Colona Land Health Assessment
2007-2008

Uncompahgre Field Office - B.L.M.

Land Health Assessment
Colona Area, 2007-2008

SUMMARY

This land health assessment evaluated over 56,000 acres of public land. The evaluation resulted in a determination of the acreage meeting Colorado BLM's Rangeland Health Standards, the acreage not meeting, and the nature and location of the problems on the landscape. A small amount of the landscape area was not evaluated due to inaccessibility, or because it was located on ecological sites which were not commonly occurring in the area. The following table and chart show the amount of land meeting or not meeting the Standards.

Acres Meeting Standards 1, 3,& 4	**Acres Not Meeting Standards 1,3,& 4**	**Acres Unknown Or N/A**
43,953 (78%)	7,084 (13%)	5,090 (9%)
Stream Miles Meeting Standards 2&5	**Stream Miles Not Meeting Standards 2&5**	**Stream Miles Unknown or N/A**
34.5 (78%)	9.2 (11%)	0.5 (1%)

In order to make the above determination, the Colona 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)	39,754 (71%)	8,864 (16%)	2,394 (4%)	5,114 (9%)
Standard 2-Riparian (miles) Non-ephemerals	14.7 (58%)	5.5 (22%)	3.6 (14%)	1.5 (6%)
Standard 3-Healthy Communities (acres)	17,334 (31%)	29,220 (52%)	4,459 (8%)	5,114 (9%)
Standard 4-T&E Species (acres)	18,052 (32%)	29,918 (53%)	2,234 (4%)	5,114 (9%)
Standard 5-Water Quality (miles) All streams	22.2 (50%)	16.4 (37%)	5.6 (13%)	0 (0%)

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

Major Land Health Problems

Standard 1 Soils: Soils across a large part of the area met Standard 1 with no problems. A small but significant area had some soil problems, but still met Standard 1, while less than 9% of the area did not meet this standard. Soil erosion was clearly accelerated above natural levels in a few areas, with gully erosion the most prominent erosion type, and this was most pronounced on adobe soils at lower elevations near to developed lands. A significant portion of the Colona Area is at increased risk of soil erosion because of low cover of plant basal area protecting the soil surface. Low litter cover—which increases the likelihood of erosion—was found at localized sites, as were high levels of bare soil.

Standard 2 Riparian Areas: The majority of stream miles fully met this standard, and exhibited healthy riparian vegetation, and normal channel morphology and hydrologic processes. Around 36% of streams had some riparian vegetation or channel problems ranging from minor to significant, and mostly related to altered flow stemming from the Uncompahgre Valley's extensive water management systems and extensive weed infestations.

Standard 3 Healthy Native Communities: A minority of areas (31%) fully met this standard. A little over half of the unit had minor problems, and about 8% of the unit had significant problems. The most common problems involved prevalence of exotic plant species and noxious weeds throughout much of the area. Cheat grass was a particularly widespread exotic species in the LHA area. Other significant problems included a lack of perennial forbs, and low levels of cool and warm season grasses. Heavy hedging on shrubs by browsing animals was a widespread problem, although shrubs were maintaining a reasonable level of vigor across most of the unit. Problems with the existing vegetation mosaic are present in many parts of the unit as well.

Standard 4 Special Status Species: Approximately 30% of the upland areas met this standard, and half met with problems. An additional 45 of the area was found to be not meeting this standard. Common habitat problems included excessive weed and exotic plant cover, low plant diversity, low cover of perennial vegetation, poor vigor of native shrubs, and overbrowsing of some shrubs by wildlife and livestock. There was inadequate data for some sensitive species—particularly animals--and recommendations are made to address this data gap.

Standard 5 Water Quality: Half of the streams and drainages in the Colona Area fully met this standard. The remaining 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, which may ultimately violate Colorado Clean Water laws and regulations.

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

Standard 1 Soils

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

Develop complete road map, use GIS to identify road-caused soil loss, and use to direct road maintenance and rehab areas so that road and travel related erosion is reduced. Complete RMP amendment to limit travel to existing routes. Pursue route designation to further limit road-

related damage to soils.

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

Re-introduce fire or simulate its effects on some sites that are losing herbaceous vegetation cover so that communities with more herbaceous plants and higher plant basal area can be established. Reseed erosion-prone disturbances such as natural fires.

Investigate cheatgrass control options, experiment with different methods.

Implement monitoring system that will address trends in soils indicators.

Standard 2 Riparian

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

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

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

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

Standard 3 Native Plant and Animal Communities

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

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

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

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

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

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

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

Restore seriously degraded plant communities.

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

Develop complete road map, use GIS to identify road-related habitat and weed problems, and use to direct road maintenance and rehab areas. Complete RMP amendment to limit travel to existing routes. Pursue route designation to further limit road-related damage to vegetation and to control the spread of weeds.

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

Standard 4 Special Status Species:

Improve monitoring and inventory data for prairie dog colonies, evaluate sites for black-footed ferret habitat potential.

Work with CDOW, CNHP, and other partners to improve information, improved monitoring methodologies and best management practices for special status species in the area

Restore historic sagebrush communities near Simms Mesa and other potential habitat for Gunnison sage grouse populations. Continue to assess the potential for increasing the amount of sage grouse suitable habitat within the unit.

Monitor recreation, grazing, weeds and other impacts on clay-loving wild buckwheat and habitat: close roads and trails in critical areas.

Monitor site conditions and trends for Canada lynx, and install permanent vegetation transects for this purpose.

Expand baseline data for raptor nests, habitats, and territories.

Implement BLM surveys, monitoring and habitat inventories for yellow-billed cuckoo, Colorado desert parsley, and Rocky Mountain thistle.

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

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

Plant native mountain shrubs to restore degraded stands where feasible, include wildlife exclosures where necessary.

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

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

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

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

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

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INTRODUCTION AND BACKGROUND

Overview

The Colona Land Health Assessment (LHA) area is located in Montrose and Ouray Counties in west-central Colorado (Figure 1.1). The LHA area is primarily centered around the southern end of the Uncompahgre Valley. From the stretch of Highway 50 that heads east of Montrose, the LHA unit extends south, nearly to the town of Ouray. To the east, it is bounded by the Cimarron River and the National Forest boundary along Cimarron Ridge. The unit is bounded to the west by private lands and the National Forest boundary on the Uncompahgre Plateau (see Figure 1.2). Towns in the area include Montrose, Colona, Ridgway and Ouray. The unit encompasses nearly 335,000 acres within its boundary, although BLM lands are nearly absent from some portions of the unit. It is made up of parts of five Level 5 watersheds: Cow Creek, Spring Creek/Happy Canyon/Dry Cedar, Upper Uncompahgre River, Cimarron River, and Beaton/McKenzie Creeks. The unit was identified in 1998, prior to the directive to base units on fifth order watershed boundaries. However, it is centered in the southern part of the Uncompahgre Field office, and largely fits within the Uncompahgre River Watershed--thereby forming a large and cohesive landscape "chunk".

Land Ownership Pattern

The Colona Land Health Assessment boundary encompasses about 335,000 acres of which 56,127 acres are public land. These public lands are distributed across the area in dispersed blocks and several isolated parcels. The BLM is broken up by large areas of private land which are mainly concentrated where soils and topography are suitable for agriculture or ranching. National Forest Lands also occupy some of the higher elevation areas (see Fig.1.2).

BLM Resource Management Plan Guidance

All public lands in the unit are covered by the Uncompahgre Basin Resource Management Plan (RMP, USDI BLM 1989), as shown in Figure. 1.3. The area falls into six main RMP management emphasis units. The largest emphasis unit in the LHA area is livestock grazing. Forestry is the primary emphasis behind much of the BLM land in the western part, while deer and elk winter range protection is the focus for the majority of land in the central and southern part of the unit. Elk calving is the priority for lands in the eastern portion of the unit. Some of the isolated BLM tracts which are difficult to access fall into the general management unit. The Fairview Research Natural Area is a small parcel of BLM set aside for rare plant protection in the northern part of the unit.

Grazing Allotments

There are 28 grazing allotments in the Colona LHA unit and allotment name, number, class of livestock, season of use and federal acres are depicted in Table 1.1. Non-adjudicated allotments are depicted in the table with an asterisk. See Figure 1.4 for a map of allotments and location within the Colona LHA area.

Table 1.1 Grazing Allotments and Management.

Allotment Name and Number	Class of Livestock	Season of Use	Federal Acres per Allotment	AUMs	Acres per AUM
Lower Horsefly (05520)	Sheep	Spring-Winter	6,040	307	20
Shinn Park/South Canal (05534)	Sheep	Winter	5,690	288	20
Dry Cedar (05537)	Sheep	Winter/Spring	4,768	360	13
Waterdog Basin (05546)	Cattle	Summer	400	34	12
Cedar (05570)	Cattle	Summer/Fall	1,525	226	8
Rock Ditch (05538)	Cattle	Fall	56	9	6
Simms Mesa (05519)	Sheep	Summer or Fall/Winter	9,657	450	22
*Government Springs (05508)	Cattle	Spring	2,170	125	17
Washboard Rock (05548)	Cattle	Summer/Fall	940	34	28
Dry Gulch (05540)	Cattle	Spring or Fall	5,221	250	21
*Tinkler Individual (05530)	Cattle	Spring/Summer	1,319	20	66
Log Hill (05529)	Cattle	Spring/Summer	3,778	189	20
Horsefly (05523)	Cattle	Summer/Fall	240	12	20
Chaffee Gulch (05528)	Cattle	Summer/Fall	666	106	6
Baldy (05568)	Cattle	Summer	560	88	6
Moonshine Park (05563)	Cattle	Summer/Fall	232	7	33
Hairpin (05569)	Cattle	Summer	500	18	28
Cedar Creek (05035)	Cattle	Spring	160	6	27
Slagle pass (05547)	Cattle	Summer/Fall	357	30	12
*Onion Lakes (05533)	Cattle	Summer	460	30	15
Burro Ridge (05532)	Cattle	Spring/Summer	200	15	13
Tommy Creek (05565)	Cattle	Spring/Summer	120	3	40
Taylor Draw (05555)	Cattle	Spring/Summer	480	15	32
Cow Creek (05566)	Cattle	Summer	520	70	8
Hillside (05562)	Cattle	Summer/Fall	120	40	3
Tappan Creek (05575)	Sheep	Spring	273	18	15
*Duckett Draw (05524)	Cattle	Spring	280	6	47
High Park (05549)	Cattle	Summer	1,620	60	27
Totals			**48,352**	**2,816**	
Averages				**100**	**17**

Figure 1.1 Colona LHA general location map.

Figure1.2 Colona LHA land ownership.

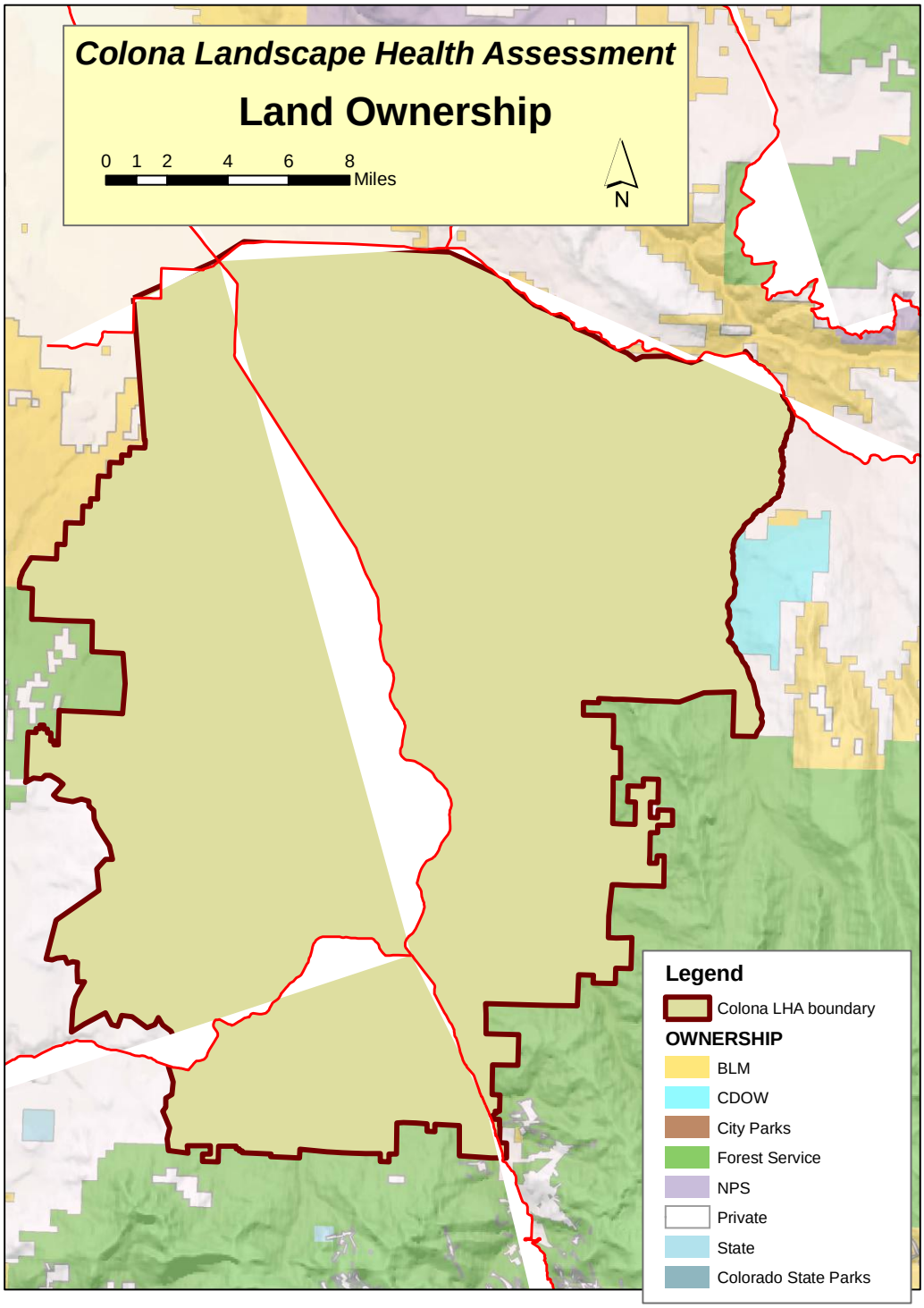


Figure 1.3 Colona LHA land management designations from the Uncompahgre Basin Resource Management Plan. Non-BLM lands appear as tinted white.

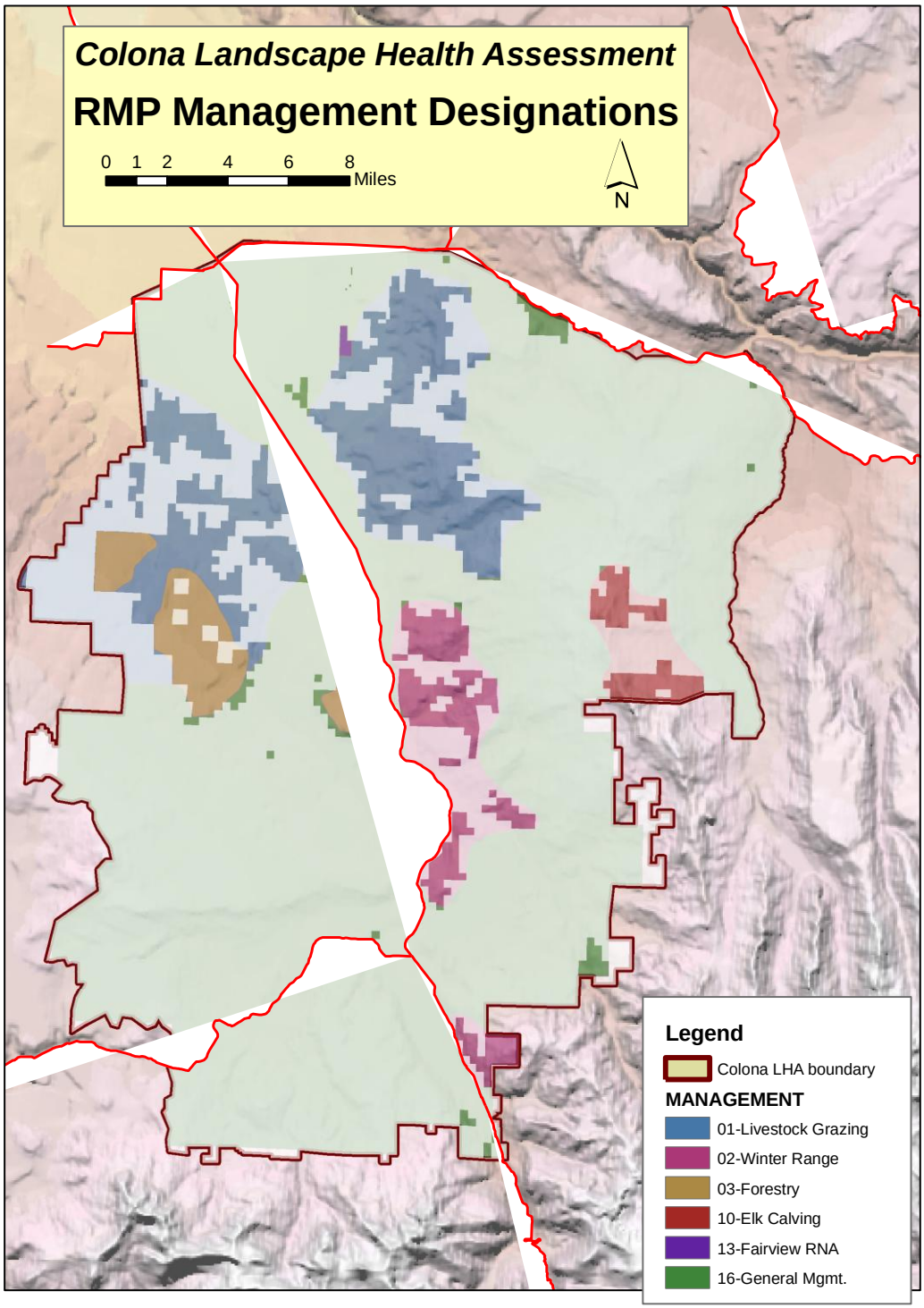
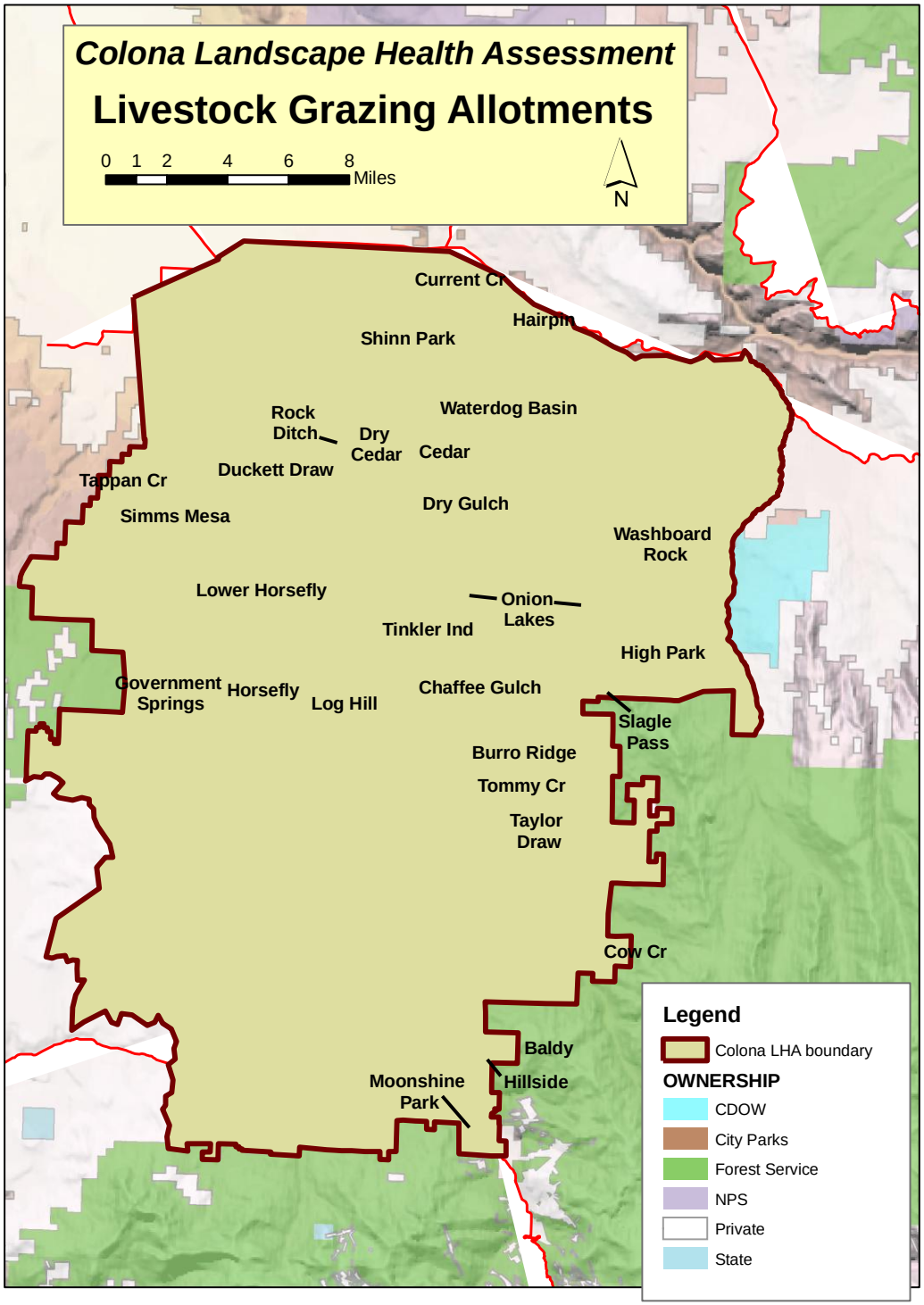


Figure 1.4 Colona LHA Area grazing allotment boundaries. Private portions of allotments appear as tinted white, unalloted BLM as brown.



Landform and Topography

Elevations range between 5,800 feet in the northern part of the unit near the town of Montrose to 11,200 feet in the eastern part of the unit (Figure 1.5). The Uncompahgre River has carved the large Uncompahgre Valley which characterizes this unit. The valley is located between the Northern San Juan Mountains to the south, the Cimarron Ridge to the east, and the Uncompahgre Plateau to the west. Smaller mesas, including Log Hill and Sims Mesa, subdivide the larger Uncompahgre Plateau. Miller Mesa lies in the foothills of the Northern San Juans. Small peaks and buttes like McKenzie Butte, Storm King, Waterdog Peak and Coal Hill surround the Uncompahgre Valley (Figure 1.6). Because of variety of landforms, slopes in the LHA unit range across the spectrum from flat valley bottoms to sheer escarpments.

Geology

The LHA is located in the Colorado Plateau physiographic province in the vicinity of the Uncompahgre Plateau and the San Juan Volcanic Field. The area is typical of Colorado Plateau geology: gently dipping sedimentary rocks, altitudes exceeding 5,000 feet, the climate is semi-arid to arid, erosion has produced innumerable escarpments and structural benches and relief is the result of the incision of deep canyons below moderately flat terrain.

The primary formations that outcrop in the area are Cretaceous sedimentary formations, Tertiary volcanic ash flows and igneous rocks and quaternary deposits. The Cretaceous rocks consist of the Mancos Shale, Dakota sandstone, Mesaverde, Fruitland and Cimarron Ridge Formations. The Cretaceous rocks outcrop on the western half of the LHA. The Tertiary rocks consist of welded ash flows, lava flows, mud-flow breccias and intrusive rocks. The Tertiary rocks outcrop on the eastern half of the LHA. The quaternary deposits consist of alluvium, colluvium and landslide deposits primarily of glacial origin deposited by Pleistocene (Ice Age) glaciers as well as terrace and alluvial stream deposits.

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

A portion of the LHA lies in the Cimarron coal field, with no commercial deposits of coal. Coal has been used for local, domestic purposes in the past. The main coal beds within this area are found in the Upper Cretaceous Fruitland Formation. Natural gas has been found in most of the sedimentary formations occurring in Colorado, but there are no exploration or producing oil and gas wells in the LHA at this time. Other mineral resources in the LHA are sand and gravel, dimension stone and clay.

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

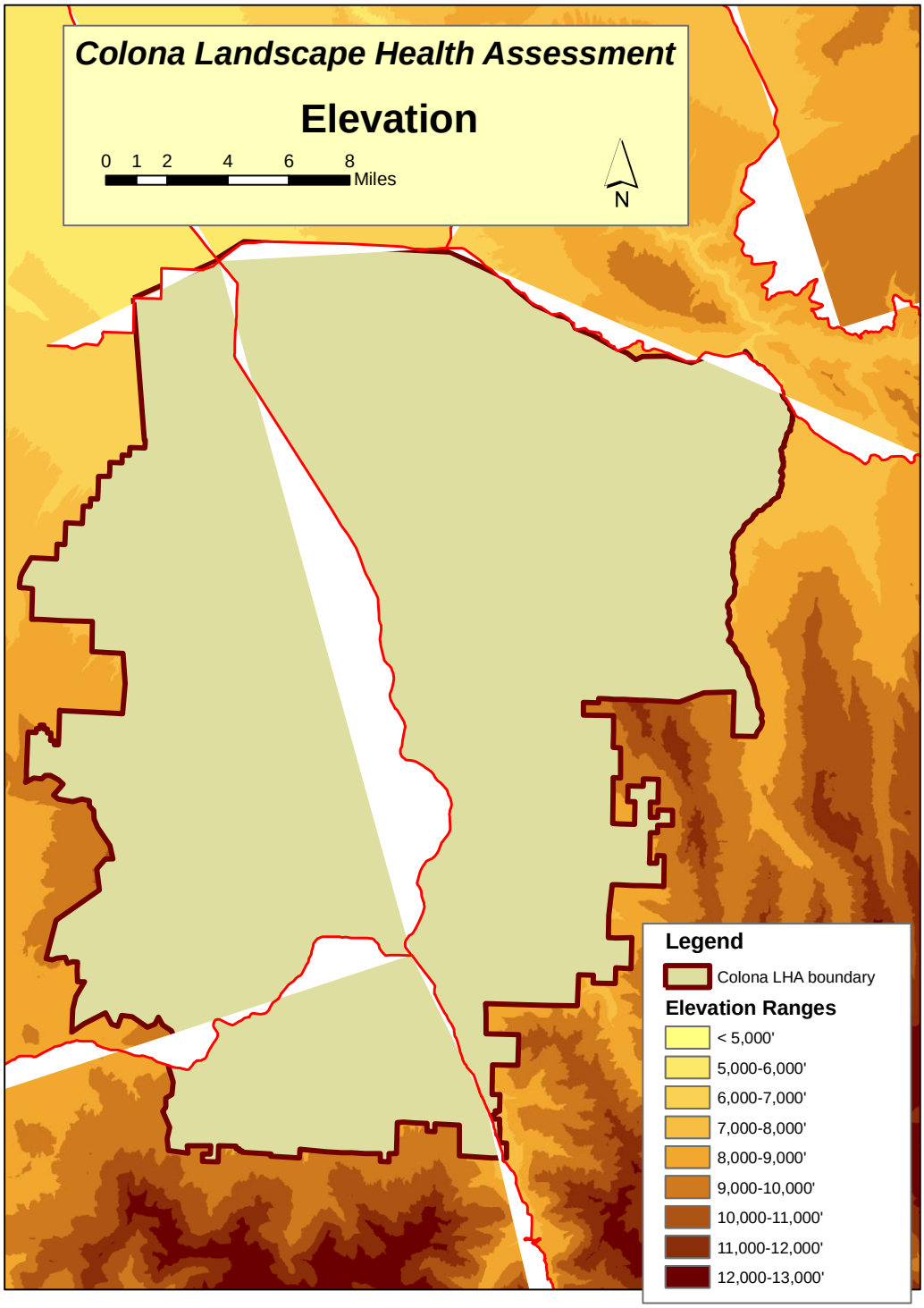


Figure 1.6 Colona LHA Area slopes and landforms. (From 30 meter Digital Elevation Model, US Geological Survey).

