incorrect.						

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**
Sandy Wash C6/D2- Natural Mosaic for Uncompahgre Valley 10,083	84	20	80*	NA	NA	NA	42----------6-----14----------38--- **42 20 0 0 38**
Patch Sizes	Early seral patches range from >2 to 394 acres, and average 20 acres (most under 65 acres). Early mid patches are >2 to 400 acres and average around 18 acres (most under 36 acres). Mid and late mid are absent and late forms the matrix, despite that it is less abundant than other stages. The prescription calls for a matrix of early mid stage with early patches evenly divided between less than 20 acres and more than 20 acres. The prescription does not acknowledge the presence of later stage woodland in this zone, which seems incorrect.						
Sandy Wash B1- Wildland Urban Interface 1,844	15	20	55*	NA	15	10	44---------8------25----------22--- **44 33 0 0 22**
Patch Sizes	Early seral patches range from >2 to 115 acres, and average 16 acres (most under 40 acres). It forms the matrix. Early mid patches are >2 to 126 acres and average around 11 acres (most under 32 acres). Mid and late mid are absent. Late seral patches range from 2 to 31 acres, with an average size of 8 acres (most patches are under 14 acres). The prescription calls for a matrix of early mid stage with early patches evenly divided between less than 50 acres and more than 50 acres, and 80% of the patches <5 acres in the late mid and late stages, with the remaining 20% of these stages in patches from 5-50 acres in size.						
Spring/Dry Creeks Natural Mosaic for Low Elevation PJ-Sage 29,338	40	5	25	10	15*	45*	4--------40----14----------41--- **4 54 0 0 41**
Patch Sizes	Early seral patches range from >2 to 39 acres, and average 6 acres (most under 13 acres). Early mid patches are >2 to over 700 acres and average around 17 acres (most under 71 acres). Early mid forms the matrix at the lower elevations. Mid and late mid are absent. Late seral patches range from 2 to 4,230 acres, with an average size of 34 acres. This stage forms the matrix in the upper elevation. The prescription calls for a matrix of late stages with early patches largely between 6-100 acres, early mid patches mostly between 6-100 acres, and mid stages mostly between 6-100 acres with a few more larger patches.						

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**
Spring/Dry Creeks **Natural Mosaic for High Elevation PJ-Mtn. Shrub** **17,338**	24	5	5	15	15*	60*	17---------18-----26----------38----- **17 18 26 0 38**
Patch Sizes	Early seral patches range from >2 to 322 acres, and average 15 acres (most under 50 acres). Early mid patches are >2 to over 286 acres and average around 16 acres (most under 47 acres). Mid patches range from 2 to 185 acres and average 9 acres, while most are under 16 acres. The late mid stage is absent. Late seral patches range from 2 to 2,550 acres, with an average size of 38 acres. This stage forms the matrix. The prescription calls for a matrix of late stages with early, early mid and mid seral patches mostly over 100 acres.						
Spring/Dry Creeks **Natural Mosaic for Salt Desert** **11,511**	16	20	40*	40*	0	0	12---------27----55----------3----- **12 27 55 0 3**
Patch Sizes	Early seral patches range from >2 to 34 acres, and average 5 acres (most under 11 acres). Early mid patches are >2 to 207 acres and average around 9 acres (most under 28 acres). Mid patches range from 2 to 1,356 acres and average 31 acres, while most are under 153 acres. This stage forms the matrix. The late mid stage is absent. Late seral patches range from 2 to 18 acres, with an average size of 5 acres, and most under 8 acres. The prescription calls for a matrix of early mid and mid stages with early patches evenly divided with half under 20 acres, and half over 20 acres.						

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**
Spring/Dry Creeks **WUI in Low Elevation PJ/Sage** **5,775**	8	30	40	20	10	2----------29----8----------60----- **2 29 8 0 60**
Patch Sizes	Early seral patches range from >2 to 7 acres, and average 4 acres (most under 6 acres). Early mid patches are >2 to 619 acres and average around 15 acres (most under 78 acres). Mid patches range from 2 to 10 acres and average 3 acres, while most are under 5 acres. Late seral patches range from 2 to 465 acres, with an average size of 37 acres, and most under 120 acres, and form the matrix. The prescription calls for a mix of seral stages with no single stage forming the matrix. The majority of early seral is in small patches (<5 acres), early mid evenly divided between patches less than 5 acres in size and patches between 5-50 acres, and mid and late mid patches mostly in that same 5-50 acre size range.					
Spring/Dry Creeks **Sage Grouse Habitat** **3,935**	5	12	65	13	10	2---------76----5----------15--- **2 76 5 0 15**
Patch Sizes	Early seral patches range from >2 to 9 acres, and average 4 acres (most under 6 acres). Early mid patches are >2 to 2,177 acres and average around 166 acres (most under 671 acres). This stage forms a matrix. Mid patches range from 2 to 14 acres and average 4 acres, while most are under 7 acres. Late seral patches range from 2 to 148 acres, with an average size of 10 acres, and most under 32 acres. The prescription calls for a mix of seral stages with no single stage forming the matrix. The majority of early seral is in <20 acre patches, early mid is mostly divided between <20 acre patches and 20-100 acre patches. Mid seral stage is supposed to be distributed similarly, while late seral is mostly in 20-100 acre patches.					