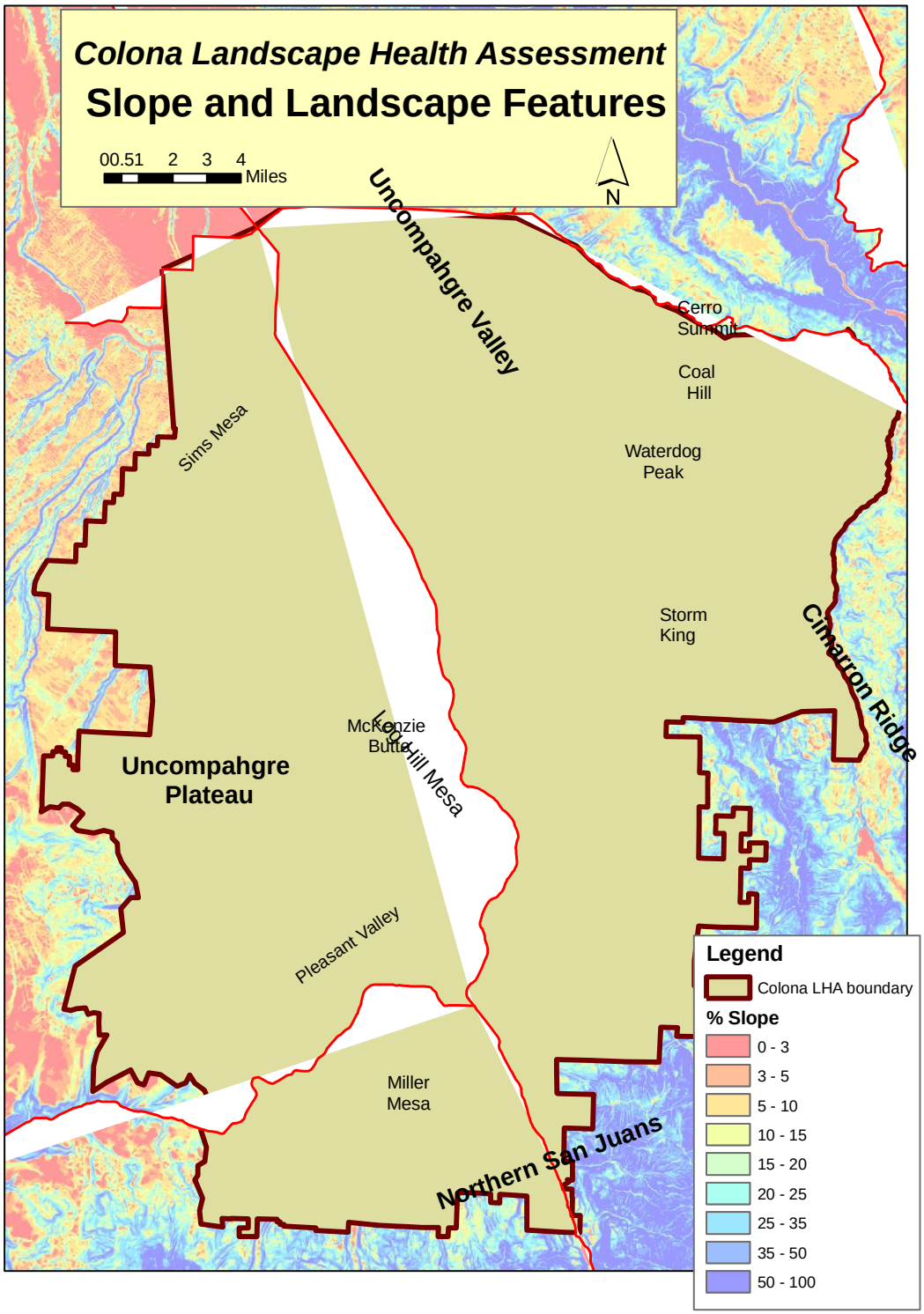
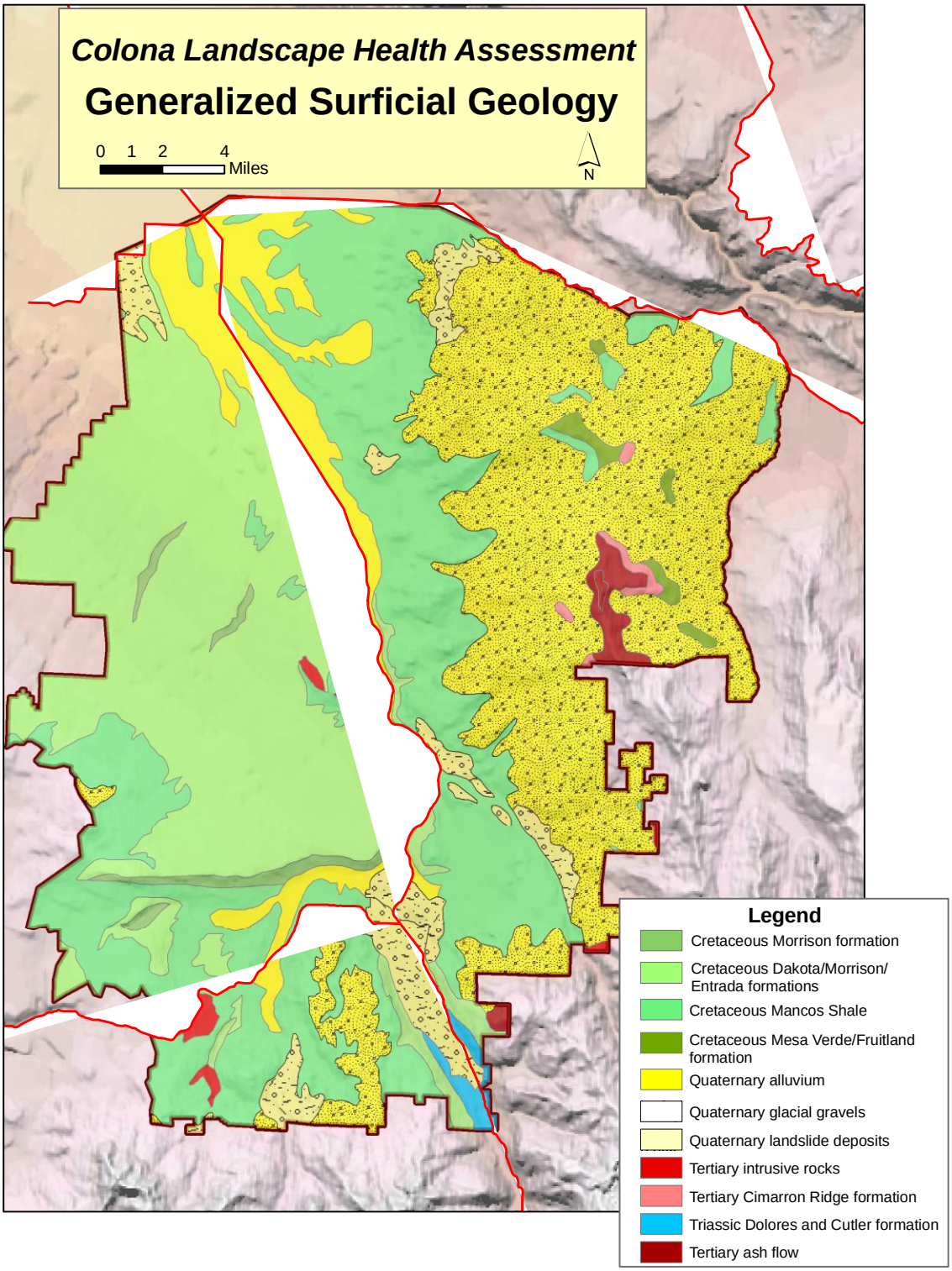


Figure 1.7 Surficial geology of the Colona LHA area.



Soils

Soils on public lands in the LHA area reflect the diverse geology and climate of the area. The soils are described in detail in the Ridgway Soil Survey (UDSA NRCS 2007.) The soil units which have been mapped to date in the LHA area are listed and described in Table S1 in the Appendix of this document, and are shown in Figure 1.8. A portion of the LHA area is not yet mapped, and is shown as a blank area on the map. The soils at the lower elevations of the LHA area are dominated by soils classified in the orders of Aridisols and Entisols. These soils have limited development from their parent material due to low climatic intensity, and have a limited potential for plant establishment and growth. At the higher elevations of the LHA area the soils are in the orders of Mollisols and Alfisols. These soils have a higher degree of development with distinct horizons in the soil profile. Surface soil horizons are typically darkened by accumulations of organic matter. The potential for vegetation production on these higher elevation soils is much greater than the lower elevation soils.

Soil resource issues the resource staff was aware of prior to the LHA evaluation include: insufficient plant cover and composition to protect the soil surface from accelerated erosion, the occurrence of incised drainages which often result from accelerated upland runoff, and poorly located and maintained roads that are commonly a source of erosion and concentrated runoff. Several vegetation treatments have also been implemented within the LHA area that have resulted in higher than normal levels of plant and litter cover on the soil surface.

Vegetation

At least 31 distinct vegetation classes occur at significant levels on BLM land in the landscape unit (Figure 1.9). These are tied to soil type as well as elevation and precipitation. Of the 31 classes, 14 cover substantial acreage, or are otherwise notable within the LHA unit.

The drainages with intermittent or perennial water contain riparian vegetation, which is most prevalent where there is reliable or augmented flow of water. On BLM these include the Uncompahgre River, and Cow, Flume, Dry Cedar, High Park, Coal, and Horsefly Creeks, along With Happy and Dolores Canyons. Small pockets of riparian vegetation are also present along some of the ephemeral drainages.

Within the broad category of riparian vegetation are many distinct, interwoven plant communities. Among the most widespread are communities dominated by narrowleaf cottonwood (*Populus angustifolia*) and distinguished by various associated shrubs and trees including thinleaf alder (*Alnus tenuifolia*), blue spruce (*Picea pungens*), Douglas fir (*Pseudotsuga menziesii*), sandbar willow (*Salix exigua*), skunkbush sumac (*Rhus trilobata*), Wood's rose (*Rosa woodsii*) and red osier dogwood (*Cornus sericea*). Some willow dominated communities are also present, with sandbar willow occurring alone or in combination with strapleaf willow (*Salix ligulifolia*). Peachleaf willow (*Salix amygdaloides*) is also present in isolated areas. Thinleaf alder forms a somewhat common community alongside the water's edge along many streams. On some of the higher stream terraces shrub-dominated communities including skunkbush sumac and silver buffaloberry are found. Small pockets of scouringrush horsetail (*Equisetum hyemale*) can also be found at lower elevations. Ephemeral and lower elevation drainages are often dominated by the alien tamarisk (*Tamarix chinensis*), and black greasewood (*Sarcobatus vermiculatus*). Detailed descriptions of these communities can be found in the Field Guide to the Wetland and Riparian Plant Associations of Colorado (Colorado Natural Heritage Program 2003).

Figure 1.8 Soils of the Colona Area (From Draft Ridgway Soil Survey NRCS 2007).

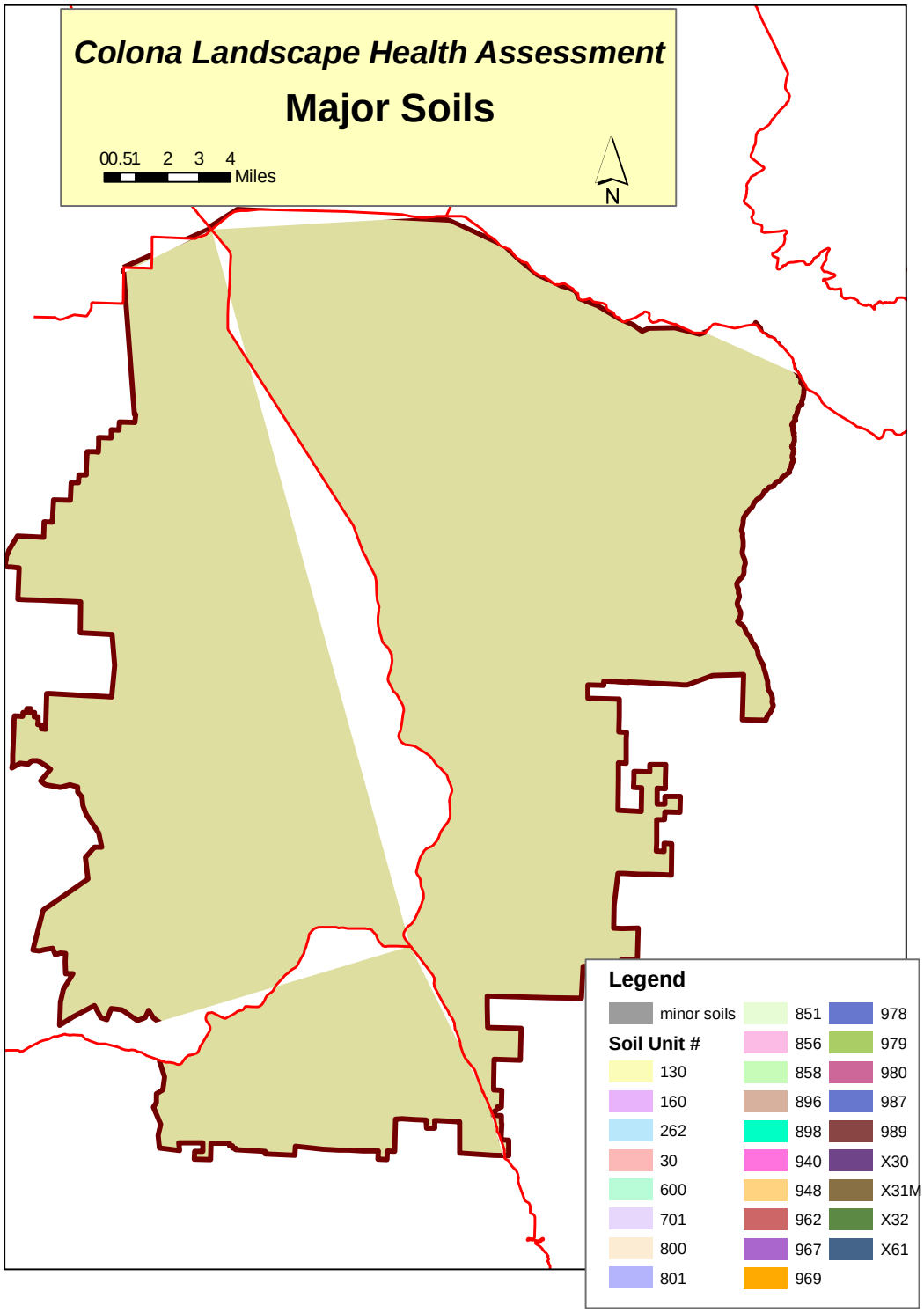
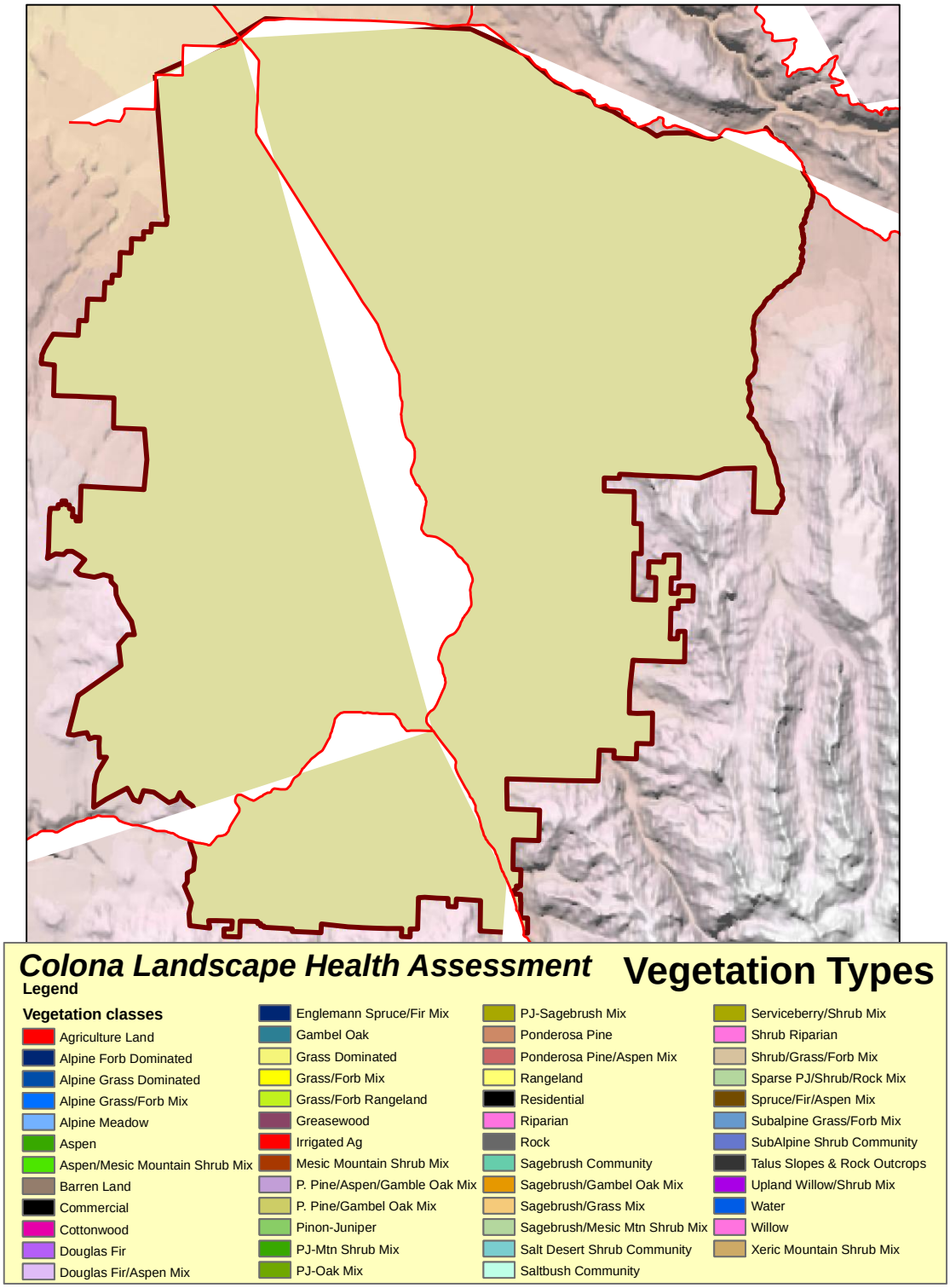


Figure 1.9 Colona LHA Area vegetation classes derived from 1993 Landsat Imagery.



The drought tolerant vegetation classes described as saltbush and salt desert shrub communities occur at the lowest elevations of the LHA unit, and are found on saline soils derived from Mancos shale. These communities include the following shrubs: shadscale (*Atriplex confertifolia*), Gardner saltbush (*Atriplex gardneri*), mat saltbush (*Atriplex corrugata*), black greasewood, four-wing saltbush (*Atriplex canescens*), black sagebrush (*Artemesia nova*), winterfat (*Krascheninnikovia lanata*), snakeweed (*Gutierrezia sarothrae*) and prickly pear cactus (*Opuntia polycantha*) in varying amounts. Native grasses including western wheatgrass (*Pascopyrum smithii*), galleta grass (*Pleuraphis jamesii*), bottlebrush squirreltail (*Elymus elymoides*), Salina wildrye (*Leymus salinus*) and Indian ricegrass (*Achnatherum hymenoides*) are found on better condition sites. Many different forbs occur, but some of the most common are wild buckwheats (*Eriogonum* spp.), death camas (*Zigadenus venenosus*), and biscuitroots (*Lomatium* and *Cymopterus* spp.) Frequently, weedy exotic species are also present. Clasping pepperweed (*Lepidium perfoliatum*), filaree (*Erodium cicutarium*), burr buttercup (*Ceratocephala testiculata*), cheatgrass (*Bromus tectorum*), spreading wallflower (*Erysimum repandum*) and European madwort (*Alyssum simplex*) are among the most common.

With increasing elevation and precipitation, saline soils diminish, and the salt-adapted communities grade into the pinyon-juniper woodland class on rocky, steeper soils and the pinyon-juniper/sagebrush mix, sagebrush community, and sagebrush/grass mix classes on less rocky soils. The pinyon-juniper woodland is dominated by Utah juniper (*Juniperus osteosperma*), with Colorado pinyon (*Pinus edulis*) in some areas. There is typically a sparse and variable understory that may contain remnant shrubs like Wyoming big sagebrush (*Artemesia tridentata wyomingensis*), birchleaf mountain mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchior utahensis),* snakeweed, yucca (*Yucca harrimaniae*), potato cactus (*Opuntia fragilis*), muttongrass (*Poa fendleriana*), and bottlebrush squirreltail. The sagebrush community is dominated by Wyoming big sagebrush or black sagebrush. Frequently snakeweed or four-wing saltbush is a secondary shrub in these communities, and there is an understory of the same native grasses found in the saltdesert shrub zone, with the addition of Sandberg bluegrass (*Poa secunda*). Primary forbs in the area are western tansymustard (*Descurainia pinnata*), scarlet globemallow (*Sphaeralcea coccinea*), and numerous species of *Penstemon, Arabis, Astragalus, Lomatium, Erigeron,* and *Machaeranthera*. Nonnative forbs are widespread with filaree and burr buttercup among the most common. Nonnative grasses are very common with cheatgrass almost ubiquitous, and crested wheatgrass persisting in areas where it has been seeded.

In some areas, woodland (mainly juniper) occurs together with sagebrush at a higher level of canopy cover. These may be successional stages that follow fire or other major natural disturbance. Some fire scars of varying ages are evident in parts of the LHA unit. Grass-forb rangeland and grass dominated communities are also present in isolated areas in this zone. They contain the forb and grass species listed above, and are often the result of fire, mechanical treatment implemented to open the woodland canopy, or they occur on small inclusions of soil which are not suitable for tree or shrub growth.

At higher elevations the PJ/mountain shrub mix, mesic mountain shrub mix, sagebrush-mesic mountain shrub mix, PJ/oak mix, and Gambel oak classes are found. The pinyon-juniper community contains birchleaf mountain mahogany (*Cercocarpus montanus*), Utah serviceberry (*Amelanchior utahensis),* and Gambel oak (*Quercus gambelii*). With increasing elevation, Utah

juniper and pinyon trees drop out of the community, and the mountain shrubs dominate the vegetation. In some areas Gambel's oak forms almost closed stands. Rocky Mountain juniper (*Juniperus scopulorum*) is present in some areas, while black chokecherry (*Prunus virginiana*) is found on more mesic sites intermixed with the other mountain shrubs. Roundleaf snowberry (*Symphoricarpos rotundifolius*) is common throughout most of these communities. Where there are openings between the typically dense shrub canopies, or in areas where the canopy is significantly above the ground surface, a productive understory of forbs and grasses exists. Commonly found species include elk sedge (*Carex geyeri*), Letterman's needlegrass (*Acnatherum lettermanii*), Kentucky bluegrass (*Poa pratensis*), muttongrass, Sandberg bluegrass, bottlebrush squirreltail, western wheatgrass, and nodding brome (*Bromus anomalus*). Forbs are numerous with many species. The most widespread and dominant include western yarrow (*Achillea millefolium*), lupine (*Lupinus* spp.), biscuitroot (*Lomatium* spp.), and aspen peavine (*Lathyrus lanzwertii*).

At the very highest elevations and in mesic drainages the Aspen, Douglas fir, and Spruce-Fir vegetation classes are found on BLM. The understory in the Douglas fir (Pseudotsuga menziesii) community is generally sparse but contains many of the same grasses and forbs found in the mountain shrub communities. The aspen (*Populus tremuloides*) understory typically contains snowberry and often black chokecherry, with a very productive understory of the grasses and forbs found with the mountain shrubs, in addition to mountain brome (*Bromus marginatus*), Thurber fescue (*Festuca thurberi*), and slender wheatgrass (*Elymus trachycaulus*). The spruce-fir type contains Engelmann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*), and has an understory typically dominated by whortleberry (*Vaccinium myrtillus*) and arnica (*Arnica cordifolia*)

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

In addition to the non-native species listed above, state listed noxious weeds are scattered in still isolated infestations across the unit. Russian knapweed (*Acroptylon repens*) and hoary cress (*Cardaria draba*) are the most common in disturbed areas at lower elevations. Tamarisk (*Tamarix chinensis*) is present in some of the lower elevation drainages while Oxeye daisy (*Chrysanthemum leucanthemum*) is found along perennial streams and high elevation meadows. Absinth wormwood (*Artemisia biennis*) a state listed "B" weed is found in Ouray County and along some stretches of roads going through BLM. Diffuse knapweed (*Centaurea diffusa)* and Yellow starthistle (*Centaurea solstitialis*), a state "A" listed weed, are found in an isolated area below the Buckhorn lake road. Houndstongue (*Cynoglossum officinale*) and Canadian thistle (*Cirsium arvense*) are found in some areas in the mountain shrub vegetation type, and a few small populations of musk and bull thistle (*Carduus nutans* and *Cirsium vulgare*) are present in old woodcuts and vegetation treatments.

Prior to the land health assessment, the UFO staff considered the extent of noxious weeds and invasive species to be a substantial vegetation problem in the area. Partly due to this, BLM has seeded all vegetation treatments and disturbances to provide competition against weeds, and is working with Montrose County to control some of its noxious weed infestations as well, but treatment has not been comprehensive. The staff also believes that fire suppression, past fires with poor rehab success, heavy winter wildlife use and historic grazing (pre-FLPMA) have

impacted the vegetation, leading to age class distribution and browse plant condition problems. Many vegetation treatment projects have taken place in this unit. These have been driven largely by the desire to reduce fire fuels in urban interface zones as well as by the declining conditions of browse stands. Treatment objectives have been to reduce tree cover and density in small patches to break up fuel continuity. A secondary outcome is an improvement in overall shrub vigor and productivity. A concern over low levels of desirable grasses and forbs has also been addressed by seeding these habitat projects with native and some nonnative seed.

Wildlife

General: The Colona LHA area supports a great diversity of upland, riparian, and aquatic wildlife species. Common species, other species of interest, and their habitats are listed below in Table 1.3. Some species are year-long residents while others are migrants. A variety of small mammals, birds, and herptiles occur throughout the unit where habitat is suitable. Habitat in the Colona area varies based on precipitation, elevation, topography, slope, aspect, geology, soils,

Table 1.3. A list of Colona Area most common or noted terrestrial wildlife species, groups of species, their occurrence, and basic habitat types in which they are found.

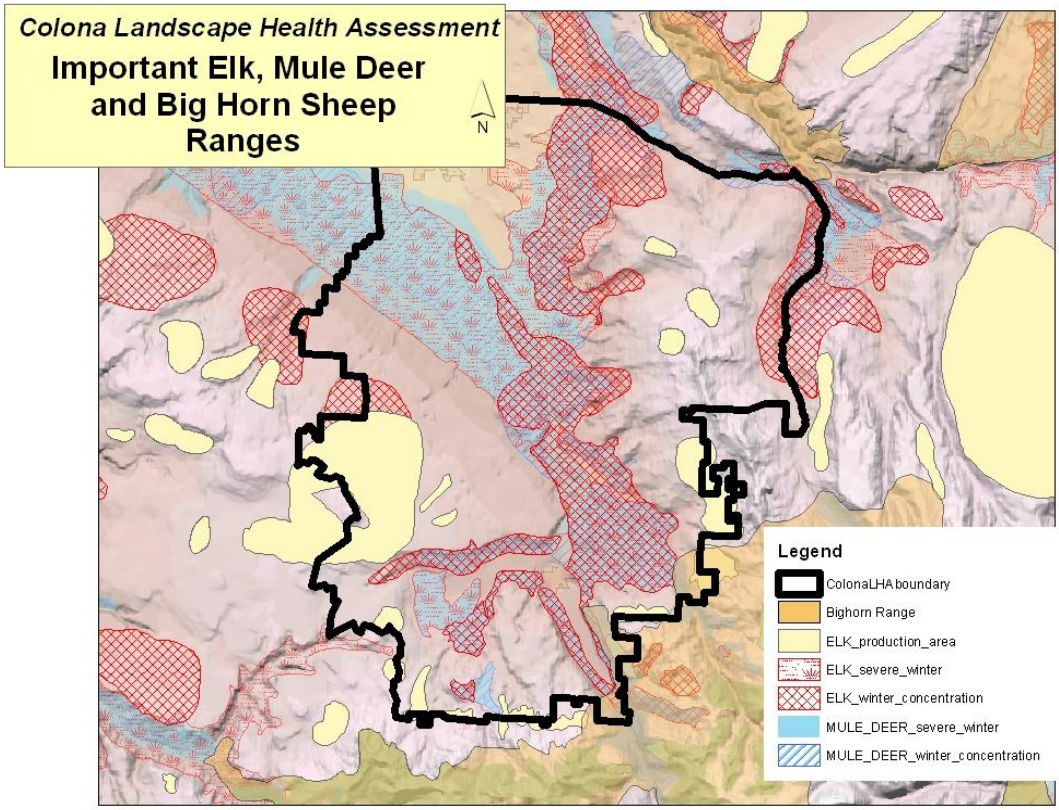
Species (Common Name)	Habitat Type	Occurrence
Mule deer	Mixed conifer/Douglas fir and spruce-fir, aspen/mesic mountain shrub mix, alpine meadow, pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland.	Common, year-long with seasonal altitude and habitat type variation
Elk	Mixed conifer/Douglas fir and spruce-fir, aspen/mesic mountain shrub mix, alpine meadow pinyon-juniper, oak-mountain shrub, riparian, sagebrush, grassland.	Common, year-long with seasonal altitude and habitat type variation
Bighorn Sheep	Canyon benches, mesa tops, and valley bottoms	Uncommon, may be present in the Baldy Peak and Portland areas.
Cougar	All types, mostly along rim-rock areas.	Common, year-long
Bobcat	All types	Uncommon, year-long
Canada lynx	Mixed conifer/ Douglas fir and spruce-fir, aspen/mesic mountain shrub mix, riparian, alpine meadow	Rare, year-long
Coyote	All types	Common, year-long
Jackrabbit, White-tailed	All types	Infrequent, year-long
Cottontail, Mountain	All types	Common, year-long
Porcupine	Pinyon-juniper, riparian	Common, year-long
Prairie Dog (White-tailed)	Sagebrush, desert shrub	Common, year-long
Raptor; Eagles, Hawks, Falcons.	All types	Common, year-long
Merriam's Turkey	Riparian forests, pinyon-juniper, oak-mountain shrub	Riparian communities and PJ in the winter and oak-mtn shrub spring and fall.
Blue grouse	Oak/Serviceberry	Common, year-long
Chukar	Salt desert	Uncommon, year-long
Neo-tropical birds	All types	Common, warm season
Small mammals	All types	Common, year-long
Amphibians-Reptiles	All types	Common year-long
Bats	All types	Common, mostly warm season

and other variables. The vegetation section of this report provides an apt description of most wildlife habitats that occur in the area of interest.

Big Game: Mule deer and elk are probably the most recognized wildlife species that occur in the LHA area due to their historic prominence in the ecosystem and their high social and economic value in the region. Both species use the Colona LHA area year-round with changes in distribution and habitat selection between warm and cold seasons. The intensity of use by each species varies widely from year to year and is controlled primarily by population size and the timing and amount of snowfall. During most winters, mule deer and elk use the same areas. Elk tend to dominate food resources where winter ranges overlap.

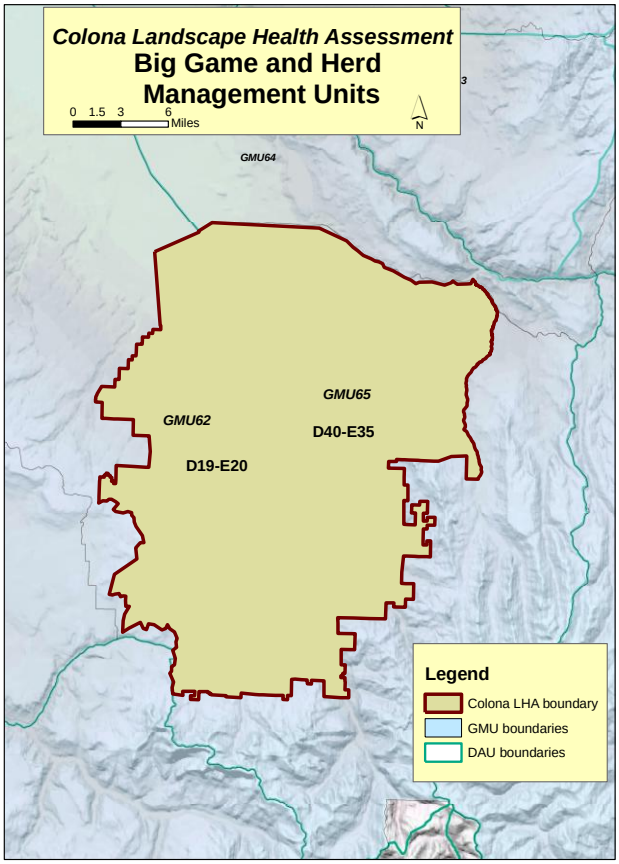
The Colorado Division of Wildlife (CDOW) has classified most of the central, lower altitude portions of the LHA as elk winter range. Elk severe winter range and winter concentration areas occur east of State Highway 550 and south of State Highway 50, extending south to the towns of Uncompahgre and Colona at which point they tend to follow and overlay the Highway 550 corridor. Smaller patches of severe winter range border the south and north of County Road 62 west of Ridgway and the Happy Canyon area west of the town of Colona. Mule deer winter range overlaps elk winter range and approximates that of elk except deer range more widely to the west of Highway 550 south of Montrose. Figure 1.10 shows areas identified by CDOW as severe winter range and winter concentration areas for elk and mule deer.

Figure 1.10 Colona LHA mule deer and elk crucial winter ranges and overall bighorn sheep range



The Colorado Division of Wildlife manages big game on a herd, or population basis, using Data Analysis Units (DAU), with sub-regions of Game Management Units (GMU) (Figure 1.11). A DAU is the geographic area representing the year-round (includes seasonal) range of a big game herd. Herds are expected to move within one or more GMUs in the DAU. Portions of GMUs 62 and 65 occur within the Colona LHA area. These GMUs occur in the following DAUs: D-19 and D-40 for mule deer; E-20 and E-35 for elk; and S21 for Rocky Mountain big horn sheep.

Figure 1.11 Colorado Division of Wildlife Game Management Units within the Colona LHA



The long-term population target for deer in D-19 is 36,000 animals with a buck to doe ratio of 36 to 100. Since 1999, the sex ratio has increased from a low of 26:100 to 38:100. Total population numbers are rising with 2006 estimates of 39,720 individuals in the 2 GMUs comprising this DAU. The long-term population objective for D-40 is 15,000 individuals and buck to doe ratio of 30:100. Populations have been climbing from a low of 12,180 to 14,710 over the past 3 years. Sex ratios have improved from 18 bucks per 100 does in 1999 to 32:100 in 2006. Hunting pressure has generally been high in these units with above average hunter success (CDOW 2007a). From 2004 to 2006, no chronic wasting disease was detected in mule deer (post-harvest) for any of the GMUs in the LHA (Miller 2007).

The long-term elk population target in E-20 is 8,500 with a maximum of 9,500 individuals. The last 3 years, elk numbers in this unit have fluctuated widely, having periodically exceeded target by up to 1000 animals, suggesting good range conditions and animal recruitment. Hunting pressure is generally high (e.g., over 6,000 hunters in GMU 62 in 2006). Hunter harvest rates are average to very high in these units. The target population for E-35 is 5,500 individuals with no set variation for minimum and maximum population to maintain near carrying capacity. Over the past 3 years, elk populations have exceeded this target by 12% or more (CDOW 2007a). From 2004 to 2006, no chronic wasting disease was detected in elk (post-harvest) for any of the GMUs in the LHA (Miller 2007).

The Colona area provides some mule deer fawning and elk calving habitat at higher elevations within oak/serviceberry and big sage/aspen communities. These mountain shrub/aspen areas are west and east of Ridgway near or on lands managed by the Forest Service. BLM lands

are contiguous with the Billy Creek State Wildlife Area, managed by CDOW primarily for elk wintering habitat.

The Cow Creek big horn sheep herd ranges near the southeastern edge of the LHA. The Cow Creek herd (S-21) is one of the few remaining indigenous herds in Colorado. The population has increased from 90 animals in 2004 to 125 in 2007, a 39% increase (CDOW 2007a). In the early 1900's the population was estimated at about 1000 animals. Significant herd reduction has occurred over the past 100 years due to habitat loss and fragmentation resulting from mining, commercial and residential development, and disease (Beecham et al. 2007). Habitat quality within the unit is considered good although fire suppression has allowed oak-brush stands to dominate formerly suitable sheep habitat, and livestock compete for forage (Banulis 2005). Management concerns for the herd include increased recreational use especially during winter months, development pressure on private lands encompassing wintering habitat, and collision risks on Highway 550 during seasonal movements. Diseases transmitted by domestic sheep are potential risks, and several allotments are situated within the herd unit. Most allotments have not been active in recent years, but there is interest in restocking (Beecham et al. 2007). BLM manages only a small portion of the Cow Creek herd range—approximately 1,800 acres just west of the Uncompahgre National Forest and Uncompahgre Wilderness.

Merriam's turkey: Merriam turkey habitat within this LHA area is found mostly on the higher mesas with woody habitat, and along the major stream drainages. They use the larger canyon bottoms at lower elevations as winter range and the pinyon-juniper, oak/serviceberry areas at higher elevations for breeding, nesting, and brood rearing.

Carnivores: Large predators, such as coyotes, cougars, and black bears use the LHA area regularly as parts of their larger overall ranges. Of the predators, coyotes are the most numerous and widespread, and the population appears to be stable or increasing at this time. Black bear primarily use the major drainages with well-developed riparian vegetation, and higher elevation oak/serviceberry areas, especially during spring, late summer, and fall for feeding. In general, black bear populations decreased significantly between 1999 and 2003 due to unprecedented mortality rates. A cause of mortality included weather events that increased bear vulnerability to harvest and damage removal. Recruitment decreased as mortality increased (CDOW 2006). CDOW has reduced DAU harvest objectives for GMUs 62 and 65 and other units to relieve pressure on the black bear populations. Bear-human conflicts are reported in the LHA primarily on private land east of Highway 550 along Burro Creek east of Ridgway Reservoir.

Prairie dogs: White-tailed prairie dogs are found in the lower elevation areas of the LHA. Generally, they occur in areas characterized by open grassland, grass/sagebrush, or salt desert shrub where soils are conducive for building burrow systems. CDOW survey data indicates approximately 44 active white-tailed prairie dog towns of variable size in the Colona LHA. The largest areas of activity are south and east of Montrose with smaller occurrences along Highway 550 south to Ridgway. In addition, over half of the Colona LHA (primarily the north end) has been classified by the USFWS as montane habitat for Gunnison's prairie dog. Gunnison's prairie dog montane population segments are currently under consideration for listing under the Endangered Species Act. The Gunnison prairie dog mapping, as provided by the USFWS, represents species distributional range and was not intended for project-level analysis (personal communication with Al Pfister, USFWS; furthermore, occurrence of Gunnison's prairie dog has not been confirmed in the Colona area. Listing at this time is "warranted but precluded" by higher priority actions to amend the lists of endangered and

threatened wildlife and plants (USFWS 2008a; Federal Register 2008). In the Colona LHA area, it appears that fluctuations in prairie dog numbers have resulted in abandonment of historical colonies, and that there has likely been a general reduction in the total number of prairie dogs living in the area. This perception is based on biologist observations and a re-inventory of prairie dog colonies on BLM which were first inventoried in the 1970s and 1980s. This showed most of the original colonies had been abandoned, although no quantitative data analysis has been carried out. It is likely that much of this apparent trend is due to bubonic plague, although other factors such as shooting and habitat fragmentation and development may also have contributed.

Aquatic wildlife: Aquatic wildlife occur in and adjacent to perennial streams, tributaries, and some intermittent streams. The LHA encompasses the western edge of the Gunnison River watershed on the east and borders the San Miguel watershed on the west. Major features include the Uncompahgre River and other primary waterways including Cow, Dallas, and Deer Creeks. River flows in the Colona area are regulated and modified by discharge from Ridgway Reservoir. The watershed is populated by native fishes including the Colorado cutthroat trout, blue-headed sucker, flannelmouth sucker, razorback sucker, roundtail chub, mottled sculpin and speckled dace. Insect populations are generally healthy and support a valued tailwater fishery. Non-native rainbow trout and brown trout can be found in the Uncompahgre and its tributaries. Northern leopard frogs, Great Basin spadefoot toads, and many snake species also occur here.

Riparian habitat along the Uncompahgre River and other waterways is extremely important for a variety of wildlife, particularly songbirds, mammals, amphibians, and raptors. The Colorado Natural Heritage Program indicates there are a diverse array of riparian habitats in the LHA area and at least 10 birds, 1 plant, 1 fish and 1 amphibian species on the Program's rare and imperiled list. Most of these species have not been inventoried, and their status is unknown.

Threatened, Endangered and Special Status Species

Within the LHA area there are several species listed as threatened or endangered, as well as species that are candidates for listing under the Endangered Species Act, as amended. For this analysis, the species list for Montrose and Gunnison Counties was obtained from the U.S. Fish and Wildlife Service (USFWS 2008b). Descriptions of these species are found in *TES Species Descriptions for the Uncompahgre Field Office* (VanReyper 2006). Also, based on the inventory data maintained by the UFO, and available from the Colorado Natural Heritage Program, there are other special status species present in the LHA area. Table 1.4 below presents a list of the Threatened, Endangered, and special status species that are found, or potentially found within the LHA area. Note: It was not intended as part of this land health assessment to identify new locations of rare plants or animals, or to determine their status. However, if conflicts with rare plants or animals on public land had been detected, they would have been documented and discussed in this report.

Table 1.4 List of potential Threatened, Endangered or Special Status Species for the Colona LHA[1].

Common Name	*Scientific name*	*Status*	*May be Present*
ENDANGERED AND THREATENED ANIMALS			
Bald Eagle[2]	*Haliaeetus leucocephalus*	Delisted	✓
Black-footed ferret	*Mustela nigripes*	E	✓
Bonytail	*Gila elegans*	E	
Canada lynx	*Lynx canadensis*	T	✓
Colorado pikeminnow	*Ptychocheilus lucius*	E	
Humpback chub	*Gila cypha*	E	
Mexican spotted owl	*Strix occidentalis*	T	✓
Razorback sucker	*Xyrauchen texanus*	E	✓
Yellow-billed cuckoo	*Coccyzus americanus*	C	✓
ENDANGERED AND THREATENED PLANTS			
Clay-loving wild buckwheat	*Eriogonum pelinophilum*	E	✓
Uinta Basin hookless cactus	*Sclerocactus glaucus*	T	
SENSITIVE ANIMALS			
Bat, Allen's big-eared	*Idionycteris phyllotis*		
Bat, big free-tailed	*Nyctinomops macrotis*	G5, S1	✓
Bat, Townsend's big-eared	*Corynorhinus townsendii*	G4/S2, FS	✓
Bat, spotted	*Euderma maculatum*	G4/S2, FS	✓
Butterfly, Great Basin silverspot	*Speyeria nokomis nokomis*	G3T1, S1	✓
Chub, Roundtail	*Gila robusta*	G2G3/ S2, SC	✓
Curlew, Long-billed	*Numenius americanus*	G5/S2BSZN, FS, SC	
Eagle, Bald	*Haliaeetus leucocephalus*	G5, S1B, S4N	✓
Falcon, peregrine	*Falco peregrinus anatum*	G4T3, S2B	✓
Fox, Kit	*Vulpes macrotis*	SC	✓
Frog, Northern leopard	*Rana pipiens**	G5/ S3, FS, SC	✓
Goshawk, northern	*Accipter gentilis*	G5/S3S3BS2N, FS	✓
Grouse, Gunnison sage	*Centrocercus minimus*	G1/S1, SC	✓
Grouse, sharp-tailed	*Tympanuchus phasianellus columbian*	G4T3, S2	✓
Hawk, ferruginous	*Buteo regalis*	G4/ S3BS4N, FS, SC	✓
Ibis, white-faced	*Plegadis chihi*	G5/S2BSZN, FS	✓
Lizard, longnose leopard	*Gambelia wislizenii*	G5, S1	
Lizard, Texas horned	*Phrynosoma cornutum*	G4G5, S1	
Myotis, fringed	*Myotis thysanodes*	G5/S3	✓
Myotis, Yuma	*Myotis yumanensis*		✓
Otter, River	*Lutra canadensis*	SC	✓
Rattlesnake, midget faded	*Crotalus viridis concolor*	G5T4, S3?	✓
Sucker, bluehead	*Catostomus discobolus*	G4/S4, SC	✓
Sucker, flannelmouth	*Catostomas latipinnis*	G3G4/S3S4, SC	✓

Common Name	*Scientific name*	Status	May be Present
Tern, black	*Chlidonias niger*		✓
Treefrog, canyon	*Hyla arenicolor*	G5, S2	✓
Trout, Colorado River cutthroat	*Oncorhynchus clarki pleuriticus*	G5T3/S3, SC	✓
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	G5T3/SR, FS	✓
SENSITIVE PLANTS			
Grand Junction milkvetch	*Astragalus linifolius*		
Naturita milkvetch	*Astragalus naturitensis*		
Sandstone milkvetch	*Astragalus sesquiflorus*		
Rocky Mountain thistle	*Cirsium perplexans*	G3/S1	✓
Kachina daisy	*Erigeron kachinensis*		
Montrose bladderpod	*Lesquerella vicina*	G1/S1	✓
Colorado desert parsley	*Lomatium concinnum*	G2/S1	✓
Paradox Valley lupine	*Lupinus crassus*		
Dolores skeleton plant	*Lygodesmia doloresensis*		
Eastwood monkey-flower	*Mimulus eastwoodiae*		
Paradox breadfruit	*Pediomelum aromaticum*		

[1]In accordance with an updated species list (Feb.7, 2008) provided by Allen Pfister of the FWS, the following species have been removed from the UFO T&E list: southwestern willow flycatcher (does not occur within the UFO), Uncompahgre fritillary butterfly (does not occur within the UFO), DeBeque phacelia (does not occur within the UFO). Gunnison's prairie dog (populations under consideration for listing) is addressed under the sensitive species section below.

[2]On June 28, 2007, Secretary of the Interior Dirk Kempthorne announced the removal of the bald eagle from the list of threatened and endangered species. For a description of bald eagle distribution and status within the Colona LHA, refer to the sensitive species section below.

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

Threatened and Endangered Species

Bald eagle: Refer to species description and map under the sensitive species section below.

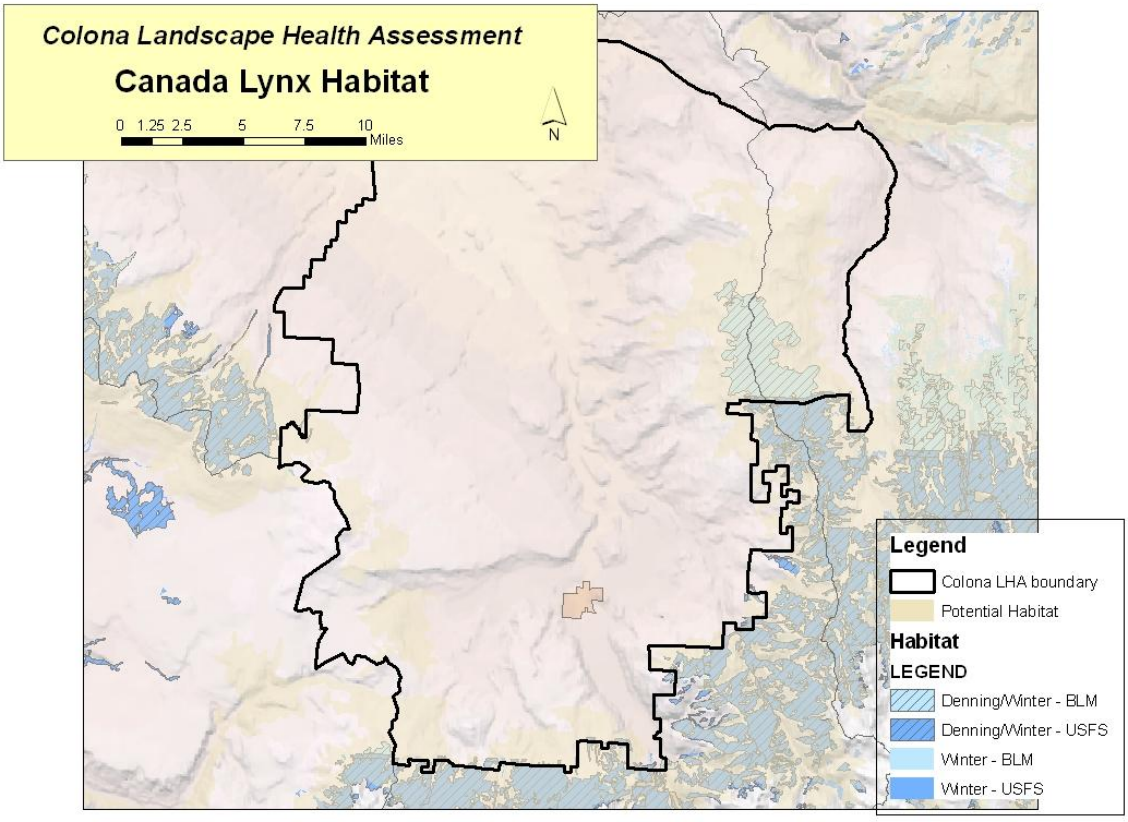
Black-footed ferret: Black-footed ferrets depend on prairie dogs for food and shelter. For the Uncompahgre Field Office, this includes Gunnison's and white-tailed prairie dogs. Based on

bioenergetics, the basic requirements for suitable ferret habitat include prairie dog towns 200 acres or greater in size with an average density of 8 active burrows/acre. According to Hunt (2007), some white-tailed prairie dog populations in the Colona LHA area appear to be thriving on private land in the vicinity but not on BLM. In general, prairie dog communities have either been abandoned or reduced in size in the Colona area over the past 10 years (Hunt 2007). According to the CNHP database, a black-footed ferret sighting was reported in 1988 in the southern portion of the LHA, north of Ridgway. It is unlikely black-footed ferrets could survive in the area due to the small size of extant prairie dog locations. The black-footed ferret is believed to have been extirpated from the area (USFWS 2005).

Canada lynx: Canada lynx are adapted to higher altitude forests and riparian areas. The species was in considered extirpated in Colorado by the mid-1970's. A lynx reintroduction program was initiated in 1999 in the San Juan Mountains (south of Montrose, Colorado) with 200 adult animals released by 2005. Reproduction was first noted in Colorado lynx in 2003 and recorded for subsequent years. In 2007 however, no successful reproduction was discovered. The CDOW has hypothesized that poor reproduction is due to a naturally occurring "dip" in the cycle of principle prey species (snowshoe hare) abundance.

Potential and mapped winter and denning habitats for lynx are found along the southern and eastern peripheries of the LHA, with portions in the east and northeast areas (Fig. 1.12). Possible lynx sightings have been reported from the higher elevations east of the Colona LHA (CNHP 2006).

Figure 1.12. Important habitat in the Colona area for the federally-listed Canada lynx



Mexican spotted owl: Mexican spotted owls (*Stryx occidentalis*) typically inhabit areas having a component of old-growth/mature forest of mixed evergreen, conifer, Douglas-fir, Ponderosa Pine, pine-oak, riparian or others. Rocky, steep canyons often near water are another selected habitat type for nesting. The Colona LHA area is within range for this subspecies and contains habitat types known for breeding, dispersal, and migration. Although potential habitat occurs in the LHA, no birds have been documented in the area. The only areas with confirmed spotted owls in Colorado are the Pike-San Isabel National Forest and nearby BLM lands (Canon City area) and Mesa Verde National Park and adjacent Ute Mountain Ute tribal land. (Boyle and Franklin, 1993).

Razorback sucker: Most of the LHA area is in the Uncompahgre River watershed. The western edge of the Upper Gunnison River watershed overlaps the LHA, and the San Miguel River watershed borders the LHA on the west. All three watersheds contribute to the Upper Colorado River Basin. The Uncompahgre River is the only tributary in the LHA with potential habitat for the razorback sucker. The only known razorback population in the Upper Colorado River Basin watershed occurs north of the Colona LHA near Grand Junction, Colorado (USFWS 2006). Changes in stream flow and water temperatures, direct loss of habitat due to inundation by reservoirs, blockage of migration routes and the introduction of non-native fish species are primarily responsible for the decline of the razorback sucker. A recovery program initiated in 1998 includes 5 basic steps to recovery: 1) provision of instream flows; 2) habitat development and maintenance; 3) native fish stocking; 4) management of non-native fish species and sport fishing; 5) research, monitoring, and data management (USFWS 2006).

Yellow-billed cuckoo: Yellow-billed cuckoos (*Coccyzus americanus*) have been reported in the geographic area surrounding the Colona LHA, but there are no confirmed observations or nesting in the LHA area itself. These cuckoos are neotropical migrants in western Colorado often associated with open woodlands with low shrubby cover usually near watercourses. Potential habitat appears to be present in a few areas along the Uncompahgre River and tributaries. Breeding bird surveys did not confirm breeding activity for the yellow-billed cuckoo in this area (Kingery 1998). Additional surveys are planned for the 2008 season.

Clay-loving wild buckwheat: Clay-loving wild buckwheat **(***Eriogonum pelinophilum*) is confined to whitish alkaline clay soils in Montrose and Delta Counties. In the Colona LHA, populations are concentrated in the Adobe Hills of the Mancos Shale formation east and south of Montrose. In 2007 a survey for clay-loving wild buckwheat was conducted in grazing allotments southeast of Montrose. Ferguson and field associates' data indicate a total number of plants in the area exceeding 200,000 individuals. "This is a substantial change in the rangewide population estimate for *E. pelinophilum* and includes the majority of the *E. pelinophilum* in existence" (Ferguson 2007).

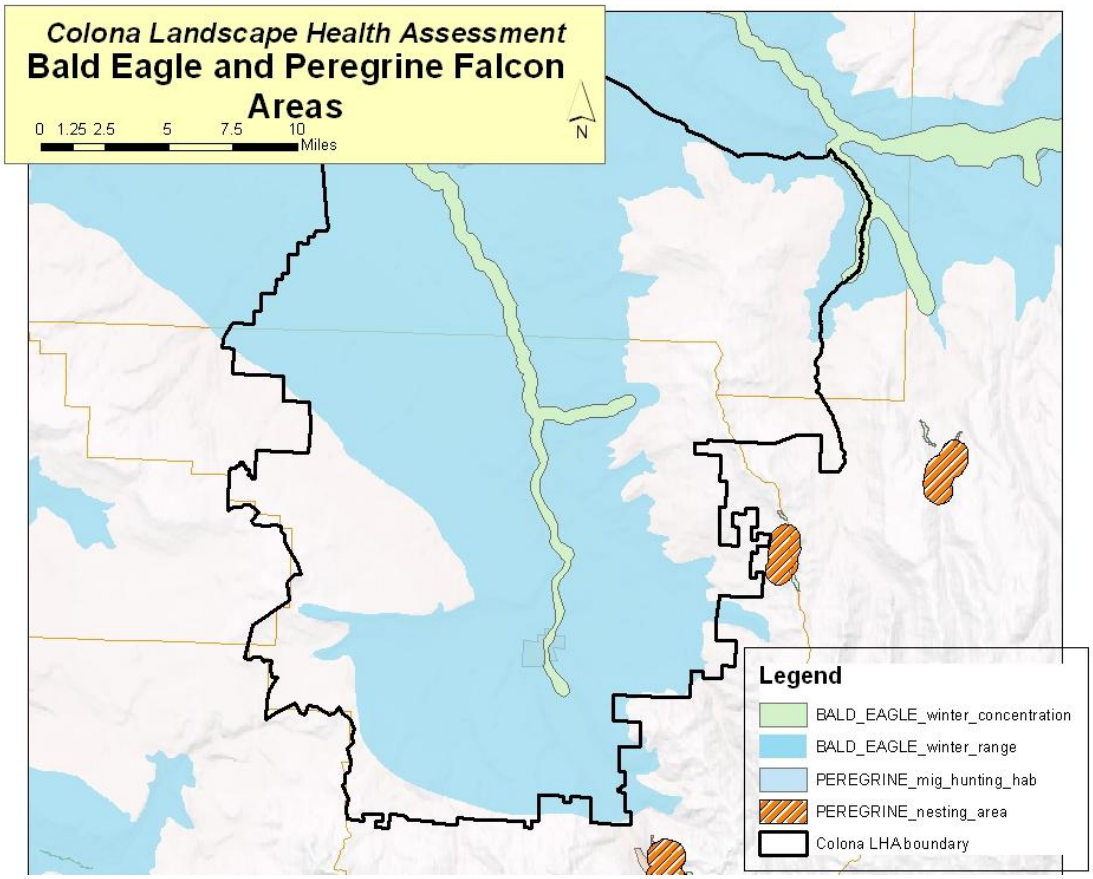
Sensitive Species

Bald eagle: Bald eagles concentrate in the late fall and winter months along the major watercourses in the LHA (Fig. 1.13). Concentration of individuals is most obvious in the vicinity of Ridgway Reservoir where there is open water and abundant road kill of mule deer along Highway 550. Although eagles are concentrated along the watercourses, most of the LHA is classified as regular winter range. Active nesting occurs south of Montrose along the Uncompahgre River. Historically active nests occur both south and east of Montrose along major waterways, and several roosting sites occur along the Uncompahgre River and major tributaries

near and within the Billy Creek State Wildlife area. The bald eagle was removed from the Endangered Species list in July of 2007 [72 Federal Register (FR) 37345-37372]. Management of eagles and habitat are still subject to guidance under the delisting monitoring plan (5-year duration) and the Bald and Golden Eagle Protection Act.

Peregrine falcon: Peregrine falcons were removed from the Endangered Species list in 1999 and are still managed under the delisting monitoring plan (64FR 46541-46558, 71FR60583). The UFO considers the peregrine a sensitive species. Peregrine nesting areas are identified to the east and south east of the LHA in association with high-elevation cliffs and rock faces (Fig 1.13). The LHA provides ample foraging habitat for peregrines especially along the watercourses and large reservoirs where waterfowl congregate.

Figure 1.13. Important bald eagle and peregrine falcon habitat in the Colona LHA



Gunnison sage grouse: The Gunnison sage grouse is found in sagebrush communities with a diversity of grasses and forbs and associated riparian systems. Sagebrush is an essential habitat feature and provides cover and forage throughout the year. Until 2006, the Gunnison sage grouse (*Centrocercus minimus*) was considered the same species as the Greater sage grouse (*Centrocercus urophasianus*). Recent work demonstrated that the population of grouse in southwestern Colorado is significantly smaller than the Greater sage grouse with distinct genetic and behavioral differences (see <http://bna.birds.cornell.edu>). Concern over the low numbers of sage grouse and habitat loss and deterioration resulted in a petition to list the bird under the

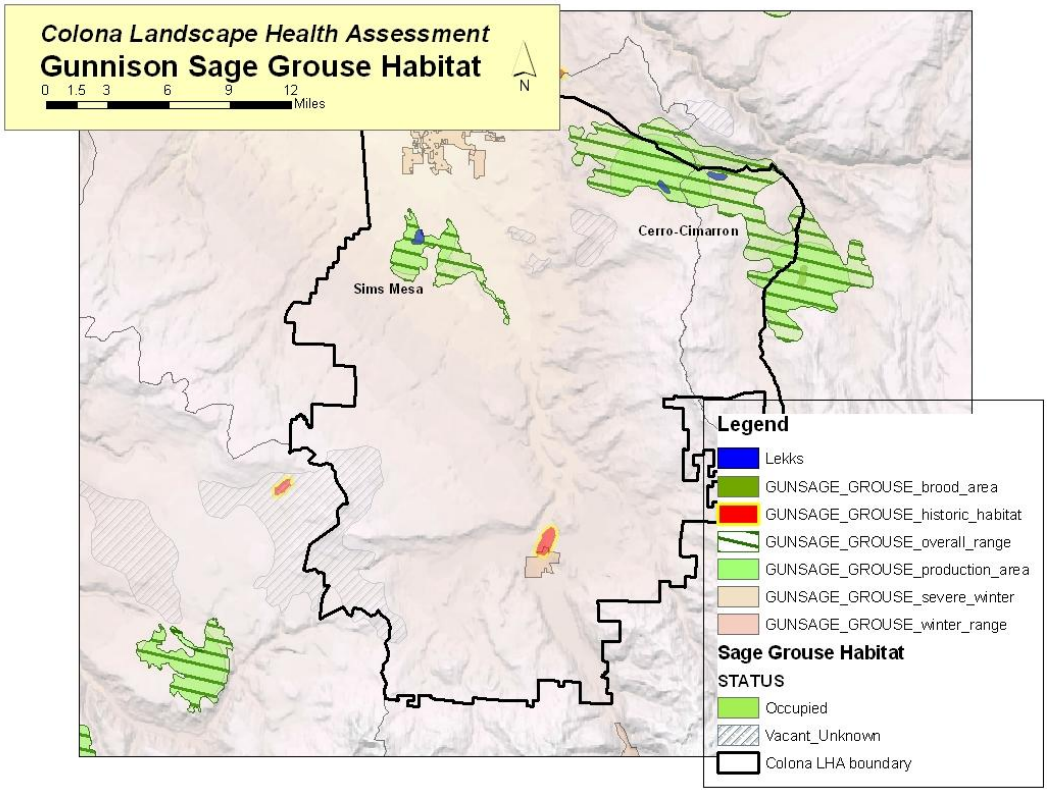
Endangered Species Act. In April 2006, the Fish and Wildlife Service issued a "not warranted" determination for listing of the Gunnison grouse.

In the current highly fragmented distribution of the Gunnison sage grouse, only eight small populations occur in Colorado – Pinon Mesa, Crawford, San Miguel Basin, Gunnison Basin, Dove Creek, Cerro Summit-Cimarron-Sims Mesa, and Poncha Pass. The Cerro Summit-Cimarron-Sims Mesa population is found partially or completely in the boundaries of the Colona LHA (Fig. 1.14). Because of a patchy distribution, the sage grouse within the LHA are divided into "subpopulations": 1) Cerro Summit – Cimarron and 2) Sims Mesa (CDOW 2006a).

The Cerro Summit-Cimarron subpopulation range is approximately 31,900 acres. Within the Cerro-Cimmaron area, habitat varies from 7,000 to 9,000 feet in elevation, consisting largely of sagebrush patches with intermittent oak brush and irrigated pastures. Late-seral stage sagebrush communities are found primarily on steep slopes. The Sims Mesa subpopulation area includes approximately 5,300 acres in Montrose County about 7 miles south of Montrose, Colorado. Elevations range from 6,000 to 7,000 feet with small patches of sagebrush fragmented by pinon-juniper woodland, residential development, recreation activity, and agricultural land (CDOW 2006a).

Over the past 7 years of data collection, sage grouse numbers in the LHA have been abnormally low. For example, the most recent (2007) lek observation data indicate 7 males for the Cerro-Cimarro and Sims subpopulations combined (CDOW 2007). Using male counts alone is an inconsistent indicator of population trends, but it can be inferred that the populations are low (CDOW 2006a).

Figure 1.14. Gunnison sage grouse habitat in the Colona LHA



Other sensitive birds: Higher altitude forest could provide nesting habitat for northern goshawks, and the entire LHA may be used during the winter by foraging birds. Ferruginous hawks are considered a migrant in this area, with potential habitat in open country with sagebrush, saltbush-greasewood shrubland, and the periphery of pinyon-juniper. Wintering ferruginous hawks concentrate in areas with high densities of small mammals such as prairie dog colonies or rabbits. They generally avoid areas of intensive agriculture or human activity. White-faced ibis are known to breed in Montrose County but no locations have been identified in the LHA. However, wetland habitat is present within the LHA. Columbian sharp-tailed grouse inhabit areas of both open grasslands and grasslands with a shrub component. Presence of breeding of this species within the UFO has not been observed or documented. Black terns are semicolonial, nesting in emergent vegetation in freshwater. The LHA is included in the breeding range for black terns, but no breeding has been recorded in Montrose or Ouray Counties. Both breeding and migration habitats occur in the area. Please refer to the threatened and endangered species section above for site-specific information on the yellow-billed cuckoo.

Several Neo-Tropical Migrant Bird species show population trend declines, or have inadequate data for making trend determinations in the Western Colorado region (Kingery, H.E. ed. 1998). The Breeding Bird Survey provides the most complete and accurate data available for NTMB species throughout their range, and in the LHA area. Partners In Flight (PIF) have organized and presented information concerning bird population status and other information by Physiographic Region. (PIF 2000)

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

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

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

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

Southern Rocky Mountain physiographic areas, in the higher elevations of the Colona LHA area. (PIF, 2000)

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

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

The control of natural fires has created successional patterns that may be quite different from historical patterns and which may have profound effects on wildlife populations and distribution. Pinyon-juniper has expanded in some areas. Fire exclusion and climatic fluctuations have resulted in stands overstocked with small trees. Wildfires tend to be less frequent and more catastrophic. The result has probably been harmful to non-forest raptors and seed-eaters, and has been beneficial mostly to non-game upland bird species.

A query of the Breeding Bird Survey Database (www.mbr-pwrc.usgs.gov/bbs/) indicates fourteen NTMB species (Table 4.1) in Western Colorado show population trend declines for the years 1966-2005, and 1980-2005. All of these species have high “importance of area” (IA) rankings; indicating a high proportion of their habitat in this region provides essential breeding habitats. Five of these species, vesper sparrow, Swainson’s hawk, Say’s phoebe, rock wren, and loggerhead shrike have very low abundance ratings, indicating they are the species’ of highest concern in this unit and landscape. The nine remaining species, horned lark, common nighthawk, killdeer, northern flicker, western wood-pewee, chipping sparrow, sage thrasher, Brewer’s sparrow and mourning dove have moderate to good abundance ratings, making them species of second highest concern. Species for which inadequate data are available (Table 4.2) to make status determinations with a high degree of certainty are considered third priority species. An additional review of data collected from 1966-2005 show that of 96 species with adequate data for analysis, there are 33 with positive trends, 41 with negative trends, and 22 are stable. The LHA area is part of the larger overall landscape that provides habitat for all these species, which is important for their long-term sustainability.

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

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

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 Colona LHA area based on Breeding Bird Survey Data.

Fish: Roundtail chub, bluehead sucker, and flannelmouth sucker may occur in the Uncompahgre and Upper Gunnison Rivers. Although historically wide-ranging, the Colorado River cutthroat is confined to isolated headwaters and lakes including smaller drainages of the Uncompahgre River in the LHA. Restoring natural river flow regimes is important for the survival of all these species. Introduced, non-native fish are another concern because of their ability to outcompete native species.

Amphibians: Northern leopard frogs inhabit springs, slow-moving streams, marshes, reservoirs, and lakes. This species appears to be faring well in Delta County north of the LHA. Within the LHA, leopard frogs have been documented in the artificial wetlands created from irrigation canal seepage southeast of Montrose (Ferguson, J.R., personal observation 2007). There are numerous canal seep wetlands around the Montrose area as well as natural wetlands created by creeks and rivers. Throughout its range, leopard frog populations have declined due to habitat loss and degradation, non-native species invasion, and undetermined causes.

Bats: Several sensitive bat species may be present in the Colona LHA area. These include the fringed myotis, Yuma myotis, spotted bat, big free-tailed bat, and Townsend's big-eared bat. Foraging habitat for Townsend's big-eared bat includes juniper woodlands, sagebrush steppe, and mountain shrub areas, which are found throughout the area. Roosting habitat includes caves, mines, and buildings. Spotted bats were documented through call identification during surveys in the Gunnison Gorge and Black Canyon National Monument which are lands contiguous with the LHA to the north (Navo 2003). Spotted bats prefer foraging habitat in pinyon-juniper woodland, canyon bottoms, open pasture, and hayfields found throughout the LHA's western and eastern halves; roosting habitat is typically rock crevices in cliffs. Spotted bat occurrences in the Colona area are rare compared with other parts of the species range. Yuma myotis were captured in the Smith Fork near Gunnison Gorge directly north of the Colona LHA during bat surveys in 2001 and 2003 (Navo, 2003). Yuma myotis are closely associated with water, and also prefer to inhabit buildings, bridges, cliff crevices and trees. Fringed myotis foraging habitat in the area includes ponderosa pine, pinyon/juniper, greasewood, saltbush, and scrub oak. They roost in caves, mines, rock crevices, buildings, and other protected sites found through out the Colona LHA area. Big-free tailed bats have been reported in many places over the entire state of Colorado, but their presence could be incidental and no breeding has been documented (Fitzgerald et al. 1994). If present in the LHA, the number of individuals is expected to be few. Big-free tailed roost in crevices on cliff faces or buildings. Foraging is primarily in sagebrush and semi-desert shrub. Threats to bats include loss of habitat and pesticides.

River otter: River otters are believed to have historically ranged throughout Colorado but never in abundance. The species was thought to be close to extirpation in Colorado resulting from water pollution and altered stream flows. The CDOW released otters in the Gunnison River in 1977; these populations appear to be surviving (Homan 2007). Otters are found in the Upper Gunnison River, and part of the eastern Colona LHA drains to that watershed. Otters are also found to the southwest of the LHA in the San Miguel River. Historical records indicate populations in or near the Uncompahgre River (Fitzgerald et al. 1994). Populations are monitored and surveyed periodically by CDOW.

Kit fox: Kit foxes inhabit sparsely-covered, semi-desert shrublands of saltbrush, shadscale and greasewood. Trapping surveys have confirmed the presence of kit fox in the adobe hills of Peach Valley directly north of the Colona LHA (Meaney et al 2006). Habitats for the fox exist contiguous with Colona LHA and the presence of individuals in the LHA is likely but not

confirmed.

Rocky mountain thistle: Rocky Mountain thistle (*Cirsium perplexans*) is a sensitive plant found in Montrose and Ouray Counties. It prefers open areas and disturbed sites in mixed shrublands and pinyon-juniper woodlands between 5,000 and 8,000 feet. In the Colona LHA, populations of *Cirsium perplexans* are most recorded from the Eldredge area between Montrose and Ridgway. Some of these occurrences are on non-BLM land, where management is a concern. Non-native plant invasion, improper grazing, and proximity to roads may threaten these occurrences. This plant is often mistaken for a non-native thistle and killed (Lyon 1998).

Montrose bladderpod: Montrose bladderpod (*Lesquerella vicina*) has habitat in the Colona LHA area consisting of sandy-gravel soil mostly of sandstone fragments over Mancos shale clay between 5,800 and 7,500 feet. These are mainly in pinyon-juniper woodlands or in the ecotone between it and salt desert scrub. It is often found in disturbed areas, including old road beds and cattle trails (NatureServe, 2006). Populations of it have been located in the Eldredge area and near Wildcat Canyon on the Uncompahgre Plateau. Development, grazing and ORV use are the main threats to this plant.

Colorado desert parsley: Colorado desert parsley (*Lomatium concinnum*) has several populations in the study area. This species prefers barren adobe soils derived from shales of the Mancos Formation in sagebrush, shadscale, greasewood, or scrub oak communities at 4,300-7,300 feet. Documented locations include the Eldredge area and the adobe hills east and southeast of Montrose. Development, sheep grazing and ORV use are potential threats. Plants occur on both BLM and private lands.

Migratory Birds

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

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

Common Name	*Scientific Name*	*Habitat/Status in Colorado*	*May be Present*
[Gunnison Sage-Grouse]	*Centrocercus minimus*	Resident	✓
Black-throated Gray Warbler	*Dendroica nigrescens*	Mixed woodland/ breeding	✓
Burrowing Owl	*Athene cunicularia*	Grassland/breeding	✓
Chestnut-collared Longspur	*Calcarius ornatus*	Annual, grassland/ migration	✓
Ferruginous Hawk	*Buteo regalis*	Grassland, shrub-steppe/ winter	✓
Flammulated Owl	*Otus flammeolus*	Open ponderosa/ breeding	✓

Golden Eagle	*Aquila chrysaetos*	Open woodland/resident	✓
Grace's Warbler	*Dendroica graciae*	Mixed woodland/breeding	✓
Gray Vireo	*Vireo vicinior*	Pinyon juniper/breeding	✓
Lewis's Woodpecker	*Melanerpes lewis*	Open woodland/resident or breeding	✓
Marbled Godwit	*Limosa fedoa*	Riparian/migration	✓
Mountain Plover	*Charadrius montanus*	Grasslands/migration	✓
Northern Harrier	*Circus cyaneus*	Agriculture, grassland/ breeding/resident	✓
Peregrine Falcon	*Falco peregrinus*	Generalist/resident	✓
Pinyon Jay	*Gymnorhinus cyanocephalus*	Pinyon juniper/resident	✓
Prairie Falcon	*Falco mexicanus*	Annual, grassland/resident	✓
Sage Sparrow	*Amphispiza belli*	Shrub steppe/breeding	✓
Short-eared Owl	*Asio flammeus*	Generalist/winter	✓
Snowy Plover	*Charadrius alexandrinus*	Riparian/migration	
Solitary Sandpiper	*Tringa solitaria*	Riparian/migration	✓
Swainson's Hawk	*Buteo swainsoni*	Agriculture, grassland/ breeding	✓
Virginia's Warbler	*Vermivora virginiae*	Dry woodland/breeding	✓
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Mixed woodland/breeding	✓
Wilson's Phalarope	*Phalaropus tricolor*	Riparian/breeding	✓
Yellow-billed Cuckoo	*Coccyzus americanus*	Riparian/breeding?	✓

Migratory birds are protected under numerous federal laws and executive orders including the Migratory Bird Treaty Act, Bald Eagle Protection Act, Lacey, Act and Wild Bird Conservation Act. To that end, the UFO strives to conserve these species and their habitat and minimize impacts by applying avoidance measures and other mitigation to project design.

The variety of habitats in the Colona LHA offers opportunities for breeding, foraging, roosting and migratory stopovers for most of the birds on the species of conservation concern list that potentially occurring in the UFO area. Riparian areas are particularly important for migrating birds, and many resident/ breeding birds nest and forage in deciduous vegetation associated with water systems. These systems as well as seepage from irrigation canal activities (especially in the Montrose area) support willow and cottonwoods critical for nesting and roosting birds.

Pinyon-juniper woodlands and sagebrush areas are important breeding habitats for corvids, sparrows, and numerous warbler species. These vegetation types also support a diversity of base prey including lagomorphs and rodents important to raptors.

Throughout their range and including the LHA area, migratory bird populations are threatened by loss of habitat due to residential development, increased OHV use, overgrazing by livestock, water diversion, and possibly drought. Agricultural use of pesticides may contribute to direct poisoning and can have indirect impacts by reducing invertebrate prey populations.

Biodiversity Focal Areas

Several efforts to identify and conserve regional and global biodiversity have been

initiated by non-governmental groups. The Colorado Natural Heritage Program has been inventorying Colorado counties for the past seven years to identify sites containing high-value plant communities, rare plants assemblages, and/or animals that they feel warrant protection and management for biodiversity conservation at a statewide level. Montrose County, including the Colona LHA area, was inventoried in 1999 (Lyon et al). Each PCA was ranked for its biodiversity values, protection urgency, and management urgency. Groups of PCAs were also combined into larger recommended "macrosites" for conservation.

The Nature Conservancy (TNC) has sponsored ecoregional assessments to identify areas important for regional biodiversity conservation. The Colona LHA area falls into two of these assessments, the Southern Rocky Mountains, and the Colorado Plateau (Neely et al. 2001, Tuhy et al. 2002). While similar to the CNHP effort in many respects, these assessments are broader in scope in that a region-wide network for biodiversity conservation is identified using computer-based optimization models to identify areas which would most efficiently and cost effectively conserve all of an ecoregion's biodiversity. Because the ecoregional assessments are done at a large scale and not ground-truthed, the areas identified provide only loose guidance as to what the targets for conservation in a given area are, and what the actual location on the ground might be.

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

Figure 1.15 shows all 22 PCAs, two CNHP conservation macrosites, TNC recommended conservation areas, and SREP important landscape linkages in the LHA area. Table 1.7 shows the important resource values in each of the identified biodiversity conservation areas, and their relative ranking in terms of conservation importance.

At the present time, the Uncompahgre Basin RMP, as amended, does not place any of these areas or linkages into special management categories that directly benefit the specific resources of the PCA other than the Fairview Area of Critical Environmental Concern (ACEC). This is a small area of BLM, but its designation limits many activities in an effort to conserve values associated with the Mancos soils and rare plants found upon them. Many areas of BLM land outside of the ACEC are open to off-highway vehicle. Often, a result is the creation of additional roads or routes. On most of the BLM lands in the LHA area, mineral material disposal, locatable mineral activities, construction of rights-of-ways, and livestock grazing are permitted.

Figure 1.15 Colona LHA area locations identified as being important for biodiversity conservation across the ecoregion, as recommended by the Colorado Natural Heritage Program, The Nature Conservancy, and Southern Rockies Ecosystem Project.

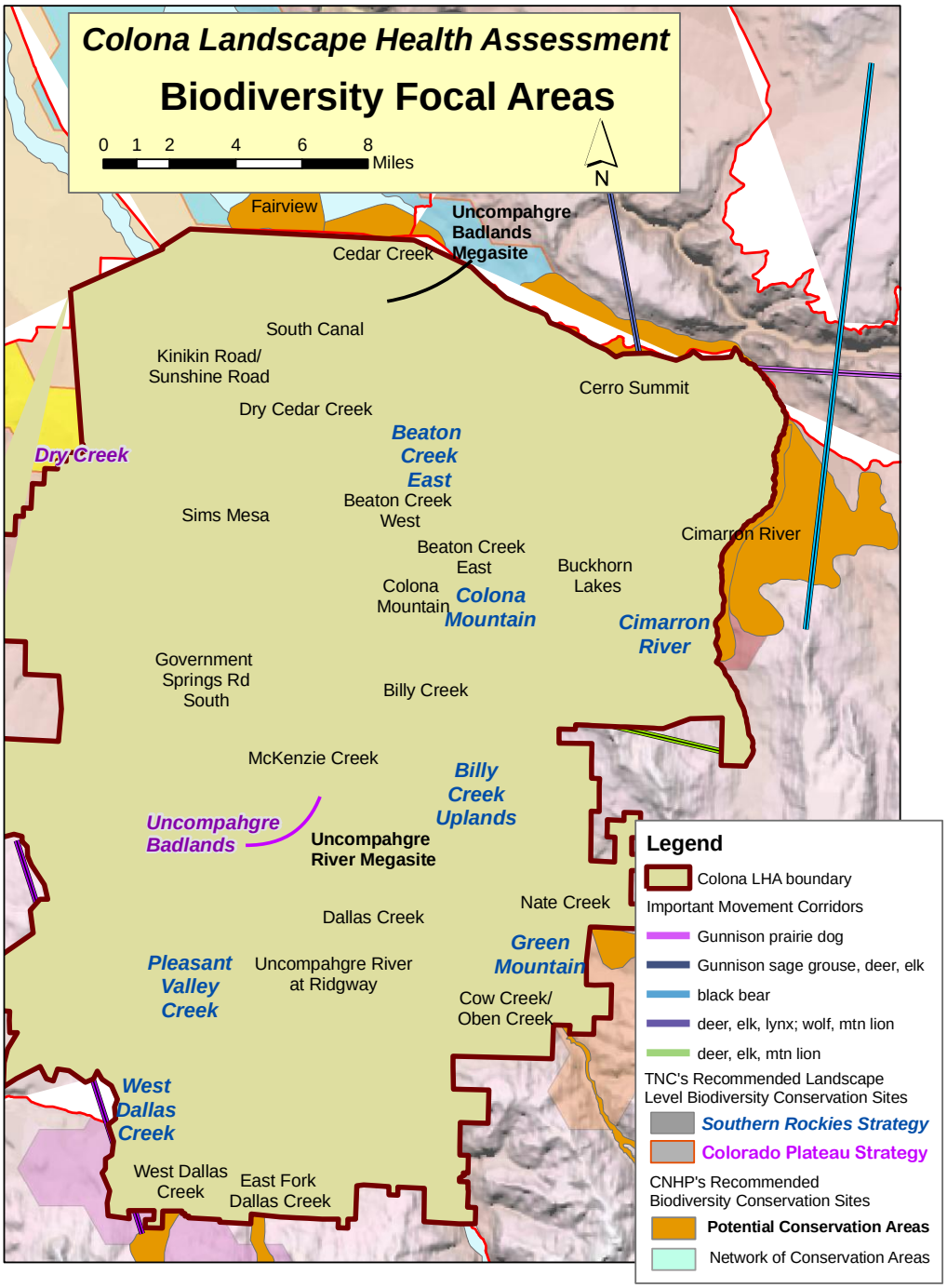


Table 1.7 Recommended conservation areas in the Colona LHA area

Site Name	Resource Values	Biodiversity or Conservation Value Rank [1]	Management/ Protection Urgency Rank [2, 3]
CNHP: Beaton Creek East	A good occurrence of Wetherill milkvetch (*Astragalus wetherillii*)	B3	M4, P2
CNHP: Beaton Creek West	A good occurrence of Wetherill milkvetch	B3	M4, P3
CNHP: Billy Creek	Two best known occurrences of Wetherill milkvetch, good quality occurrences of Colorado desert-parsley (*Lomatium concinnum*), and a fair population of Rocky Mountain thistle (*Cirsium perplexans*)	B2	M2, P2
CNHP: Buckhorn Lakes	An excellent example of a globally rare montane willow carr	B3	M3, P4
CNHP: Cedar Creek	Good occurrences of Colorado desert-parsley	B2	M3, P3
CNHP: Cerro Summit	A fair occurrence of the Gunnison Sage Grouse	B2	M4, P3
CNHP: Cimarron River	Two good examples of a globally vulnerable riparian plant community	B3	M4, P3
CNHP: Colona Mountain	One of the best known occurrences of Wetherill milkvetch, and a good population of good-neighbor bladderpod (*Lesquerella vicina*)	B2	M5, P3
CNHP: Cow Creek/Oben Creek	Four excellent examples of globally rare riparian plant communities, occupied black swift nesting habitat	B2	M3, P2
CNHP: Dallas Creek	General biodiversity significance	B5	M3, P3
CNHP: Dry Cedar Creek	An excellent occurrence of Colorado desert-parsley, Adobe beardtongue (Penstemon retrorsus),and good-neighbor bladderpod	B2	M3, P2
CNHP: East Fork of Dallas Creek	Fair occurrence of a globally imperiled wetland community, and an excellent occurrence of a more common sedge-dominated wetland	B3	M2, P3
CNHP: Fairview	Two fair occurrences of the clay-loving wild buckwheat (*Eriogonum pelinophilum*), and a good occurrence of adobe beardtongue	B3	M3, P2
CNHP: Government Springs Rd South	Two small populations of the good-neighbor bladderpod	B4	M3, P3
CNHP: Kinnekin Road/ Sunshine Road	A good occurrence of the clay-loving wild buckwheat, Colorado desert-parsley and good-neighbor bladderpod	B2	M2, P2
CNHP: McKenzie Creek	A good occurrence of a montane riparian forest considered vulnerable throughout its range	B4	M3, P4
CNHP: Nate Creek	A good example of a globally vulnerable riparian plant community and a good population of the large-flowered globemallow (*Iliamna grandiflora*), and Colorado River cutthroat trout	B3	M3, P3
CNHP: Sims Mesa	A small population of Gunnison sage grouse (not seen for last several years)	B2	M3, P3
CNHP: South Canal	Excellent occurrence of the clay-loving wild buckwheat	B2	M3, P2

Site Name	Resource Values	Biodiversity or Conservation Value Rank [1]	Management/ Protection Urgency Rank [2, 3]
CNHP: Uncompahgre River at Eldridge	A fair condition remnant of a globally imperiled riparian plant community, and the canyon bog-orchid (Platanthera sparsiflora) which is rare in Colorado	B2	M2, P2
CNHP: Uncompahgre River at Ridgway	A fair condition remnant of a critically imperiled riparian plant community	B2	M3, P3
CNHP: Uncompahgre Badlands Megasite	Contains the majority of the occurrences of the clay-loving wild buckwheat, Colorado desert-parsley, adobe penstemon, and the good-neighbor bladderpod	B2	M2, P1
CNHP: Uncompahgre River Macrosite	Relic stands of a riparian forest community considered critically imperiled throughout its range, examples of common riparian communities, Black Canyon gilia, (Gilia penstemonoides, large-flowered globemallow, gray vireo, black swift, New Mexican cliff fern (*Woodsia neomexicana*), canyon bog-orchid, Yellowstone whitlowgrass (*Draba incerta*), Western polypody (*Polypodium hesperium*), Southern maidenhair fern (*Adiantum capillus-veneris*), purple cliffbrake (*Pellaea atropurpurea*), Northern leopard frog, golden eagle, and Aleutian maidenhair fern (*Adiantum aleuticum*)	B3	M1, P1
CNHP: West Dallas Creek	Two good examples of a montane riparian willow carr, and beaked sedge montane perched wetland, also a good example of a more common montane riparian forest community	B3	M3, P4
TNC: Beaton Creek East	Wetherill milkvetch, montane low-moderate gradient small river wide channels and basins (alluvium), winterfat shrub steppe	Threats from residential development and fire management	
TNC: Billy Creek Uplands	Rocky Mountain thistle, Wetherill milkvetch	Threats from residential development, fire mgmt, powerlines and roads, forestry, invasive species	
TNC: Cimarron River	Rocky Mountain thistle, montane moderate-low gradient headwater creeks granite/volcanic substrate	Threats from road/utility corridors, alien species, and fire management	
TNC: Colona Mountain	Wetherill milkvetch, montane low-moderate gradient small river wide channels and basins (alluvium)	Threats from fire management	
TNC: Dry Creek	Gunnison Sage Grouse, good-neighbor bladderpod, Narrowleaf cottonwood-Rocky Mtn juniper woodland, Narrowleaf cottonwood/ fragrant sumac woodland , montane to low elevation perennial to intermittent headwaters and creeks, mountain, foothill and desert riparian woodland/shrubland, pinyon-juniper and juniper woodlands, sagebrush shrublands	Very high threats from altered fire regime, high threats from vehicles and roads, improper grazing, and invasive species	

Site Name	Resource Values	Management/ Protection Urgency Rank [2, 3]
TNC: Dry Creek	Gunnison Sage Grouse, good-neighbor bladderpod, Narrowleaf cottonwood-Rocky Mountain juniper woodland, Narrowleaf cottonwood/fragrant sumac woodland , montane to low elevation perennial to intermittent headwaters and creeks, mountain, foothill and desert riparian woodland/shrubland, pinyon-juniper and juniper woodlands, sagebrush shrublands	Very high threats from altered fire regime, high threats from vehicles and roads, improper grazing, and invasive species
TNC: Green Mountain	Colorado River cutthroat trout, large-flower globemallow, Gambel's oad shrubland, montane moderate-low gradient headwater creeks granite/volcanic substrate	Threats from stream diversions, fire management, grazing, invasive species, rec use, road/utility corridors, parasites, single species management
TNC: Pleasant Valley Creek	Narrowleaf cottonwood-Rocky Mountain juniper woodland	Threats from residential development, fire management and grazing
TNC: Uncompahgre Badlands	Kit fox, bald eagle, northern leopard frog, clay-loving wild buckwheat, Colorado desert-parsley, good-neighbor bladderpod, narrowleaf cottonwood-river hawthorne woodland, narrowleaf cottonwood/strapleaf willow-silver buffaloberry woodland, small to large rivers, perennial flow, low–mid elevations, montane to low elevation perennial to intermittent headwaters and creeks, mixed salt-desert scrub, lower montane shrubland, foothill and desert riparian woodland/shrubland,	high threats from altered fire regime, high threats from vehicles and roads, and habitat loss
TNC: West Dallas Creek	Mountain whitlow grass (*Draba rectifructa*), Colorado Divide whitlow-grass (*Draba streptbrachia*), alpine dry tundra, alpine-subalpine wet meadow, Gambel's oak shrubland alpine steep-very steep gradient headwaters creek-granite and volcanic, alpine/montane moderate to low gradient headwaters creeks-shale and sandstones, alpine/montane moderate to low gradient small rivers in shale and sandstone,	Threats from residential development, dam operation, fire management, grazing, invasive species, mining, rec use

[1] Biodiversity Rank: B1= Outstanding significance such as the only known site for a globally species. B2= Very high significance, such as one of the best examples of a community type, or good occurrence of a globally imperiled species or a species with very restricted range. B3= High significance, such as an excellent example of any community type or a good occurrence of any species with very restricted range or a good occurrence of a state rare species.

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

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

Surface and Ground Water

The Colona Landscape Unit includes portions of the Uncompahgre and Upper Gunnison 4th Field River Basins. Table 1.8 and Figure 1.16 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 Designations and Classifications for the Colona Landscape Unit.

5th Field Watershed	*Land Status Acres*		*Stream Segment*	*Stream Designation*	*Stream Classification*
	BLM	*Other*			
1402000640 Spring Creek/Happy Canyon	30,881	88,081	Uncompahgre River		Aquatic Life Cold 1[1] Recreation E Water Supply Agriculture
			Tributaries to Uncompahgre River	Use Protected[5]	Aquatic Life Warm 2 Recreation N Agriculture
14002000603 Beaton/Mckenzie Creek	15,104	45,147	Billy, Beaton and Onion Creeks		Aquatic Life Cold 1 Recreation N (11/1-4/1) Recreation P (5/1-10/31 Water Supply Agriculture
			Uncompahgre River		Aquatic Life Cold 1 Recreation E[2] Water Supply[4] Agriculture[3]
			Other tributaries to the Uncompahgre River		Aquatic Life Cold 2 Recreation N (11/1-4/1) Recreation P (5/1-10/31) Water Supply Agriculture
1402000281 Cimarron River	2,580	29,621	Tributaries to the Cimarron River		Aquatic Life Cold 1 Recreation U Water supply Agriculture
1402000679 Upper Uncompahgre River	3,735	87,676	Uncompahgre River		Aquatic Life Cold 1 Recreation E Water Supply Agriculture
			Tributaries upstream of Dexter creek	Use Protected[5]	Aquatic Life Cold 2 Recreation E Water Supply Agriculture
			Tributaries downstream of Dexter creek		Aquatic Life Cold 2 Recreation N (11/1-4/1) Recreation P (5/1-10/31) Water Supply Agriculture
1402000640 Cow Creek	3,845	28,018	Cow Creek		Aquatic Life Cold 1 Recreation N (11/1-4/1) Recreation P (5/1-10/31) Water Supply Agriculture
			Other tributaries to the Uncompahgre River		Aquatic Life Cold 2 Recreation N (11/1-4/1) Recreation P (5/1-10/31) Water Supply Agriculture

1 - Waters are designated either warm or cold based on water temperature regime. Class 1 water's are capable of sustaining a wide

variety of cold or warm water biota, while class 2 waters are not.

2 -Class E - Existing Primary Contact Use - These surface waters are used for primary contact recreation or have been used for such activities since November 28, 1975.

- Class P - Potential Primary Contact Use - These surface waters have the potential to be used for primary contact recreation. This classification shall be assigned to water segments for which no use attainability analysis has been performed demonstrating that a recreation class N classification is appropriate, if a reasonable level of inquiry has failed to identify any existing primary contact uses of the water segment, or where the conclusion of a UAA is that primary contact uses may potentially occur in the segment, but there are no existing primary contact uses.

- Class N - Not Primary Contact Use - These surface waters are not suitable or intended to become suitable for primary contact recreation uses. This classification shall be applied only where a use attainability analysis demonstrates that there is not a reasonable likelihood that primary contact uses will occur in the water segment(s) in question within the next 20-year period.

3 - Waters suitable for irrigating crops usually grown in Colorado.

4 - Waters 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: the Uncompahgre River and tributaries, including: Cow Creek, Chaffee Gulch, Billy Creek, Beaton Creek, Dolores Creek, Happy Canyon, and Horsefly Creek. Many of the tributaries to the Uncompahgre River flow intermittently, due to both the semi-arid climate and water diversions. High flow in the areas larger drainages occurs from both snowmelt and rainfall events. The snowmelt is typically generated from the high elevation headwater areas. Short duration flood flows occur from high intensity precipitation events associated with monsoonal air flow patterns in mid to late summer. Typically, these summer floods are localized and more significant on low order drainages.

Annual precipitation varies from about 12 inches at the lower elevations in the valley bottoms to more than 30 inches at the higher elevations. From 25 to 50% of the annual precipitation falls as snow during the colder months, depending on elevation. Most of the precipitation outside of the mid to late summer season occurs from frontal type storm systems, which are typically regional in size. Precipitation from frontal events occurs over a relatively long duration but at low intensity rates. In contrast, summer precipitation is commonly associated with the southwest monsoon air flow pattern, which can produce localized, short duration, and intense precipitation events.

Salinity concentrations in the landscape unit's waters, vary with climate, geology, and land uses. Within the landscape unit, most of the tributaries to the Uncompahgre River are intermittent and lack specific water quality data. Specific Conductance readings on the Uncompahgre River can act as an indicator of the salinity loading from lands within the landscape unit that drain to the river. Figure 1.17 shows the specific conductance in the Uncompahgre River at Ridgway towards the upper end of the landscape unit, at Colona in the mid to lower reaches of the unit and at Delta, several miles downstream of the landscape unit. The data show the river has a slight decrease in salinity from the Ridgway to the Colona monitoring stations. This is likely a result of relatively low salt laden tributary inflows, such as Dallas and Cow Creek. However, down stream of Colona, where the Mancos shale formation and agricultural activities increase, salinity concentrations are significantly greater.

The Colorado's Unified Watershed Assessment (Table 1.9), 12/1998, ranked both the Uncompahgre Basin as Category 1, defined as "Watersheds in Need of Restoration", due to salinity management issues and lower reaches of the Uncompahgre on the state's 3030(d) list.

Table 1.10 contains the streams in the LHA area that are water quality limited, or in violation of state water quality standards. The copper and iron impairment on the Uncompahgre River is dominantly related to the upper reaches of the river in the San Juan mining district,

Figure 1.16 Colona LHA area streams and 5th level watersheds.

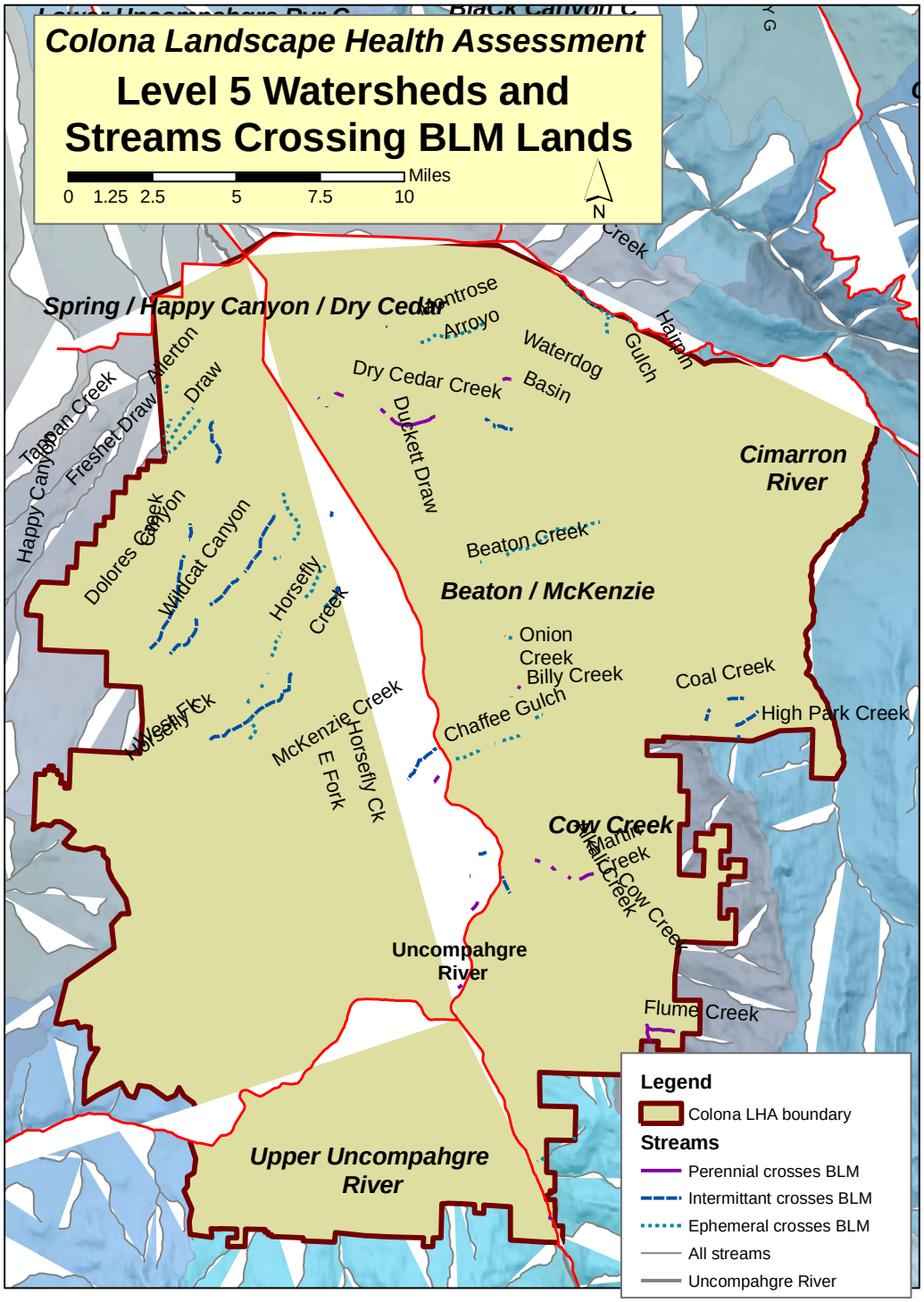


Figure 1.17 Specific Conductance along select points of the Uncompahgre River

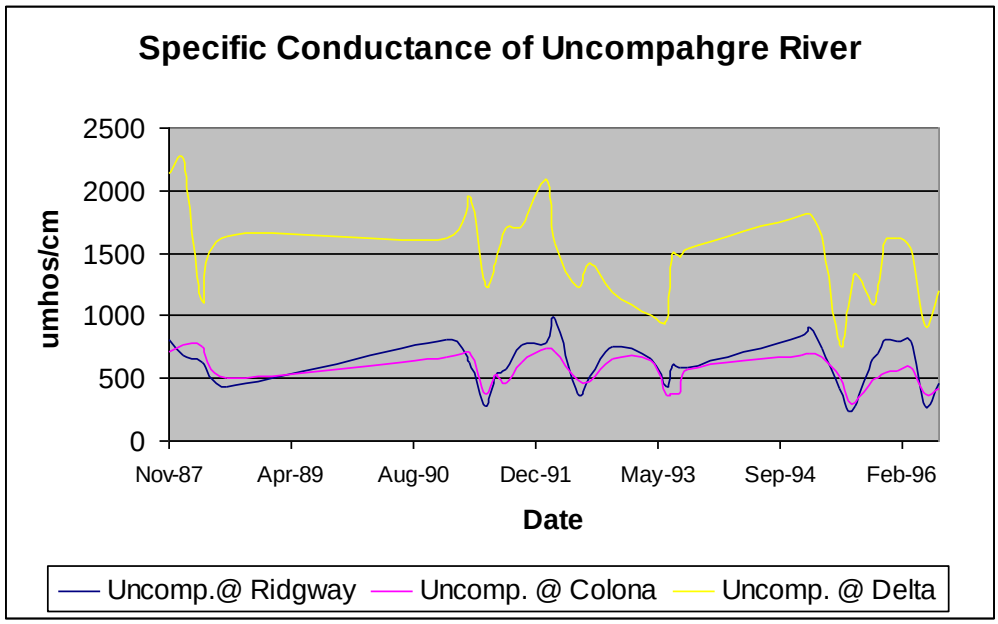


Table 1.9 Colorado Unified Watershed Assessment Ranking

4th Field Watershed	Category Rank*	Category Ranking for BLM Portion of Watersheds	Rationale for ranking
14020006 Uncompahgre	1	No Ranking	- 303(d) listed segments - EQIP Project area -Lower Gunnison Salinity Control Project

* Unified Watershed Assessment ranking are defined as:
Category 1: Watersheds in need of restoration.

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

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

Table 1.10 Water Quality Limited Stream Segments Requiring the Implementation of the Total Maximum Daily Load Process (TMDLs) – (303)d List

Segment Description	Portion	Impairment	Priority
Uncompahgre River, Red Mountain Creek to Montrose	all	Copper, Iron (total recoverable)	High
Tributaries to Uncompahgre River, South Canal to Gunnison River	all	Selenium	High

Table 1.11 lists the stream segments in the LHA area that are on Colorado's Monitoring and Evaluation List. This list identifies water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more listing factors, such as the representative nature of the available data. Water bodies that are impaired but whether the cause of impairment is attributable to pollutants as opposed to pollution is unclear are also included on the M&E List. Aquatic macroinvertebrate population density and composition are commonly evaluated to assess and monitor the stream health. Macroinvertbrates are good indicators of stream health, as there are usually many species that are relatively immobile, and many invertebrates are sensitive to pollutants. Additionally, invertebrates are good indicators because of their year-round presence in the stream environment and also because they are capable of reacting to intermittent discharges.

Table 1.11 Water Bodies Identified By the State of Colorado for Monitoring and Evaluation.

Segment Description	Impairment
Ridgway Reservoir	Dissolved Oxygen
Alkali Creek	Selenium
Billy Creek, Onion Creek	Selenium

Groundwater occurrence in the LHA area occurs in bedrock aquifers in the Dakota and Morrison formations, and in unconsolidated surface deposits of alluvium and colluvium (Table 1.12). Ground water in the bedrock aquifers flows in the direction of the geologic dip. On public lands within the LHA area, there are about 8 known springs, most discharging from small localized, unconsolidated aquifers. On average they have good water quality, with Total Dissolved Solids concentrations less than 500 ppm, as implied by the conductance values.

Table 1.12 Springs within the Colona LHA Unit.

Spring name	Flow rate cfs	Elevation feet	Location	Sample Date	Temperature Degrees F	Conductance (umhos/cm)	pH (su)
Dolores Spring	0.002	7400	T.47 N., R.9 W., S.19, SESW, NMPM	8/13/1982	9	430	7.3
Baldy Spring 1	0.004	9320	T.45 N., R.8 W., S.36, NESW, NMPM	6/22/1982	10	250	7.8
Baldy Spring 2	0.002	9560	T.45 N., R.8 W., S.36, SESE, NMPM	6/22/1982	10	360	8.8
Baldy Spring 3	0.002	9760	T.45 N., R.8 W., S.36, SWSE, NMPM	6/25/1982	10	290	7.8
Baldy Spring 4	0.001	9400	T.45 N., R.8 W., S.36, SESE, NMPM	6/25/1982	10	200	7.7
High Park Spring	0.750	9800	T.47 N., R.7 W., S.36, NWSW, NMPM	10/18/1982	6	120	6.7
Zadra Spring	0.009	9360	T.45 N., R.8 W., S.36, NWNE, NMPM	7/25/1985	9	360	7.5
Baldy Park Spring	0.007	9300	T.45 N., R.8 W., S.36, NENW, NMPM	7/25/1985	8	600	7.0

METHODS

The land health assessment was conducted on public lands in the Colona LHA Unit during the period spanning April through June of 2007. The following procedures were used:

1). The area was first broken apart into 45 different polygons. Polygons were based on ecological sites (NRCS-USDA 2003) derived from soil mapping units (where available) and allotment boundaries. Because the Ridgway Soil Survey is incomplete, some areas in the LHA were subdivided based only on allotment boundaries and elevation lines. Polygons ranged from 23 to 4,718 acres in size. Some ecological sites within allotments were too small or minor to evaluate, and are categorized as "Unknown". Other areas were not sampled because they were on steep and rocky slopes. These were generally considered to be meeting the Land Health Standards. Other areas were not upland, so were not evaluated for Standards 1 or 3.

2). The interdisciplinary team made up of range, wildlife, ecology, hydrology, and T&E specialists ranged between 6-8 people. At the beginning of the field work period, the entire team worked together collecting data in order to gain consistency. Afterwards data was collected primarily by interdisciplinary teams of two to three people.

3). Each polygon was visited in the field, and land health assessment forms were used to describe the plant community characteristics, and various soil and community health attributes. Polygons were evaluated at one to five sites spread across the polygon. The sites were predetermined on maps, and not subjectively chosen in the field. Data collection occurred in the field. Most points were mapped by a GPS unit in the field. A photo of each site was also taken.

4). Riparian Proper Functioning Condition (PFC) data was collected at points along nearly all perennial and intermittent streams within each grazing allotment during the summer of 2006. 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 2006 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 Colona LHA area was conducted in the summer of 2007. 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 routes.

7). Data from the field forms and location data were 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. Based on the data collected in the field, mean values of groundcover and plant growth form cover were also calculated for each ecological site type (unique combinations of ecological site, slope and aspect).

8). A final determination for Standard 1 and for the vegetation portion of Standard 3 for each polygon was made by the ID team. This was done by evaluating all the sites in each polygon, and identifying problems with the range health indicators or by finding substantially lower than average values for the ecological site type. Problems were defined as a score of 1 or 2 for the following health indicators: runoff drainages, pedestals, plant distribution, community diversity,

exotic plants, or noxious weeds; or for scores of substantially more than 10% worse than average for soil cover or plant cover. Browse plant vigor attributes were also considered. The ID team judged each polygon as to whether it was meeting the standard (no substantive problems at any site in the polygon), not meeting the standard (substantive problems at one half or the majority of sites in the polygon), or meeting with problem areas (substantive 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 ratings (Meeting, Not Meeting, Meeting With Problems) were 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 of possible disturbances made on the site, grazing dates, reported livestock 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. In some cases this information may have influenced the final ratings for Standard 3 for the polygons.

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			
39,754	8,864	2,394	5,090	24

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 pedestal problems were insignificant across the Colona area, gullying was widespread near the floor of the Uncompahgre Valley. Much of this was on highly erosive Mancos shale derived soils, and was in some areas associated with stream channels (see Figure 2.2). In other areas, gullies occurred on loamy soils and were not closely associated with streams. Gullies follow an evolutionary process which includes headcutting that pushes the gully upstream of its initial starting point. Because of this characteristic, the presence of a gully at a site may or may not be attributable to other characteristics or management of the site. It does however reflect a loss of soil at the site, which is very important to site productivity.

Active Soil Erosion–Runoff Drainages

Runoff drainages occur where water fails to infiltrate into the soil and instead runs off the site as overland flow. Water running over the soil surface is an important source of soil erosion, carrying off soil particles as it goes. An additional concern is that water which does not enter into the soil is unavailable for plant growth. This reduces productivity in an area that is already constrained by a dry climate. Runoff drainage problems were minor across the unit (Figure 2.3). However, the area east of Montrose had multiple sites with runoff drainage problems. These problems were mainly found on steep slopes derived from the highly erosive Mancos shale, and were generally not thought to be excessive for the site and soil type.

Figure 2.1 Colona LHA Standard 1 Polygon Ratings.

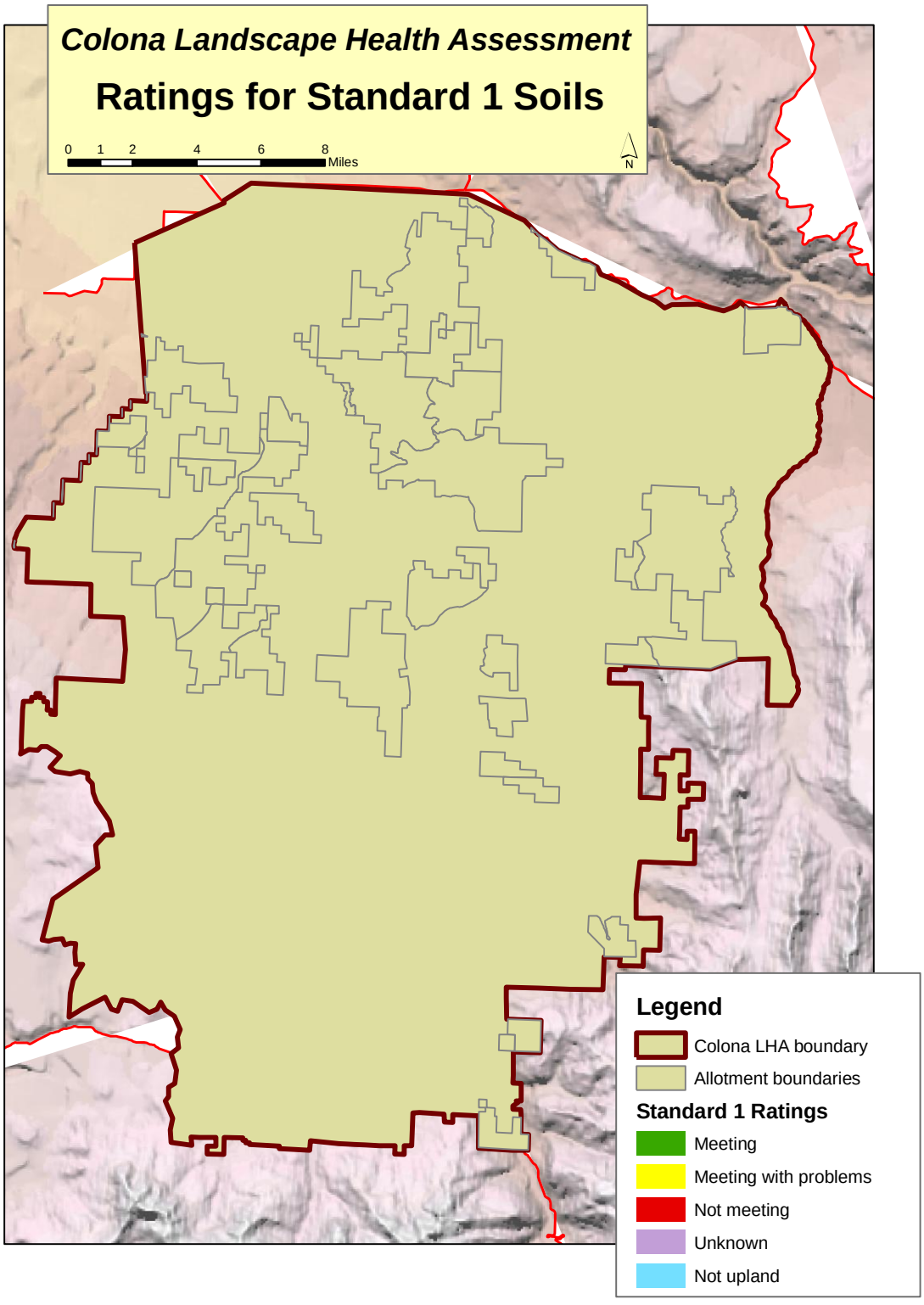


Figure 2.2 Colona LHA Area soil erosion problems: map shows all sites with gully activity (Rosgen type F and G channels), and soil pedestals (sites with scores of 1 or 2 on the Rangeland Health Indicators data sheet.)

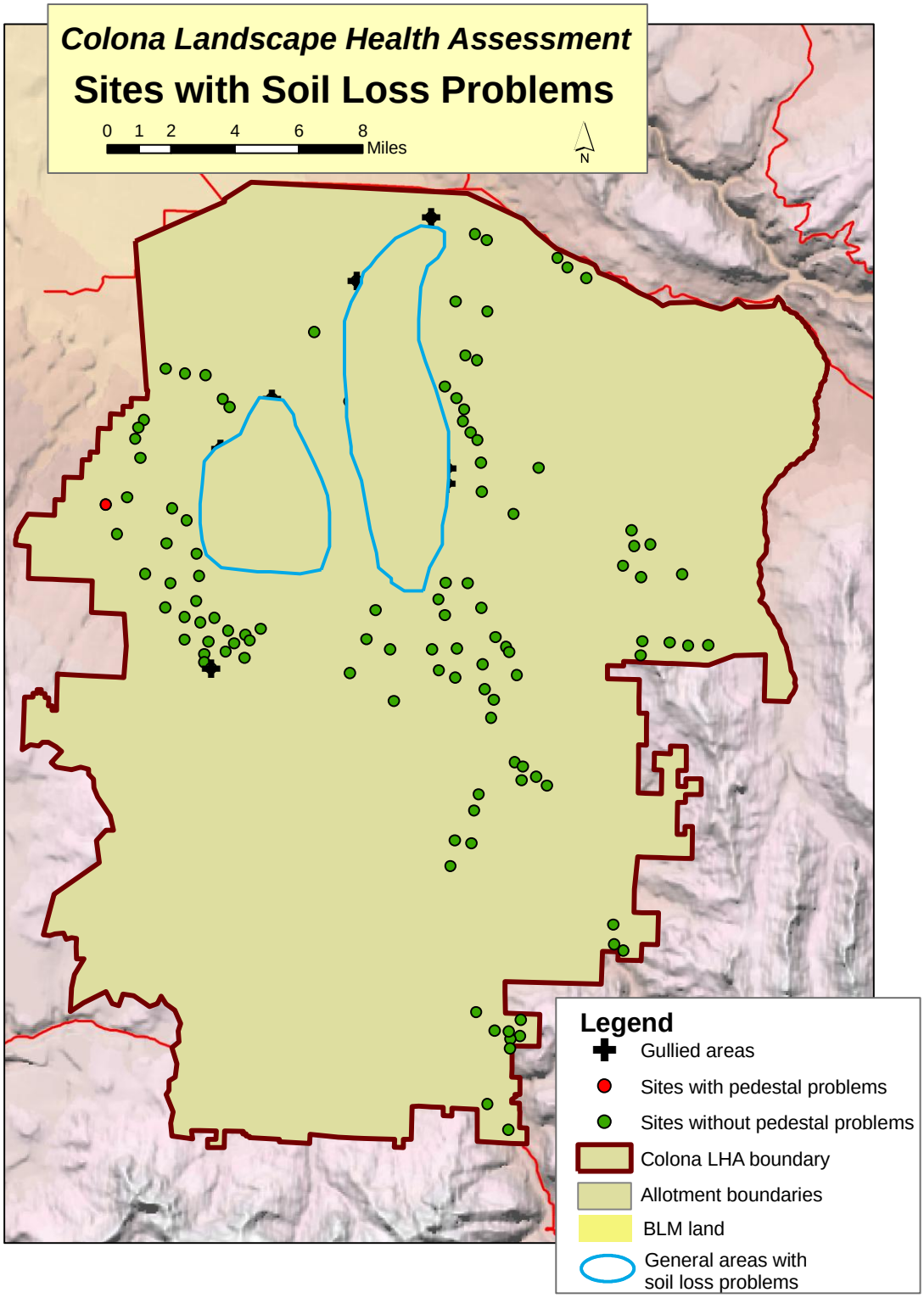
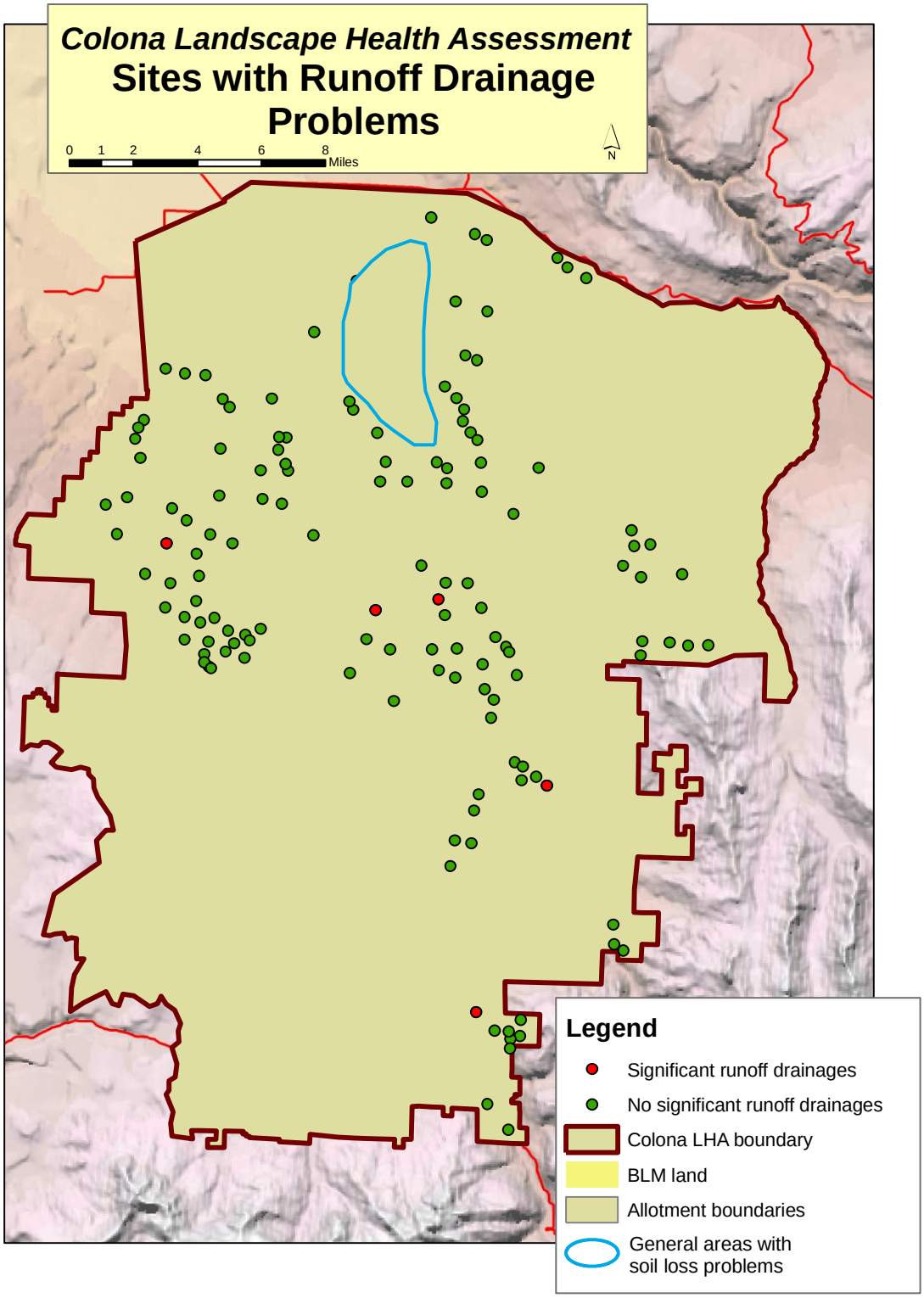


Figure 2.3 Colona LHA Area runoff related problems. Sites with erosion associated with overland flow: runoff drainage scores of 1 or 2 on the Rangeland Health Indicator sheet are considered problem sites.



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. High levels of bare soil were found at many sites throughout the Colona unit, with the exception of the higher elevations (Figure 2.4). These sites had substantially higher bare soil than the average values for the ecological sites. Several locations with concentrations of problem sites were found in the central part of the LHA area and are identified by blue circles in Figure 2.4.

Low Plant Basal Cover

Plant basal cover is one of the best sources of soil protection since it protects the soil surface from wind and water erosion, and binds soil particles together with roots. The percent of ground covered by the crowns of perennial plants (basal area) was used as an important indicator of the level of soil protection. In addition to elevating the risk of soil erosion, low basal cover is a concern because the site is producing less vegetation, less vigorous vegetation, or a different type of vegetation than it is capable of producing. Low basal cover was found at many sites throughout the LHA area, to a greater degree than bare soil (Figure 2.5). Most of the areas where low plant basal cover is found are located in the west and central parts of the Colona unit, as identified by the blue circles in Figure 2.5.

Low Litter Cover

Litter (the term for dead plant parts on the soil surface) is another plant-related source of soil protection. Litter is made up of persistent or long term litter which is typically the larger and woodier component, and nonpersistent litter which is finer and quickly degrades. Although the nonpersistent portion of litter tends to be less permanent than plant basal cover, persistent and nonpersistent together serve to protect the soil surface and enhance water infiltration by slowing movement of overland flow of water. In addition, as litter decomposes it adds to the organic material in the soil, increasing soil productivity.

As with bare soil and plant basal area, low litter cover was also found to occur at many sites throughout the unit with the exception of the higher elevations (Figure 2.6). Concentrations of sites with low litter cover were again found in the western and central parts of the Colona area, as identified by the blue circles in Figure 2.6. Litter cover varied widely in the pinyon-juniper and mountain shrub ecological sites, and was mainly tied to the density of trees and shrubs at a site. In some areas litter values were inflated by thick cheatgrass cover, or by recent vegetation treatments which have chipped up the woody plants and created a sort of mulch on the soil surface.

Other Soil Disturbances

During the field assessment phase of conducting the land health assessment, several roads were encountered that exhibited accelerated erosion. The water quality section of this assessment shows such a road on Log Hill Mesa. Additionally, a trespass road was encountered in Taylor Draw that was poorly constructed, lacking drainage and erosion control features (Figure 2.7). Several invasive weed species were lining the roadway, which have the potential to spread to adjacent sites.

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

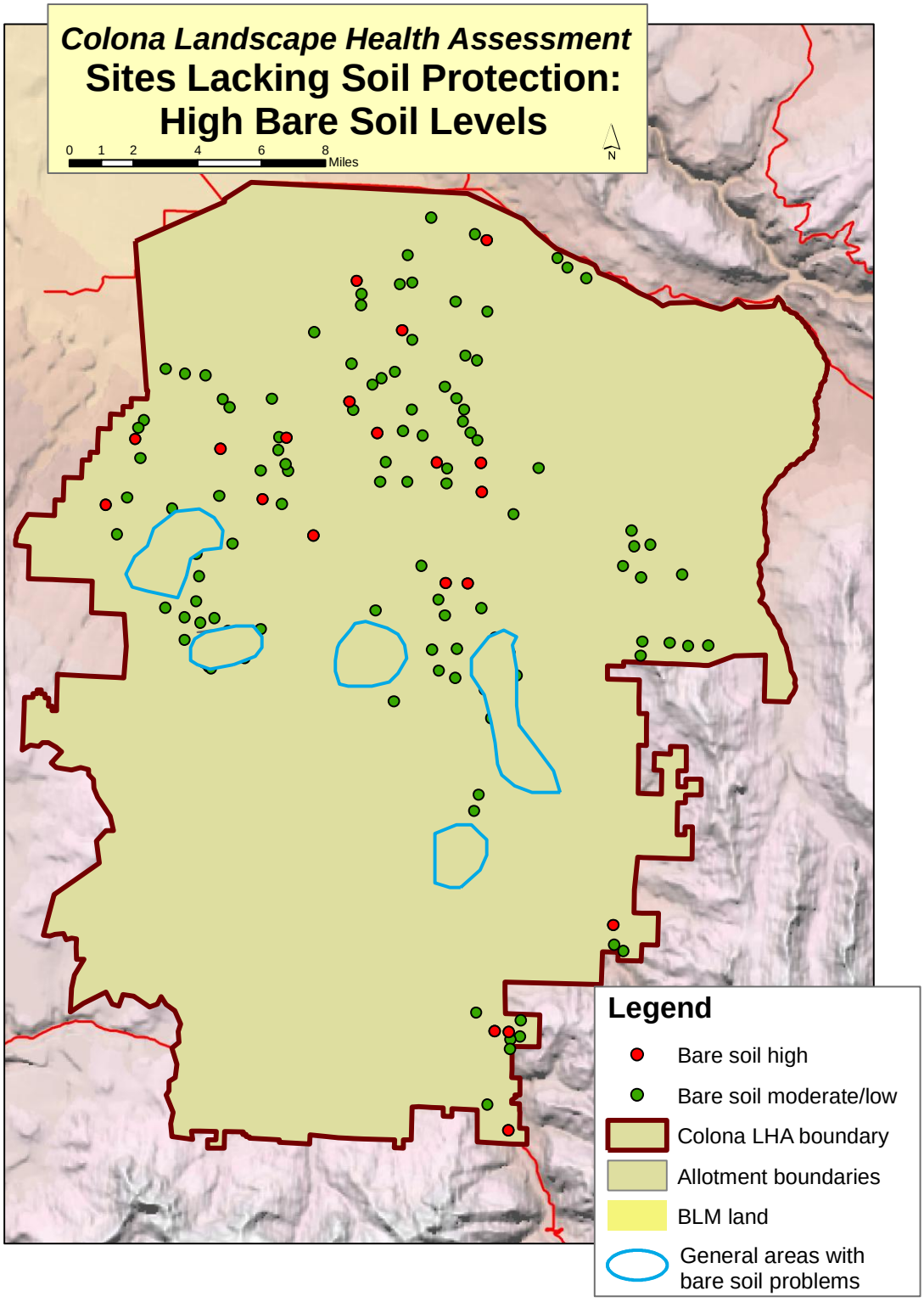


Figure 2.5 Colona LHA Area sites with low plant basal cover. On this map red dots denote sites with basal cover worse than 10% below average for the ecological site.

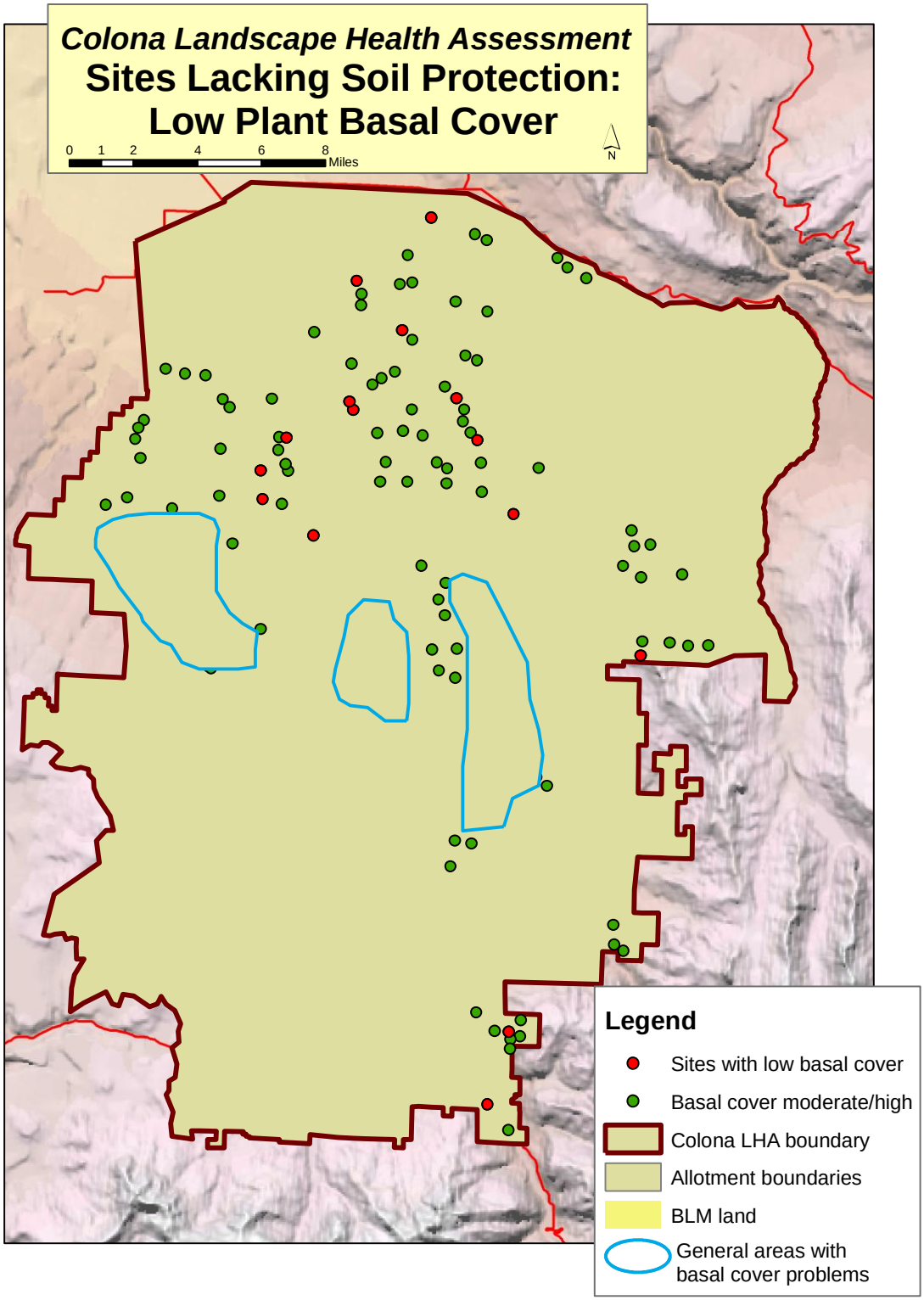


Figure 2.6 Colona LHA Area sites with low litter cover. On this map, red dots denote sites with litter cover worse than 10% below average for the ecological site.

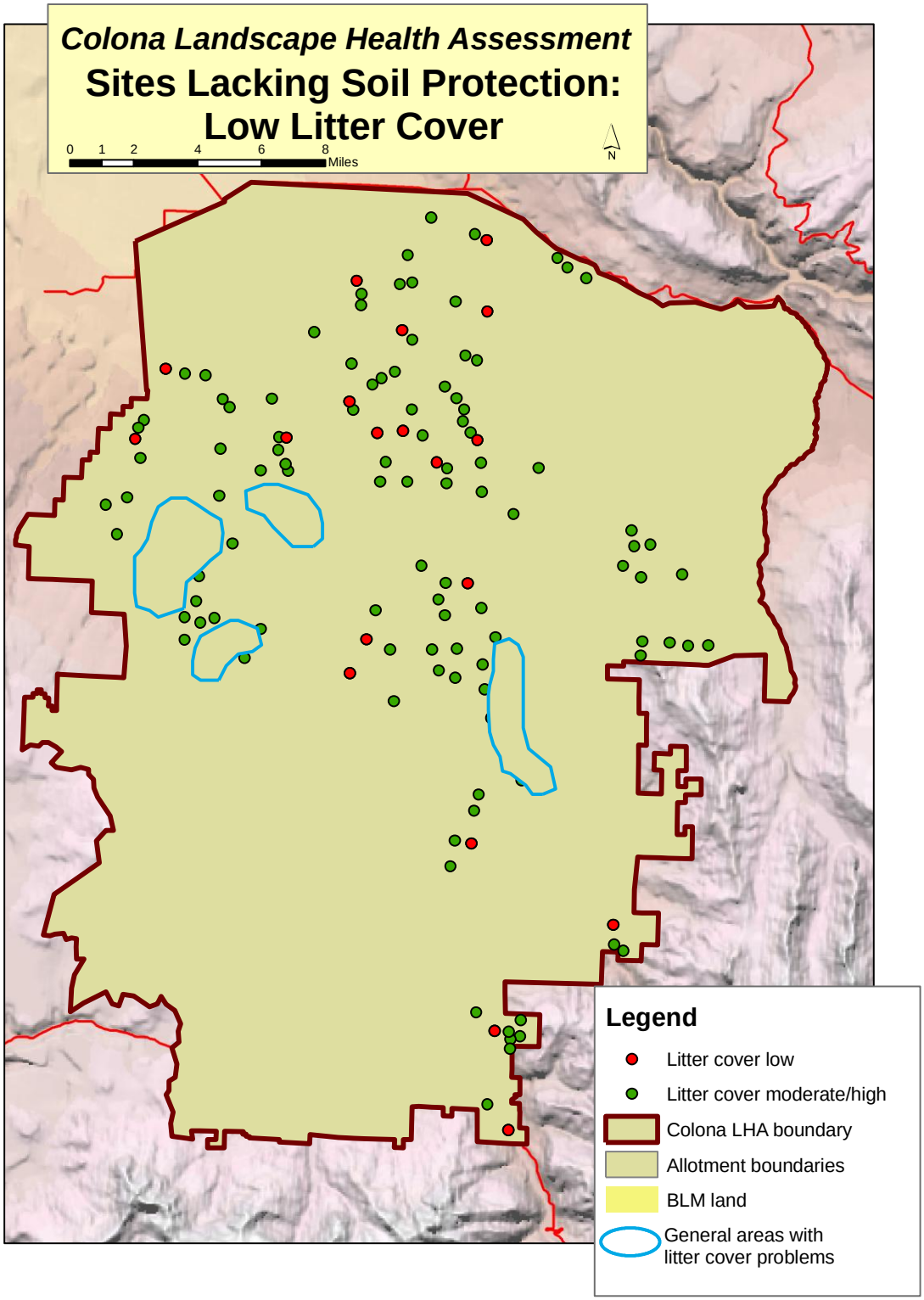


Figure 2.7 Trespass road construction.

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

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

Mileage Figures

Meeting Standard 2		**Not Meeting Standard 2**	**Unknown**
Meeting	Meeting with problems		
14.7 miles	5.5 miles	3.6 miles	1.5 miles

See figure 3.1 for stream segment ratings.

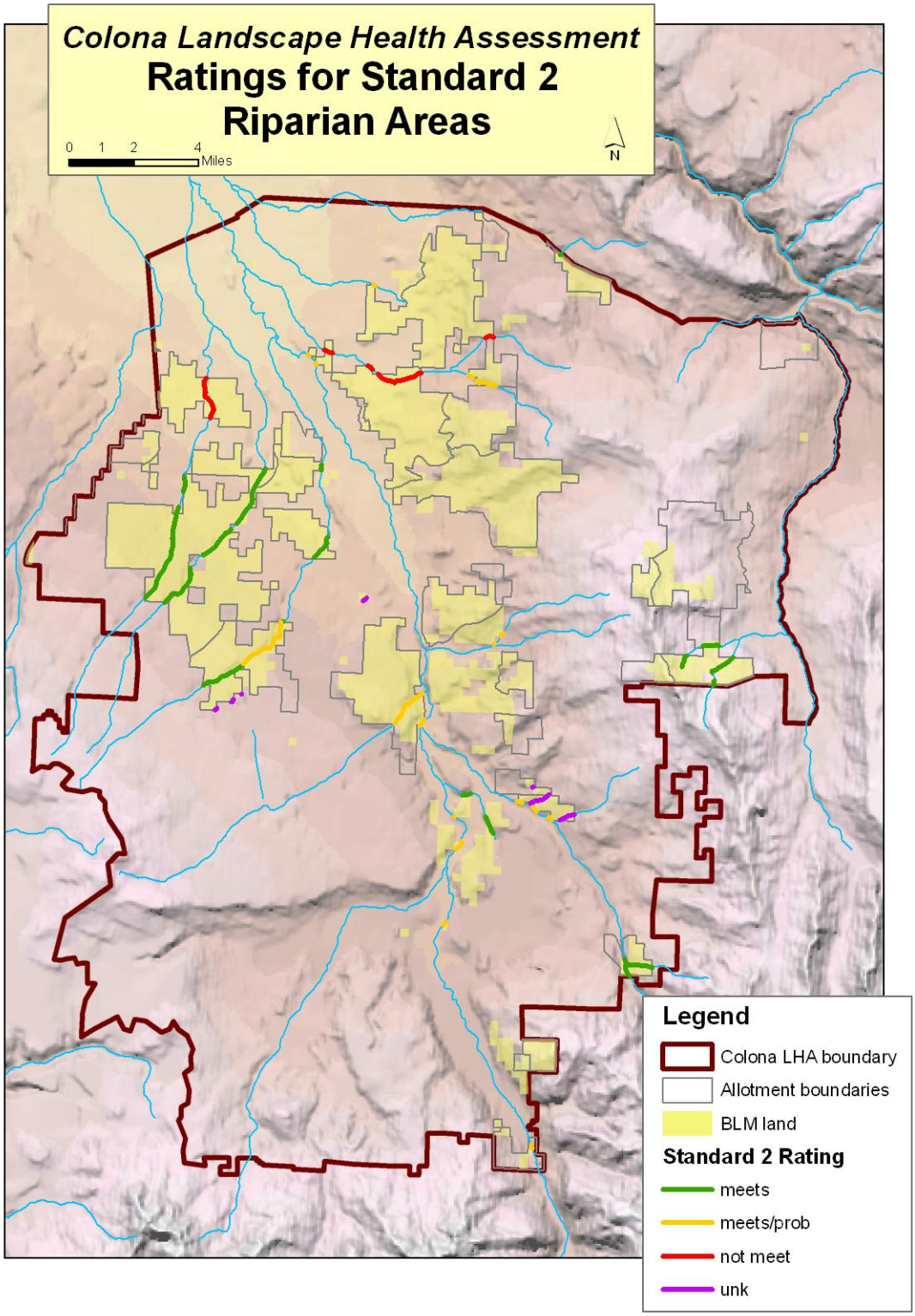
Specific Problems

The majority of riparian areas on public land in the landscape unit fully meet Standard 2. These streams have no evident problems with hydrology, vegetation, or excessive erosion and deposition from either the stream channel or from the watershed. While some of these streams do have minor weed problems, they are not yet affecting stream functionality. This is the case despite significant flow alterations from extensive water developments and manipulations throughout the region. Out of the total 25.3 miles of perennial or intermittent streams, 5.5 miles were rated as "functioning at risk", which we have translated into "meeting Standard 2 with problem areas". An additional 3.6 miles did not meet Standard 2. All problem streams are detailed below.

Brook Creek: A short reach (0.1 miles) of this intermittent stream passes through two corners of BLM land. It was rated as meeting Standard 2 with problems, mainly because of high levels of noxious weeds in the riparian area, and limited areas where the floodplain was not fully functional. Houndstongue, Canada thistle, burdock and whitetop were the main weeds found, and these species are widespread in watersheds around Brook Creek. The floodplain problems are consistent with low streamflow. The Brook Ditch diverts flow (up to 3 cfs) from the stream above the reach which crosses BLM. The area is not allotted for livestock grazing.

Cow Creek: Approximately 0.4 miles of the lower reaches of Cow Creek was rated as meeting Standard 2 with problems. This distance is made up of several shorter, isolated segments which cross separate corners of BLM land. A variety of channel and vegetation problems were found, although none of them was especially widespread or serious, other than stream channel lateral instability. Lack of adequate riparian vegetation in some areas was likely a product of the channel instability, and possibly also related to willow reductions on neighboring agricultural

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



land. There are also 11 water diversions from Cow Creek upstream of this reach (diverting 32.25 cfs, and the Cow Creek Feeder Canal, which affects an additional 325 cfs) which influence flow levels. See Figure 3.1 for a photograph of this reach of Cow Creek.

Dry Cedar Creek: All of the 2.2 miles of this stream which flow through BLM land were rated as not meeting Standard 2. Both channel and vegetation problems were encountered. The channel problems mainly related to channel downcutting and associated floodplain and erosion problems. Riparian vegetation had poor age class and species diversity, and in some areas was not abundant or capable of protecting banks during high flows. Noxious weeds (tamarisk, burdock, whitetop and Russian knapweed) were also widespread. There is one diversion upstream of the BLM, and another midway through. Flows in this stream also appear to be augmented with agricultural runoff. This stream and its condition are typical of many which flow through the Mancos Shale soils below agricultural areas. See Figure 3.1 for a photograph of this reach of Dry Cedar Creek.

Happy Canyon Creek: About 1.4 miles of the lower reach of Happy Canyon Creek which flows through BLM were rated as not meeting Standard 2. This reach showed many channel and vegetation problems, most of which were consistent with low streamflow. Channel problems included vertical instability and downcutting along with a nonfunctional floodplain. Vegetation problems ranged from low age class and species diversity to low vigor and inadequate amounts and types of vegetation to protect streambanks during high flows. Upstream water diversions influence this stream (7.5 cfs is removed by the West Happy Canyon Ditch). It also receives heavy recreational and OHV use in the lower part of the reach.

Horsefly Creek: While somewhat more than half of the length of Horsefly Creek that flows through BLM fully met Standard 2, two miles of the middle reach were rated as meeting Standard 2 with problems. The problems related to low riparian plant vigor, and lack of the appropriate wetland species which are capable of protecting streambanks during high flows. These problems are consistent with low stream flow. There are at least two ditches which divert flows upstream of this reach (The Tierra Colorado and Edgar Williams Ditches remove up to 42 cfs). Additionally, long term drought is likely exacerbating the low flow problem.

McKenzie Creek: About 1.3 miles of McKenzie Creek flow through BLM. All of this stretch was rated as meeting Standard 2 with problems. The problems cited were similar to those on Horsefly Creek--low riparian plant vigor, poor species composition, and lack of the appropriate type and adequate amounts of wetland species needed to protect streambanks during high flows. Again, these problems are consistent with low streamflow. In addition, patches of the noxious weed houndstongue were found in the riparian vegetation. Several ditches divert water upstream of this reach (a total of 47 cfs are permitted for diversion). It is also downstream of extensive areas of private agricultural land.

Montrose Arroyo: Of the part of Montrose Arroyo which has perennial flow, only a very small portion flows through BLM land (0.04 miles). This was rated as meeting Standard 2 with problems. Most significant of these is a somewhat downcut channel, and the occasional, associated problems with a minimally functional floodplain, eroding channel, poor vegetation cover or the wrong type of vegetation to stabilize the streambanks. This stream receives augmented flows from agricultural runoff. As with Dry Cedar Creek, this stream shows the typical problems found on streams which flow through the Mancos Shale soils below agricultural areas.

Uncompahgre River: Small bits and pieces of the Uncompahgre River flow through BLM land in this LHA unit, totaling 0.8 miles in all (the longest stretch through BLM is 0.3 miles). The entire 0.8 miles is rated as meeting Standard 2 with problems. The river passes through extensive private agricultural and residential lands, and many parts of the upland watershed are altered by these land uses. Problems with the channel include failure of the riparian area to be at its potential width, areas of lateral channel instability, and an imbalance between sediment and flow. The riparian vegetation also has areas of poor vigor, inadequate vegetation cover to protect streambanks during high flows, and patches of noxious weeds including Chinese clematis, Canada thistle and Russian olive. The flow on the river is regulated by the dam at Ridgway Reservoir, and the flows are augmented by Gunnison River water below the town of Colona.

Waterdog Basin: Nearly 0.8 miles of this intermittent stream flow through BLM land. It was rated as meeting Standard 2 with problems. Problems with this stream are mainly related to riparian vegetation and include inadequate cover to protect streambanks during high flows and lack of regeneration on point bars. Some areas had inappropriate species to withstand flooding, low vigor, and noxious weeds including Canada thistle, tamarisk, whitetop and houndstongue. This stream is adjacent to private agricultural lands. It also has upstream diversions which probably affect streamflow.

Figure 3.1 Cow Creek on left, showing wide channel, on right Dry Cedar Creek showing non-riparian species (greasewood) and noxious weeds (whitetop) dominating riparian zone.

Standard 3 (Vegetation): *Healthy productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and habitats' potentials. 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			
17,334	29,220	4,459	5,090	24

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 by the vegetation. A diverse community also has greater resilience to disturbance, since the various species represent more survival and reproductive strategies and capabilities than would be present in monocultures. Figure 4.2 shows that diversity problems are not a widespread problem throughout the Colona LHA unit. However, there are areas along the edges of the Uncompahgre Valley bottom which have some low diversity sites.

Cool Season Grass Cover

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

Figure 4.1 Colona LHA Area Standard 3 ratings.

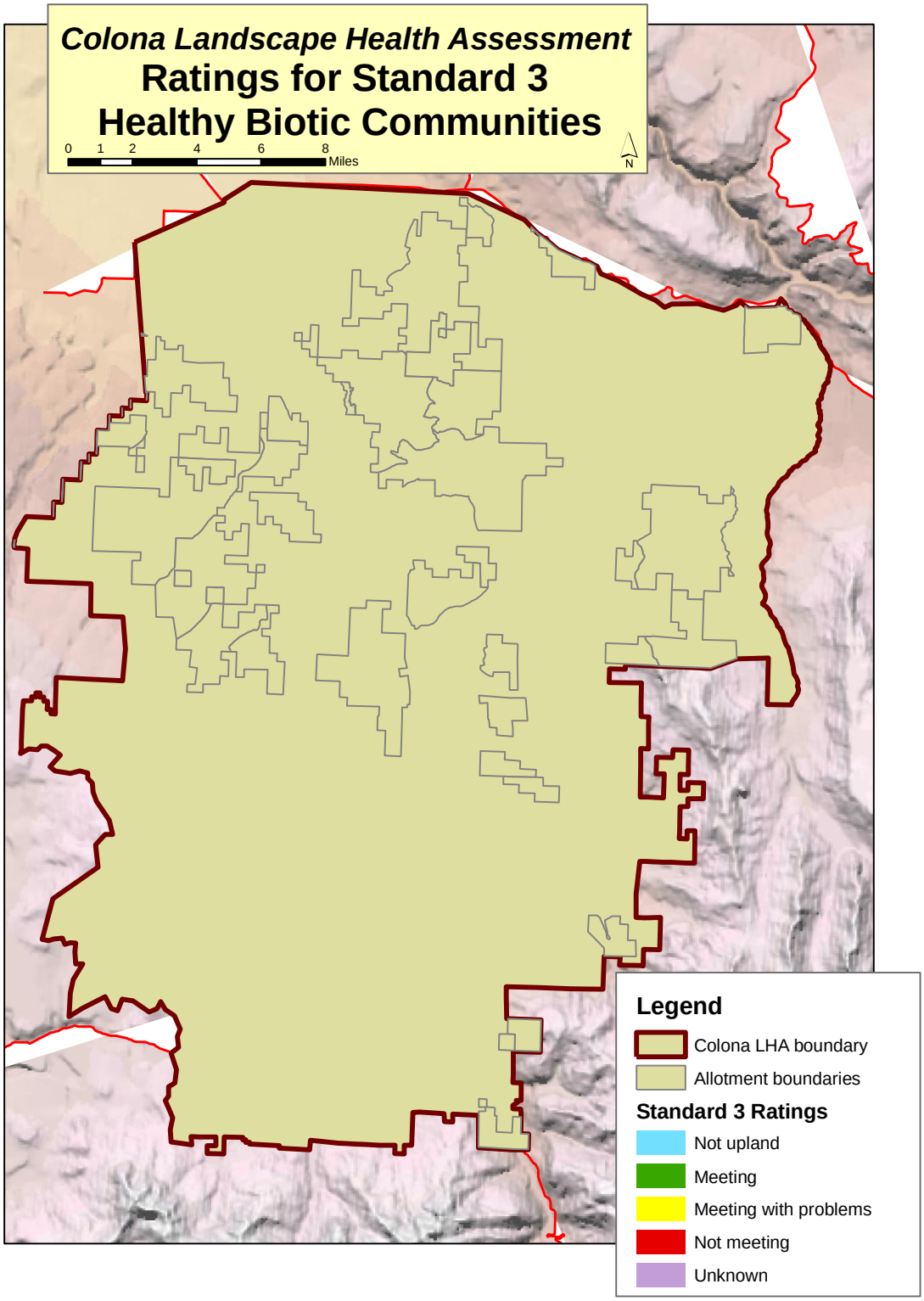


Figure 4.2 Colona LHA Area plant diversity. This map shows sites with Rangeland Health Sheet scores of 1 or 2 as diversity problem sites, scores of 3, 4 or 5 as adequate to good diversity.

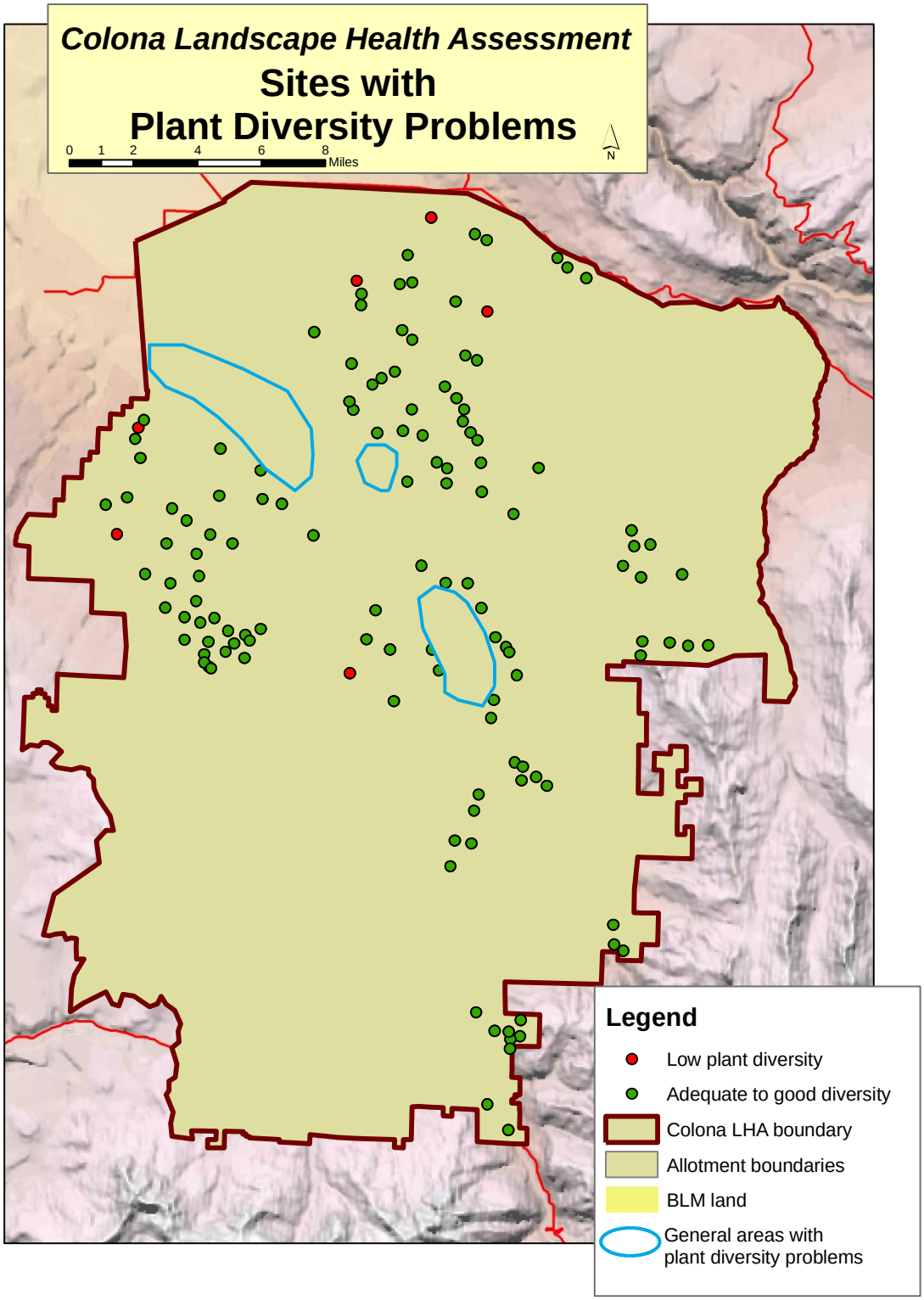
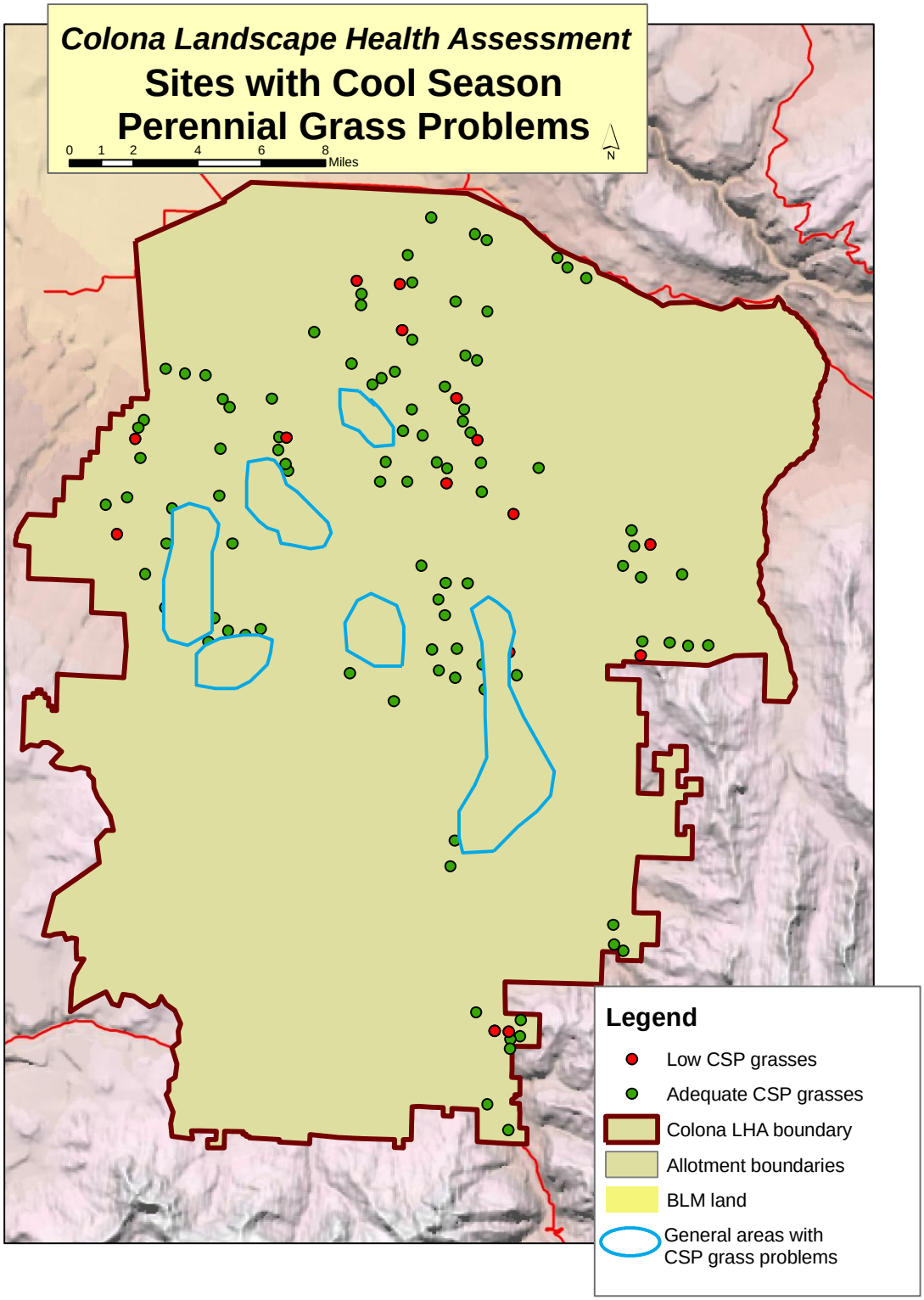


Figure 4.3 Colona LHA Area perennial cool season grass cover. On this map red dots denote sites with perennial cool season grass canopy cover worse than 10% below the average value for the ecological site.



Problems with low cool season grass cover were widespread across the Colona unit. Some patterns were evident in the distribution of these problems, with many of the steep, mountain shrub dominated sites having comparatively low cool season grass cover. There were also problems in the higher elevation pinyon country which may be connected to the vegetation treatment history throughout that vegetation zone.

Warm Season Grass Cover

Warm season grasses germinate and grow during periods of summer moisture. This capability enables them to use monsoonal moisture during warm periods when cool season grasses are mostly dormant. Warm season grasses are growing and vulnerable to grazing during the summer, a season in which only higher elevation BLM lands are grazed. Historically, vegetation treatments and seedings have reduced warm season grasses in many areas across BLM lands. The Colona area has had a great number of vegetation treatments where the topography permits. In addition, many other parts of the Colona LHA area have very low levels of warm season grass, perhaps as a result of local climate patterns and soil characteristics. Several broad areas that had problems with warm season grasses were observed across the lower elevations of the LHA unit (Figure 4.4).

Perennial Forb Cover

Perennial forbs are a source of diversity, nectar, seeds, palatable forage, varied photosynthetic periods and root morphologies. These characteristics increase a community's water and sunlight capturing capabilities, biomass production, and ability to support animals. Although typically not a dominant plant type, forbs fill many important niches in a plant community. Like the cool season perennial grasses, perennial forbs are one of the native plant types that appear to have been most impacted by historic grazing, especially at lower elevations. Native perennial forbs have also been reduced in many areas by past BLM treatments and seedings. Percent perennial forb canopy cover is used as an indicator of plant community health and wildlife habitat quality.

Low perennial forb cover was found across many parts of the Colona LHA unit (Figure 4.5). Problems with forbs were found in many of the same locations where cool season grasses were at low levels.

Pinyon-Juniper Invasion and Decline

Pinyon and juniper trees are native species which live for centuries and have been common in the region for thousands of years. However, historic photos and tree stand structure indicate that in some areas across the Uncompahgre Field Office, pinyon-juniper woodlands are becoming denser than they were in the past and are expanding into other plant communities. As this occurs, herbaceous and shrub species visibly decline in dominance and vigor, and the landscape loses patch diversity at the larger scale. Pinyon and juniper invasion (as evidenced by young age classes of trees dominating a site) is used as an indicator of plant community health and wildlife habitat quality. Tree invasion was found in only two relatively small parts of the unit (Figure 4.6), and was occurring mainly as tree reestablishment in formerly chained woodland.

Recent long-term drought has brought on an ips beetle epidemic in much of southwestern Colorado. Many other pinyon pathogens have also combined with these to create "pinyon decline" which kills the pinyon trees. Because pinyon are such an important part of the plant communities in western Colorado, pinyon decline was used as an indicator of health, and captured by evaluating pinyon tree vigor at each site. While many trees which had died two or more years ago were observed in numerous areas across the Colona unit, only a few sites had

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

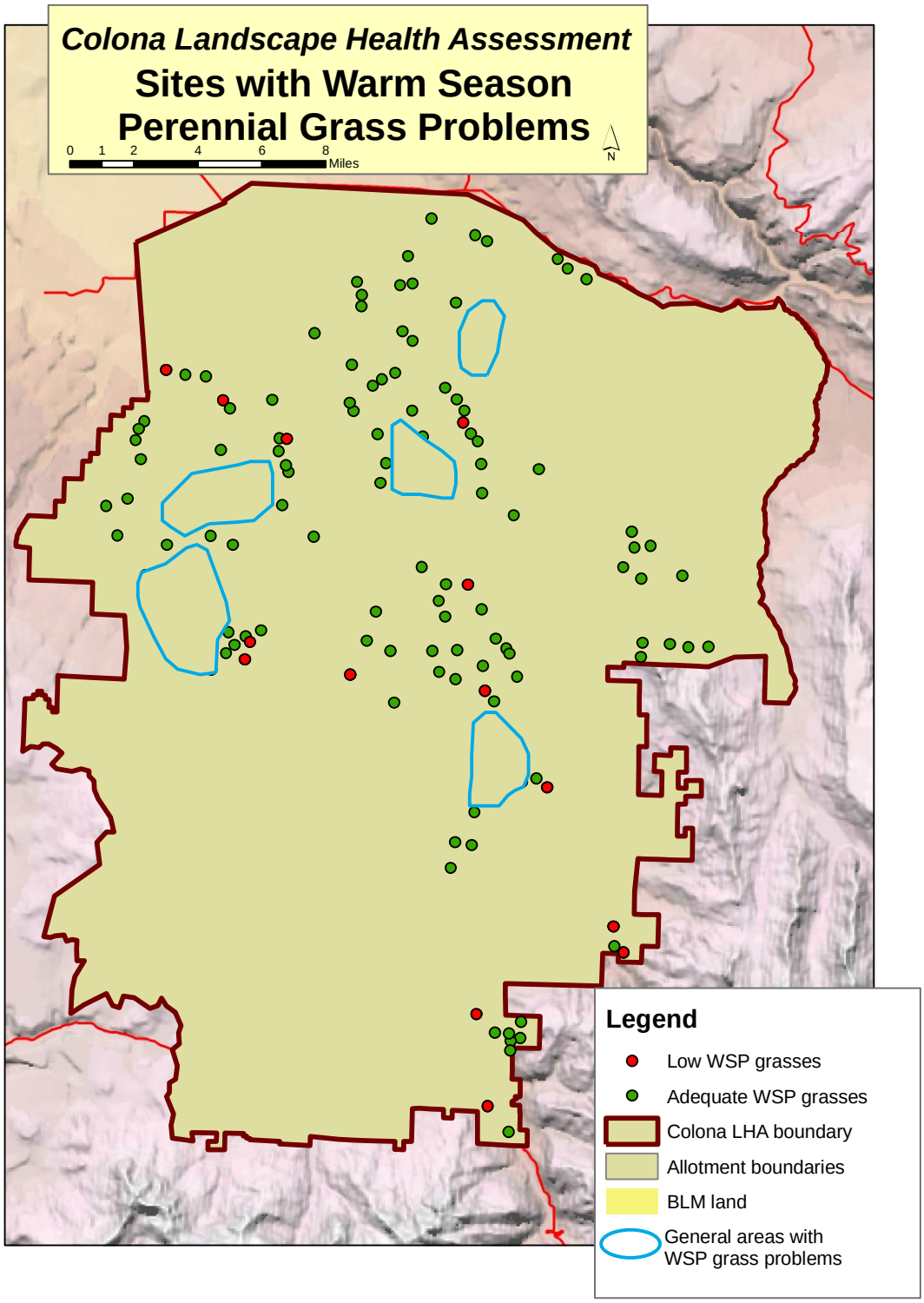


Figure 4.5 Colona LHA Area perennial forb cover. On this map red dots denote sites with perennial forb canopy cover values worse than 10% below the average value for the ecological site.

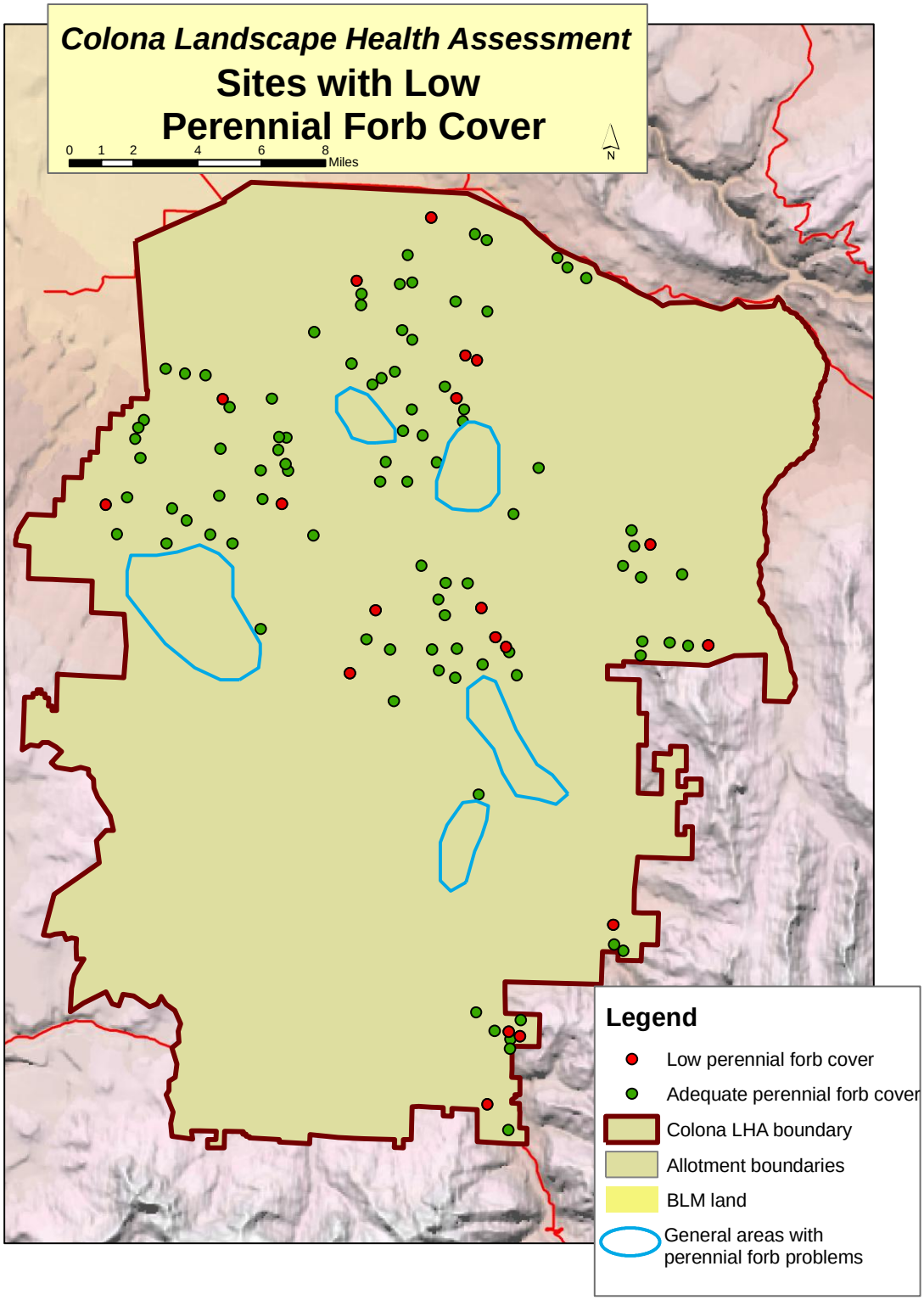
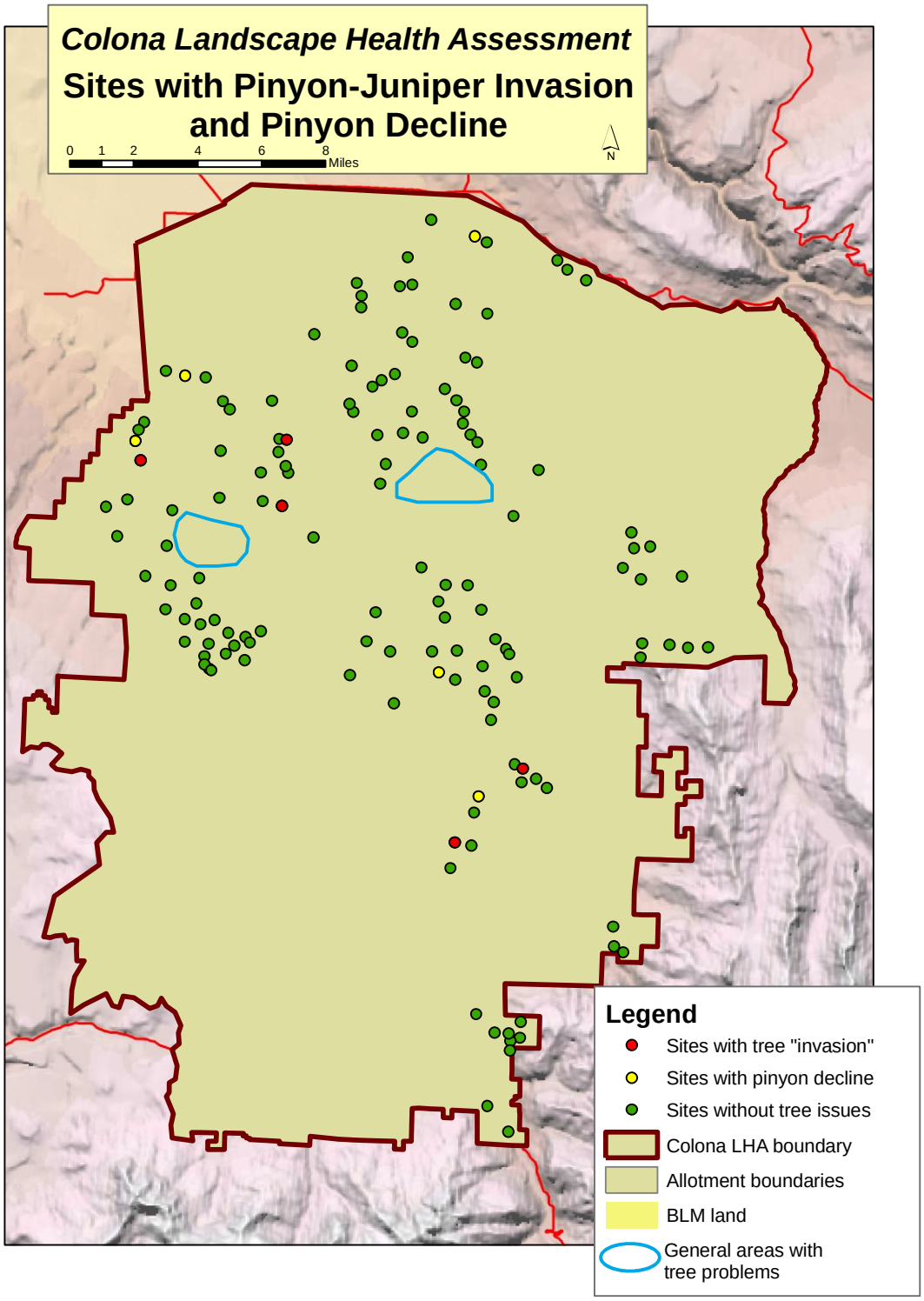


Figure 4.6 Colona LHA Area pinyon-juniper invasion and pinyon decline. Red dots denote sites where young age classes of either pinyon or juniper are the dominant tree age classes on the site. Yellow dots denote sites where most of the living pinyon trees are in a state of low vigor.



much evidence of currently dying trees. This may indicate that most of the pinyon decline has passed.

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 poor plant community health and wildlife habitat quality.

Exotics are a significant problem across the LHA area (Figure 4.7). About 10% of the sites visited were dominated by exotic plants, and these were located in the lower elevations of the Colona unit. There appeared to be an association between exotic dominance, lower elevation plant communities, and proximity to agricultural lands. Exotics were present at significant levels within the communities, but not dominant at an additional 38% of the sites.

The primary exotic species encountered were cheatgrass (*Bromus tectorum*), Kentucky bluegrass (*Poa pratensis*), the seeded species crested wheatgrass (*Agropyron cristatum*), burr buttercup (*Ceratocephela testiculata*), and European madwort (*Alyssum simplex*). Cheatgrass is an exotic species of particular concern, as it has completely overtaken and transformed many plant communities in the Great Basin. Land managers in the Colorado Plateau region are concerned that this area may be on the threshold of a similar level of cheatgrass invasion. Of the 154 sites visited in the Colona LHA area, cheatgrass occurred at very high levels at 2% of the sites, and an additional 5% had significant cover of cheatgrass. Cheatgrass was present at low canopy cover levels in 27% of the remaining sites, and was at trace amounts at another 13% (Figure 4.8). The remaining 53% of sites were free of cheatgrass. The cheatgrass problems were found throughout the unit except at the upper elevations and on some of the Mancos shale derived soils. Burned and other heavily disturbed areas in the Colona unit appear to have the most widespread and densest infestations of cheatgrass.

Noxious Weed Infestations

Noxious weeds are those exotic species which are formally designated by the state of Colorado as noxious. On or very near to Colona area BLM lands, the following noxious weed species are established: Russian knapweed (*Acroptylon repens*), jointed goatgrass (*Aegilops cylindrica*), lesser burdock (*Arctium minus*), hoary cress (*Cardaria draba*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), yellow star-thistle (*Centaurea solstitialis*), oxeye daisy (*Chrysanthemum leucanthemum*), bull thistle (*Cirsium vulgare*), field bindweed (*Convolvulus arvensis*), houndstongue (*Cynoglossum officinale*), Russian olive (*Eleagnus angustifolia*), halogeton (*Halogeton glomeratus*), horehound (*Marrubium vulgare*), bouncingbet (*Saponaria officinalis*), tamarisk (*Tamarix chinensis*), and cocklebur (*Xanthium strumarium*). Of these species, Russian knapweed, musk thistle, hoary cress and Canada thistle are the most widespread.

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

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

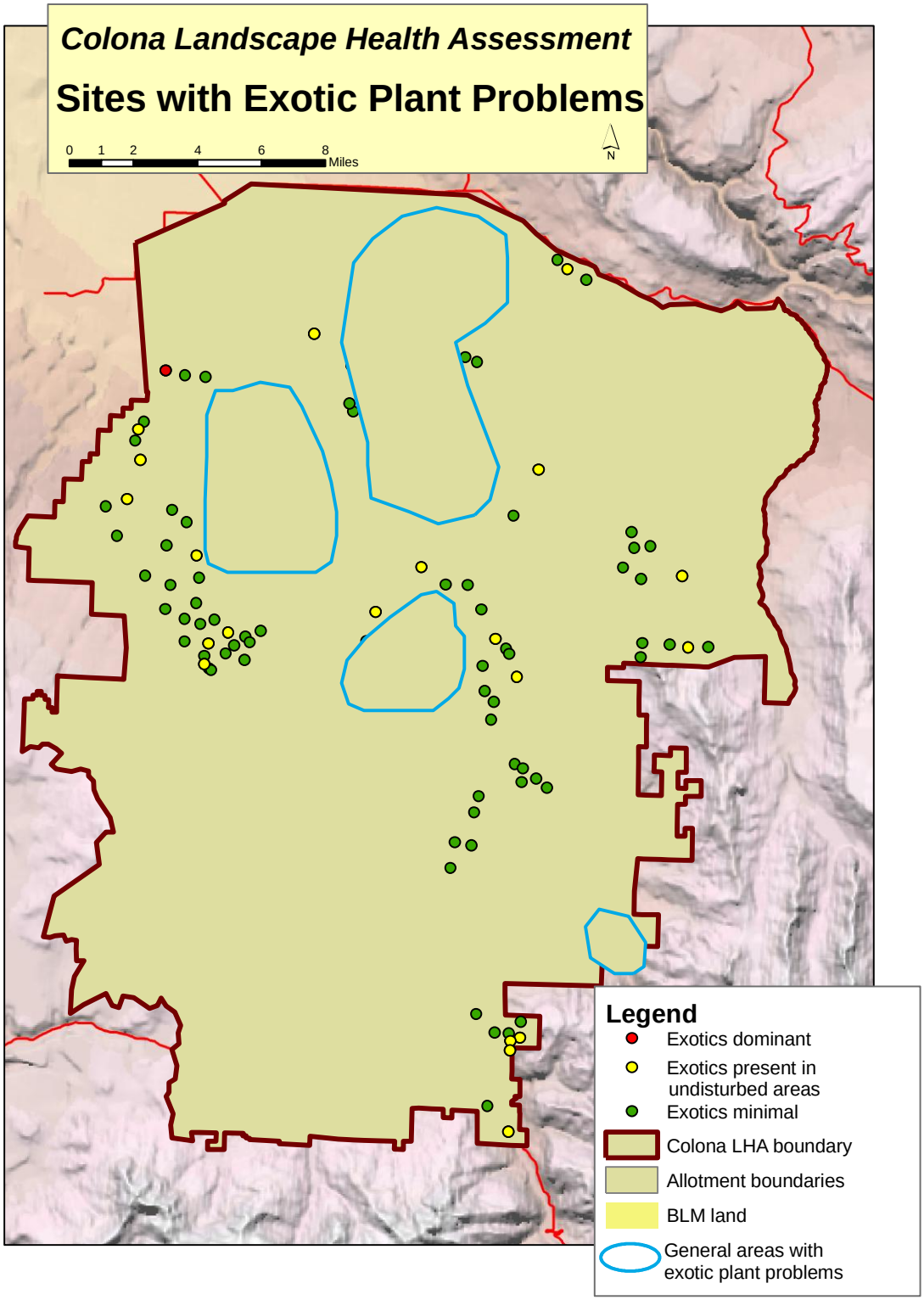


Figure 4.8 Colona LHA Area cheatgrass infestations. This map shows sites with cheatgrass at varying levels of canopy cover.

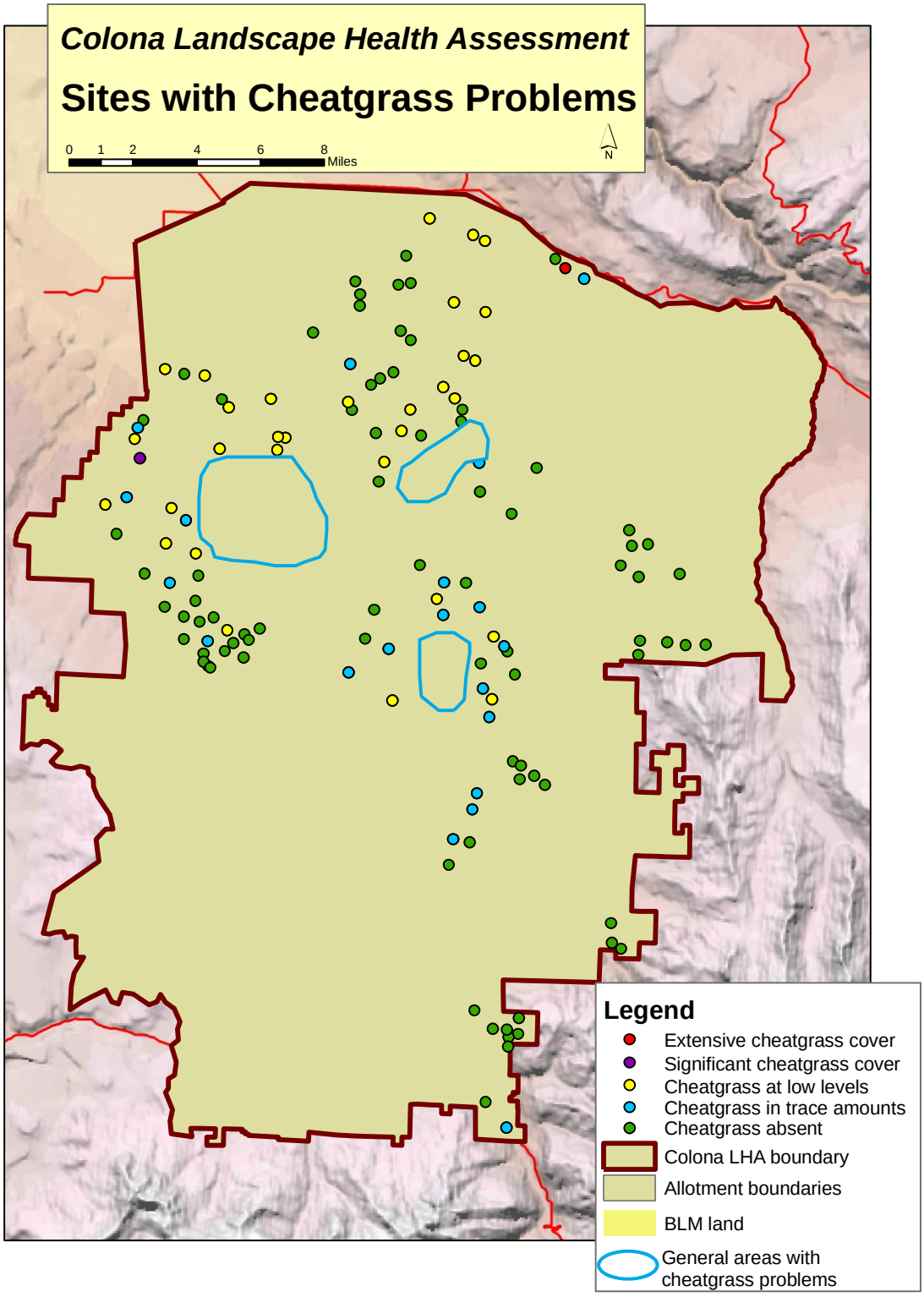
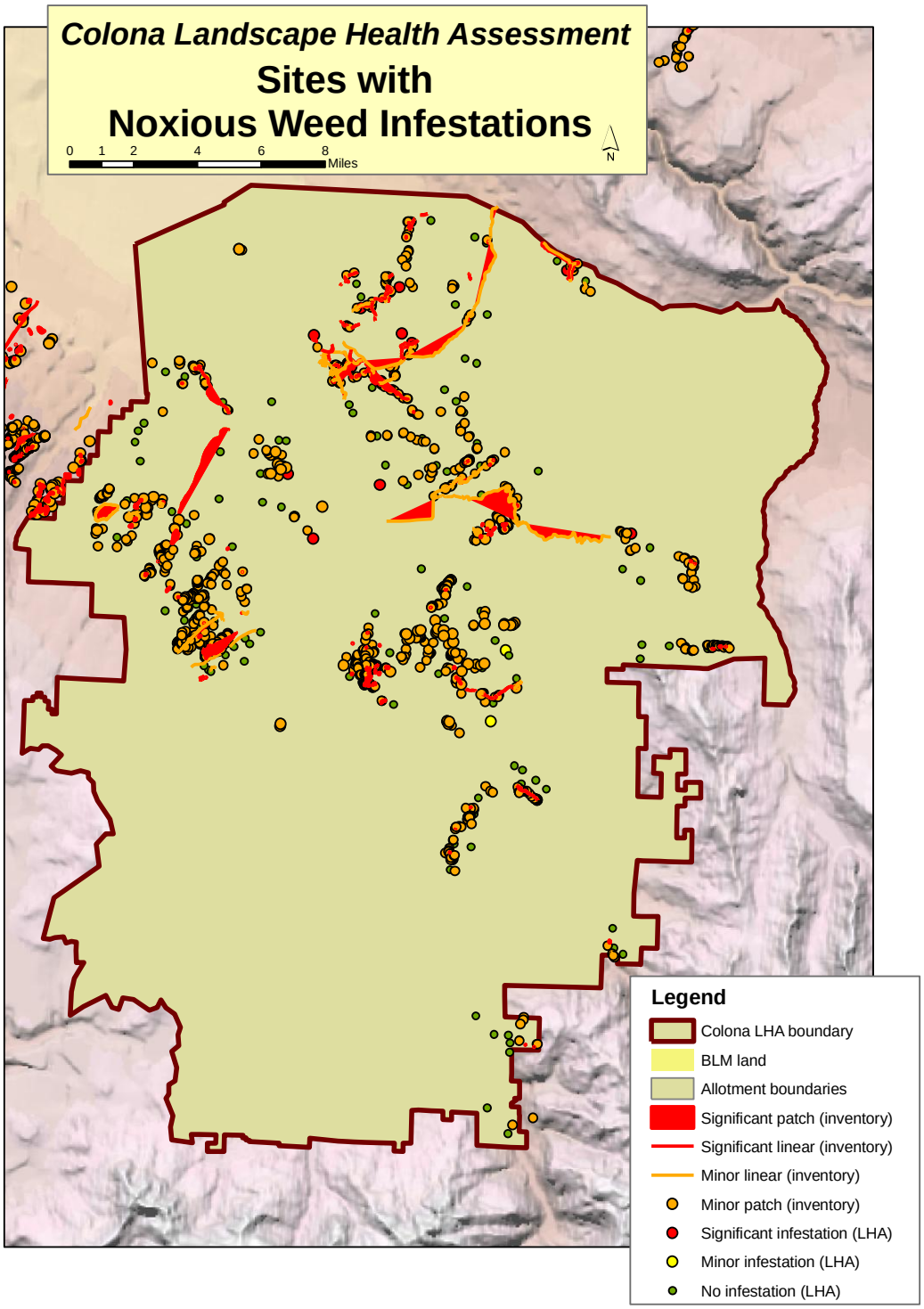


Figure 4.9 Colona LHA Area noxious weed occurrences. This data comes from two sources-a comprehensive weed inventory which maps large patch infestations, linear weed infestations and small point infestations. The LHA data collection points also generated weed data.



roads, are another frequent site for noxious weeds. Stock ponds, roads and drainages are also often infested with Russian knapweed, tamarisk, whitetop, Canada thistle, cocklebur and burdock. For most of the landscape apart from drainages, noxious weeds are not yet a dominant part of the plant community, and usually not even present. However, although few infestations are present in undisturbed lands, infestations tend to be distributed frequently enough across the landscape to pose a threat to undisturbed lands, especially with some of the more invasive species. Species of particular concern in this unit include yellow star-thistle, and diffuse and spotted knapweeds. These species are not yet fully established in this part of Colorado, and we still have the opportunity to eradicate them.

Shrub Utilization

Hedging is the alteration of a shrub's growth form into a compact, dense growth of twigs. Hedging on shrubs is caused by repeated browsing by wildlife or livestock, and can result in reduced productivity and vigor of the shrub, or even death. Hedging is indicative of the balance between browsers and habitat carrying capacity. It is used here as one indicator of plant and animal community health. Problems with shrub hedging occur across the unit, with many sites--particularly east of Montrose--showing severe hedging (Figure 4.10). This indicates there is probably an imbalance between the available vegetation and the browsing animals.

Shrub Vigor

Shrubs are an important component of most plant communities across the unit. They are often the dominant life form of the plant community and also provide structure, diversity and food, thus shaping many aspects of the plant and animal community. Shrub vigor, (or health and productivity) is used as an indicator of plant community health and wildlife habitat quality. Low vigor indicates the plants are stressed, more vulnerable to disease, unlikely to reproduce successfully, and produce less food for wildife. We observed only limited problems with shrub vigor across the unit (Figure 4.11). In the mountain shrub vegetation, some areas of frost kill on Gambel's oak from current and past years were seen. A variety of other shrub species showed low productivity and reproduction at a scattering of sites across the middle and lower elevations.

Native Plant Distribution

Two hundred forty six different plant species were found to occur in the unit. Of those native species which occurred in significant amounts on at least one site, Utah juniper was the most widespread species. It was at 51 out of a total of 154 sites where data was collected. Colorado pinyon was the second most widespread species occurring in significant amounts on 48 sites, with bottlebrush squirreltail, a perennial cool season bunchgrass the third most common on 32 sites, followed by muttongrass, Wyoming big sagebrush, and Gambel's oak, all occurring at 29 sites. The most common warm season perennial grasses were blue grama and galleta grass, which both occurred at only 6 sites, reflecting the overall scarcity of this functional group in the LHA area. The most common perennial forb was charming woodyaster (*Xylorhiza venusta*) which was significant on 10 sites, and is limited to Mancos shale soils. Fifty five species occurred at substantial levels on only one site, and another 60 occurred on less than 10 sites as a significant component of the plant community. This distribution of plant species reflects the general dominance of the community by a few species, with the majority of species being comparatively infrequent and sporadically distributed, or at very low levels across the landscape.

As expected, both elevation and soils appear to drive where most of the plant species are located. The Mancos shale derived soils along the valley bottom in the Colona Unit support substantially different plant species than the sandy-loam soils found on the mesa tops. Deeper

Figure 4.10 Colona LHA Area shrub utilization and hedging levels. Sites with shrubs falling in hedge classes 3 or 6 depicted as seriously hedged, sites with shrubs in hedge class 2 or 5 are moderately hedged, and sites with shrubs in hedge class 1 or 4 are not hedged.

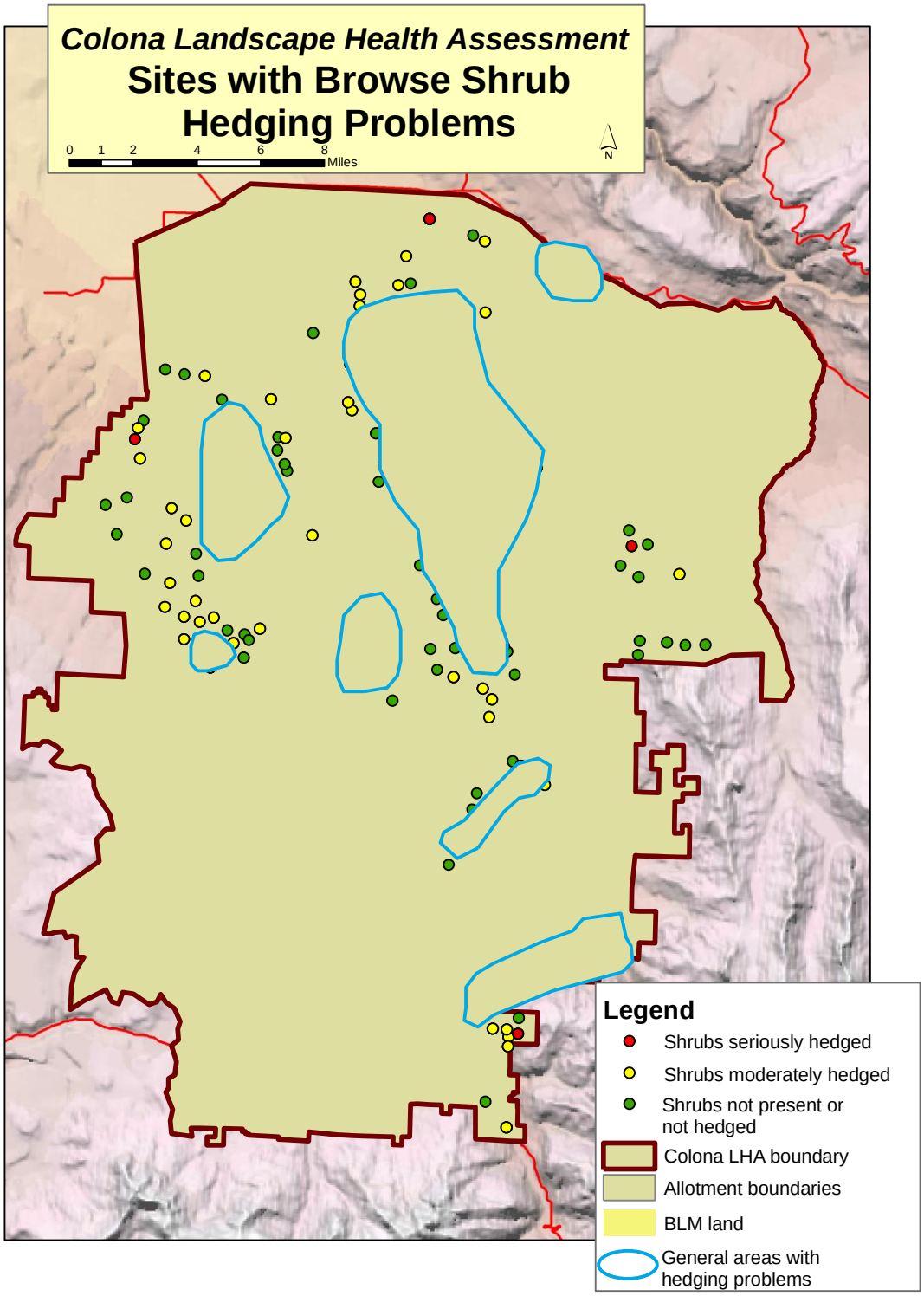
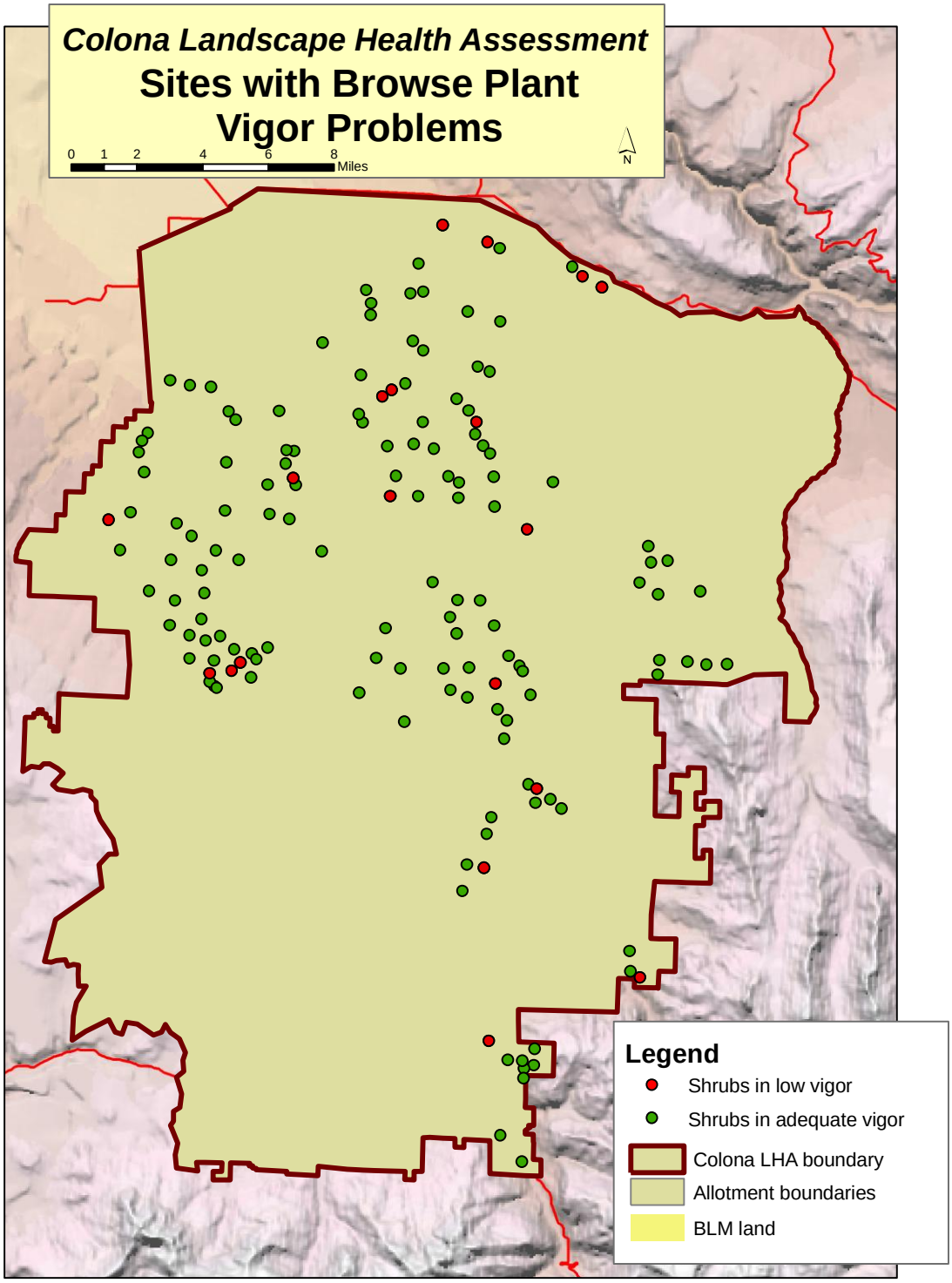


Figure 4.11 Colona LHA Area browse plant vigor. Red dots denote sites with at least one major browse shrub species that is in predominantly low vigor across the site.



soils typically support some different species than shallow and rocky soils, although many species also occur on both soil types. Elevation and aspect also affect plant distribution, with the moist, higher elevations and aspects typically supporting a greater variety of species.

The most obvious problems observed with plant populations are associated with the ongoing climatic influences such as the 2001-2003 drought and series of years with late spring freezes. The effects of large scale pinyon decline that ended around 2006 were widespread with large areas having standing dead and down pinyon. In many locations more than 50% of the pinyons had been killed. In spite of this, pinyon appear to be persisting throughout the range of habitat types in which they have historically grown. In addition, widespread top kill was observed on the Gambel's oak across the mountain shrub zone. However, because of its clonal growth and habit of sprouting, this species is resilient and is still persisting as a dominant plant to this point.

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

Connectivity

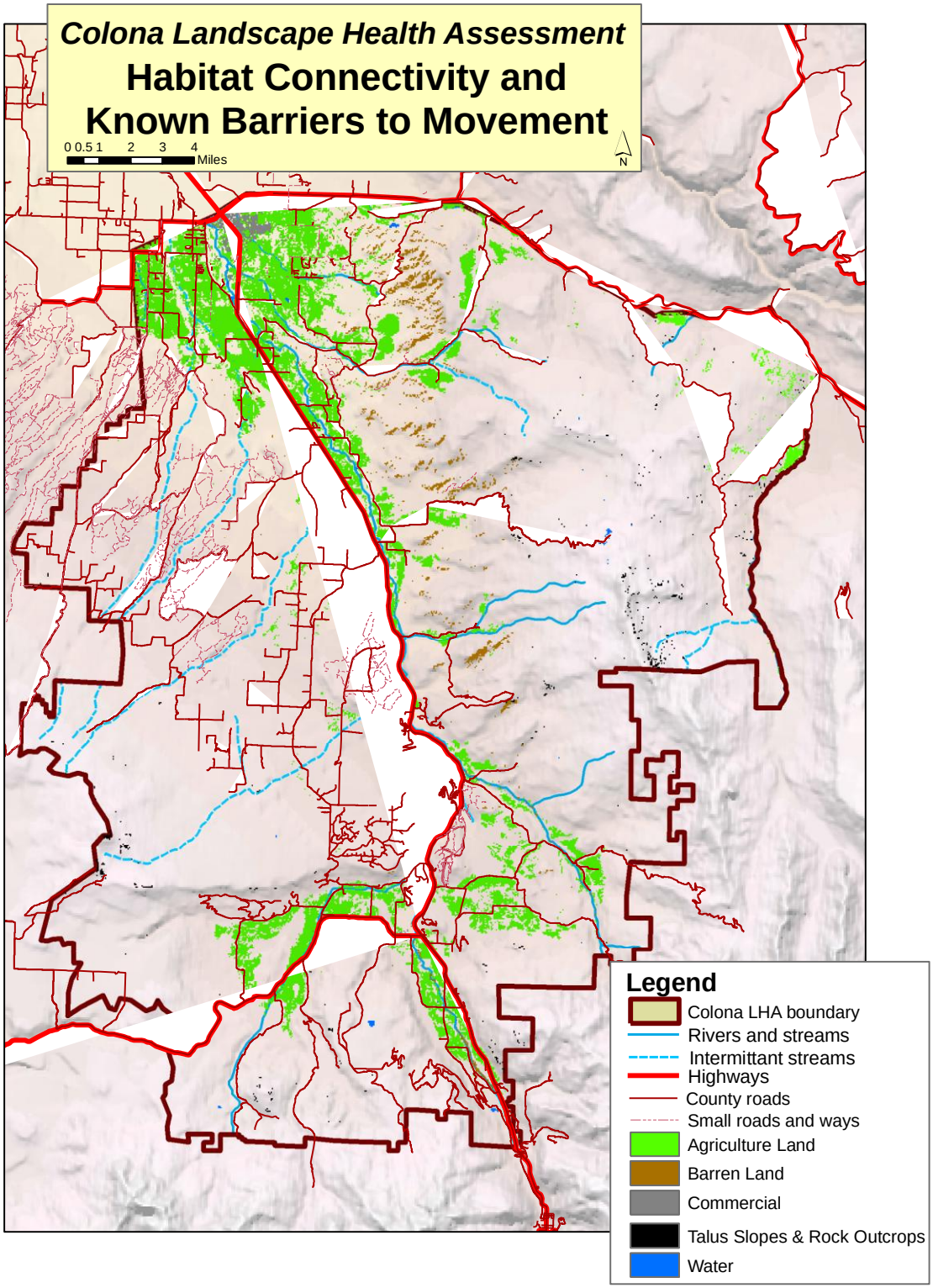
Not much information is available, nor are we aware of formal procedures that are outlined for assessing connectivity of habitat in dry woodland, mountain shrub or semi-desert shrubland vegetation types, particularly in very rough terrain. Because the Colona area is highly fragmented by topography, we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

Steep rock outcrops and rocky slopes: While steep rocky areas typically do not cover much area within the Colona unit, they can be a significant barrier to local movement when they are so steep as to be impassable. The west face of Storm King Mountain is representative of this situation, and is the most notable such area in the Colona unit. Otherwise, most of the rock outcrops and cliffs in this unit are found in isolated, small patches on the sides of drainages. Usually these are not continuous bands that completely cut off movement from ridge top to drainage bottom, and they are probably small enough that they do not tend to funnel movement of larger animals, or make movement more difficult in this landscape. Given their isolated occurrence, it is unlikely that these rocky areas significantly reduce large ungulate and carnivore use of this landscape.

Barren areas: There are areas of badlands in the Colona unit which are unsuitable habitat for many species, and probably discourage movement of some species (such as deer) from the east to west sides at the northern end of the valley. The badlands originate from the Mancos Shale Formation along the sides of the Uncompahgre River Valley. These barren and often steep adobe hills are most pronounced in the northeast portion of the unit.

Rivers, streams, and dams*:* The Uncompahgre River is a small river that lies at the heart of the Colona LHA area. It may present some barrier to movement, especially for smaller animals which are not able to swim across it. This is particularly the case at Ridgway Reservoir, which is formed by the Ridgway Dam on the Uncompahgre River. The reservoir averages more than 0.3 mile across, and is impassable to most terrestrial animals.

Figure 4.12 Colona 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 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. However, there are a number of large canals in the unit which are up to 20' across and can prevent movement of some animals during times when the water is running (April through October).

In addition to being a barrier for some animals, rivers, streams and canals act as dispersal and movement corridors for both plant and animal species. Weed species often move along streams because water transports their seeds, and because they find a similar habitat to irrigated cropland or landscaping (which are often sources of weeds) in the riparian zone. Russian knapweed, hoary cress, oxeye daisy and houndstongue form numerous infestations throughout the LHA unit, and seem to become established along drainage corridors, ditches and where livestock ponds have been built.

Agriculture and intensive human land uses*:* Agriculture and residential use of land can act as a barrier to movement by species that don't use the nonnative vegetation, tolerate the presence of humans and domesticated animals like dogs, need hiding cover, or cannot travel long distances in unsuitable habitat. Agriculture and residential development can also act as corridors for other species. For example, species that thrive in disturbed areas, those that are transported by domestic species, others that benefit from the irrigation systems and more abundant moisture, or those that use crop species are able to move through agricultural lands and populate the areas adjacent to agricultural lands. Species like the European starling, raccoon, domestic cats, red fox, cockleburr, and Russian olive are spreading and utilizing parts of the unit as a result of agricultural and human land uses in and adjacent to the unit. Deer and elk feed on the irrigated lands, and their behavior and movement patterns are altered by the presence of these fields.

Irrigated agriculture and residential development are the dominant land use along a nearly 2 mile wide swath along the Uncompahgre River from Colona up to Montrose. Around the town of Montrose, this swath widens to 6 miles across, and presents a substantial barrier to movement, most particularly where commercial and residential development has occurred. Montrose is a rapidly expanding small city and growth is projected to continue at a rapid pace, which will continue to fragment habitat and increase the scope and scale of the barrier to wildlife movement.

Agriculture is also found along major drainages into the Uncompahgre River such as Cow and Dallas Creeks. The increased human presence and altered plant communities in these developed areas are certainly affecting plant and animal communities on adjacent BLM lands. This is apparent both in the distribution of weeds and in the browse plant condition on these BLM lands.

Roads and trails*:* Roads can be a barrier to movement because they are a strip of bare or altered ground, and because they are a focus of human activity and disturbance. In the case of heavily traveled roads, they can be a major cause of mortality for animals trying to cross. The most heavily traveled roads in the unit are Highway 50 east of Montrose and Highway 550 between Montrose and Ridgway. This latter stretch of highway has extremely high deer mortality in the winter, and a local citizens group has formed to try to find ways to reduce this.

Because of proximity to towns and a history of open travel designations, a dense road network has developed on BLM lands 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 and coyote in the pinyon-juniper woodland, and weed species, which spread along the disturbed ground, particularly where the roads are maintained

and graded or graveled.

Livestock, wildlife, people, vehicles, and pets*:* Livestock, deer and elk provide a mechanism for dispersal of seeds, insects, and disease. They are likely a principal source of weeds in native communities because they can transport seeds in their fur or digestive tracts, and because they often move between heavily disturbed or agricultural private lands, up into native rangelands. They can also reduce the competitive capabilities of native plant species through grazing, and are a source of soil disturbance. People, their vehicles and their pets transport weed seeds in the same way.

Wildlife Habitat and Wildlife Communities

Problems related to wildlife and habitats mirror those described under the vegetation section. Polygons with a rating less than "meeting" typically exhibited one or more of the following symptoms:

1) Degraded or unsuitable habitat due to past vegetation treatments

Certain vegetation treatments within the Colona LHA have rendered some areas poor or unsuitable for wildlife, particularly for sagebrush obligates (sage sparrow, Brewer's sparrow, etc.) by removing essential habitat components (sagebrush) and replacing with introduced species (crested wheatgrass). LHA observers also noted invasion by cheatgrass, annuals, and/or noxious weeds at several treatment sites. Research indicates that sagebrush conversions to improve cattle forage may reduce food and cover value for these species, particularly in wintering and nesting habitats (Beck and Mitchell 2000). Crested wheatgrass plantings create a monoculture that typically result in poor habitat structure and diversity for wildlife (with some exceptions—big game, e.g.) and are, in part, to blame for declines in sagebrush obligate numbers (Reynolds and Trost 1980 from Beck and Mitchell 2000). However, if done properly, sagebrush thinning can increase herbaceous production and forb cover (Johnson et al. 1996 from Beck and Mitchell 2000). LHA observers also noted invasion by cheatgrass, annuals, and/or noxious weeds at several treatment sites. Importantly, some treatment areas within the LHA are recovering well and have apparently resulted in improved conditions for wildlife.

2) Overbrowsed shrubs and trees

Much of the Colona LHA contains severe winter range and/or winter concentration areas for elk and deer. These areas experience relatively heavy pressure from big game, particularly during harsh winters and in areas where livestock graze. Wild ungulates have the ability to cause dramatic shifts in vegetation, impacting birds, small mammals, and other wildlife. Shrub overbrowsing and damage by big game was observed over a large portion of the LHA, suggesting an imbalance between big game numbers and habitat carrying capacity. This idea is supported by CDOW DAU data (refer to Wildlife section earlier in this document). Some livestock grazing was cited as a cause of this condition although much of this is thought to be historical use. Shrub vigor was generally good across the LHA.

3) Habitat fragmentation, degradation and loss due to anthropogenic disturbances

Road expansion, recreation (primarily ORV), agriculture, and residential developments are increasing habitat fragmentation and are degrading some habitats through the introduction of weeds.

4) Excessive weeds and/or threat of invasion
Weeds including cheatgrass, annuals, and noxious species are at moderate to high levels in some areas and also occur at undisturbed sites. In some cases, weed presence was at levels which pose a risk for invasion if a major disturbance was to occur (i.e., fire). For most wildlife, exotic and noxious weeds result in degraded or unsuitable habitat through displacement of native vegetation.

5) Low plant community diversity
Plant community diversity at several sites was lower than expected for the ecological type. This problem was often observed in connection with other indicators (weeds, vegetation treatments, overbrowsing, etc.). Diverse plant communities and mosaics are typically more resilient and provide habitat features for a greater number of wildlife species.

6) Poor cover by perennial cool- and warm-season grasses and forbs
This condition was noted across the LHA, particularly at low elevation sites. Good cover by native perennial grasses and forbs provides essential cover and forage for multiple wildlife species.

*Please refer to the introductory Wildlife Section in this document for a discussion on species' population status and trends.

The Vegetation Mosaic

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 a healthy vegetation mosaic and coordinate activities that affect the mosaic, large scale plans and strategies have been developed that set objectives for the how the mosaic should look. The Uncompahgre Field Office Fire Management Plan (FMP) (USDI 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 western 1/3 of the Colona 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 Colona LHA assessment area is broken into five vegetation management subunits (Figure 4.14): Kinnekin, Storm King, Billy Creek, Spring Creek/Dry Creek, and Simms Mesa. The Simms Mesa unit is under 100 acres, so will not be analyzed in detail. The remaining units are further subdivided into polygons, each representing different landscape mosaic objectives (Figure 4.13). The existing vegetation mosaic on BLM lands is shown in Figure 4.14. Table V1 in the Appendix compares the existing seral stage proportions on BLM lands with the desired

amounts specified by objectives from the Fire Management Plan and the Spring Creek/Dry Creek Vegetation Management Strategy. Please see this appendix for a more graphical representation of discrepancies between the mosaic objectives and the existing habitat. Patch sizes for each of the vegetation management subunits in the Colona LHA area are also compared with objectives.

Kinnikin Unit

The largest portion of this unit (31%) is made up of the B1 polygon, which is based upon Wildland-urban interface. The objective behind this unit is to create a vegetation mosaic which slows the spread of fire and gives firefighters multiple opportunities to control a fire. Vegetation in this subunit is generally similar to vegetation mosaic objectives described in the Fire Management Plan, although it is somewhat divergent in the early stage (having about 950 too few acres of early seral vegetation), and in the late mid stage (900 too few acres) and the late stages (with 800 too many acres). The abundance of mid seral vegetation should develop over time to fill the void in late mid seral vegetation. However the current lack of late mid seral vegetation is not a concern for meeting the objective of fire controllability, while the abundance of late probably is a concern, particularly in the southern part of the unit where it forms the matrix. Patch sizes for early seral vegetation are currently appropriate, and similar sized patches are needed, so that the landscape is set up to transition to a matrix of early mid seral vegetation across the unit over time.

The next largest fraction of this unit is the C6/D2 polygon which has the objective of restoring a natural and appropriate vegetation mosaic to the valley bottom lands. The pattern of existing vegetation in this unit is generally similar to the mosaic objective, with minor deviations. The most important is that there are around 900 too few early seral acres. Additional acreage of early seral is needed in patches which average 20 acres, much larger than the current early patch size average of 3 acres. Additionally, about 18% of the unit is estimated to be in later seral/structural stages with woodland occupying it. However, this should not be considered a major deviation from polygon objectives, nor drive vegetation treatments. This stage is not supposed to be present according to the mosaic objective, but its presence here probably reflects inaccurate placement of the polygon boundary, and isolated woodlands occurring in draws and on north slopes.

The next largest fraction of the Kinnekin unit is the C7/D3 polygon which includes the ridges around the Black Canyon, including the northern part of Cimarron Ridge and has the objective of restoring a natural age class mosaic to this area. The existing mosaic deviates only a little from the objective: currently there are around 800 too few acres of early seral stage. Additional patches of early seral vegetation are needed in sizes ranging from 1 to more than 50 acres. While the other seral stages are now within acceptable ranges, a large acreage is in the mid stage which will age and move into the late mid stage over the next few decades. This will help move the matrix toward an older stage in the northern portion of the unit. Areas of this mid stage vegetation would also be a good source for new early seral vegetation, as well as some of the late stage vegetation.

The C3 polygon makes up the next largest fraction of the Kinnekin Unit. It is an area identified to promote quality habitat for wintering elk, and occupies 12% of this unit. Seral stages in this polygon are somewhat dissimilar from the desired seral stage distribution identified in the mosaic objective. Early seral vegetation is lacking by about 600 acres, and what is present occurs in patches that are too small for optimal elk habitat. Additional acreage of early seral

Figure 4.13 Colona LHA Area Vegetation management subunits and polygons within them that prescribe various desired vegetation mosaics. From BLM, 2002: UFO Fire Management Plan (eastern 2/3) and Spring Creek/Dry Creek Vegetation Management Strategy 2003 (western 1/3.)

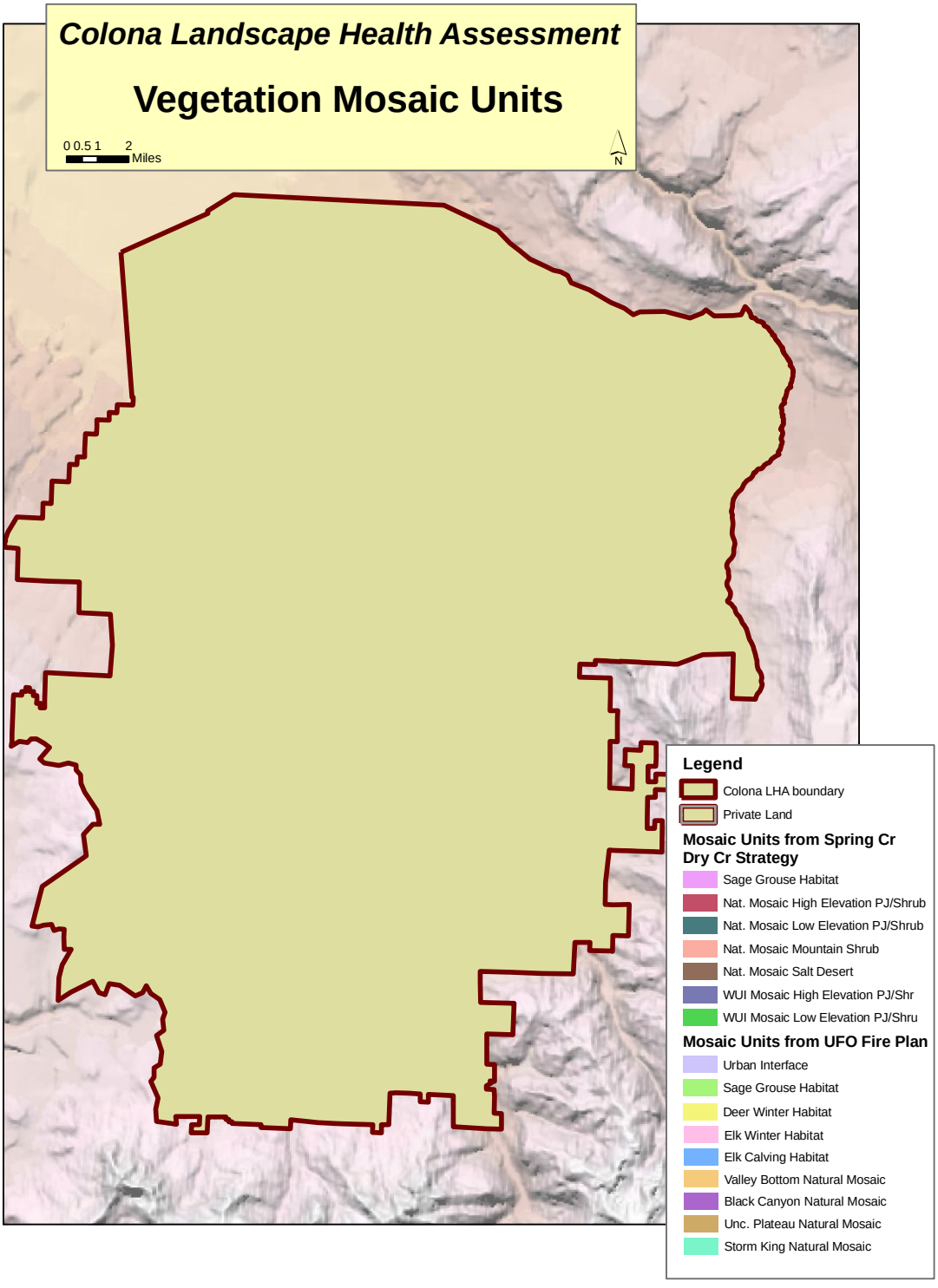
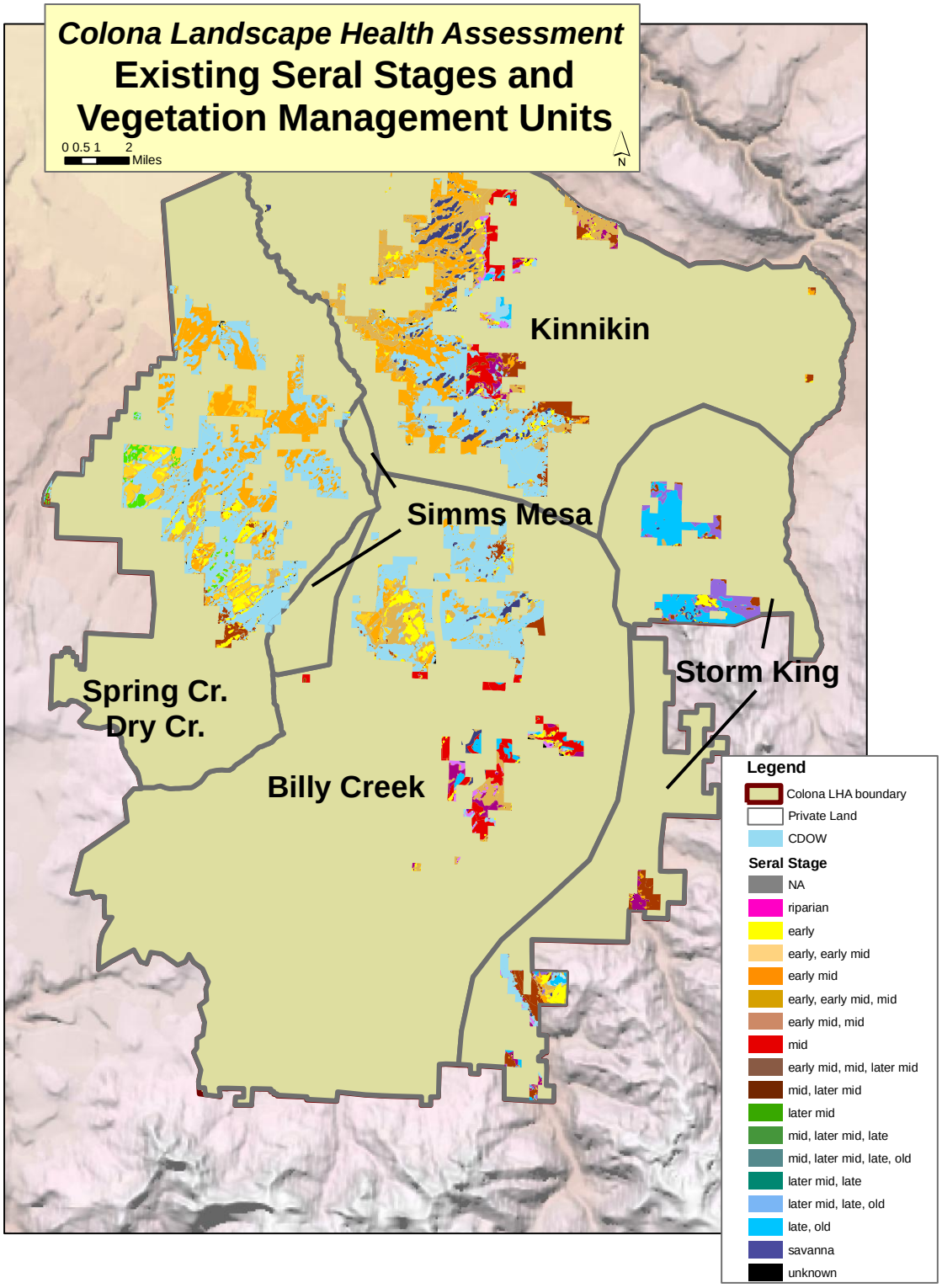


Figure 4.14 Colona LHA Area existing vegetation seral and structural stages. Colors that denote more than one stage indicate areas where the exact seral stage is uncertain so the range of possible stages for the area is shown.



vegetation is needed, primarily in patches that range from 50-200 acres in size. Currently, there is too much early mid seral vegetation by about 500 acres. Most vegetation treatments should target excess early mid seral areas to convert to early seral vegetation. The current matrix stage is late seral, which is in line with unit objectives.

The C2 polygon makes up the smallest sizeable portion in the Kinnekin unit. It is an area targeted to promote quality habitat for wintering deer. This unit also deviates somewhat from the desired mosaic objectives. There are around 200 too few acres of early seral vegetation, and around 200 too many acres of mid seral vegetation. The older stages are within acceptable ranges, and form the matrix as needed for optimum deer habitat. The additional early seral acreage should be taken primarily from mid age class vegetation when developing any vegetation treatments. Because the shrub component is such an important part of deer winter habitat, projects to remove establishing young trees in mid seral vegetation should also be implemented to create more early mid vegetation which is dominated by shrubs and grasses, on at least 300 acres. The majority of new patches of early and early mid vegetation should be in patches ranging from 1-25 acres in size.

Billy Creek Unit

A large fraction of this unit (26%) is comprised of the B1 Wildland Urban Interface polygon. The current estimated mosaic deviates widely from that specified in the objectives. Around 500 additional acres of early seral vegetation and 1,100 acres of early mid and mid vegetation are needed. Most of this should come from late stage and old vegetation, which is far in excess of the desired amounts and even forms the matrix in the northern part of the unit. The current array of patch sizes for early vegetation (1-40) acres is appropriate, but the older age vegetation occurs in patches that are too large over too much of the landscape and should mostly be reduced to patches that are <5 acres although some may range up to 50 acres if they don't interfere with fuel concerns.

Caution should be used when designing vegetation treatments to achieve the mosaic needed to help firefighters control wildfire. The mosaic objective provides only general guidelines for meeting the intent of the mosaic, and it may be that much of the older seral stages are on parts of the landscape that are sufficiently broken by steep and barren southern slopes such that fire control objectives are already partially met. If natural processes are pushing the polygon toward developing older age class vegetation, then sustaining unnaturally high levels of earlier age vegetation may be difficult and expensive.

The C8/D4 polygon also makes up a large portion of the Billy Creek Unit. This polygon is designed to promote a natural mosaic for the eastern slope of the Uncompahgre Plateau. Current seral stage composition deviates moderately from the desired mosaic. While the amount of early seral is about right, there are around 800 too many acres of early mid/mid vegetation, and a shortage of the late mid and late age classes. Vegetation treatments that set back vegetation age classes should generally be avoided in this polygon, and the vegetation should be allowed to age. Current patch size distribution is appropriate for the early stage vegetation, but the mid stage needs to age and transition into a matrix of later seral vegetation.

The D3 (Black Canyon) polygon makes up the third largest fraction in the Billy Creek Unit, at 22%. The existing seral stage mosaic deviates widely from that specified in the mosaic objective, with all seral stages out of their desired ranges. Around 500 acres of additional early seral, 300 additional acres of early mid seral, and 500 acres of late mid seral vegetation are needed. The present patch sizes which average 9-10 acres and up to 200 acres is in line with objectives. Nearly all additional acreage of early and early mid seral vegetation should come

from the existing late and old seral vegetation which has about 1,300 acres in excess of the objective. However, late seral vegetation currently makes up the matrix, as identified in the objective, and before designing vegetation treatments to achieve these changes, the mosaic objectives should be reviewed to determine whether they reflect our best understanding of the Historic Range of Variability. It is surprising that this landscape should be so far removed from objectives meant to simulate a mosaic developed by natural processes, particularly since the stage in abundance is the late/old stage which takes more than a century to develop.

The elk wintering habitat (C3) polygon makes up 15% of the Billy Creek unit. Vegetation seral stages in this polygon deviate somewhat from the mosaic objectives. There is a lack of early seral stage (by about 500 acres), and the current early seral patches need to be much larger in size—ranging from 50-200 acres. There is an abundance of early mid seral by the same amount. Older age classes form the matrix—as they should—and are within acceptable ranges of targets specified by the objective.

Deer wintering habitat (C2 polygon) makes up the final polygon of substantial size in this unit. In this polygon, current seral stage distribution deviates somewhat from the mosaic objectives. Around 200 acres of early seral vegetation are needed—primarily in patches of 1-25 acres--, as are another 200 acres of late mid vegetation. Currently there is virtually no acreage of either of these two types. The majority of vegetation is in the late and old age classes. Projects should mainly be designed to create early seral from the late stage vegetation. Additional late mid vegetation would not substantially benefit wintering habitat quality for deer, although some thinning could take place to encourage pockets of remnant shrubs to increase within the overall hiding and resting cover provided by the mature trees.

Storm King Unit

The largest polygon in this unit is polygon D10—designed to promote a natural mosaic in the Storm King Ridge area. It occupies 66% of this unit. This is a high elevation polygon with different vegetation types than most other polygons, and the seral stages were interpreted differently as a result—with mountain shrub dominated vegetation considered early mid seral and aspen dominated vegetation considered late mid seral. This polygon deviates substantially from the desired mosaic. To meet objectives, around 600 additional acres of early seral and 700 acres of early mid seral vegetation are needed. These additional acres should largely come from the late/old age class which dominates the current vegetation and forms a matrix. Instead, the vegetation should be in an intermix of age classes with no clear matrix stage, and patch sizes should be primarily 1-50 acres in size. However, before designing vegetation treatments to achieve these changes, the mosaic objectives should be reviewed to determine whether they reflect our best understanding of the Historic Range of Variability. It is surprising that this landscape should be so far removed from objectives meant to emulate natural processes, particularly since the stage in abundance is the late/old stage which takes more than a century to develop.

The next largest polygon in this unit is the D3 Black Canyon natural mosaic polygon, which occupies 19% of the Storm King unit. Note that this polygon may be erroneously labeled in this unit and might better be changed to the D10 polygon. As it currently is mapped, the existing seral stages are somewhat out of the ranges specified in the mosaic objectives, with approximately 300 too many acres of early mid seral stage and 200 too few acres of late/old stage vegetation. The other stages are within their appropriate ranges. A matrix stage of older seral vegetation needs to be developed, and patches within it should be mostly 10-50 acres in size. Vegetation projects to change age class—if any--in this polygon should be designed to

promote and speed up recruitment of mid age to older age classes and to break up larger (>100 acre) patches. However the polygon should first be reviewed to determine if it is correctly mapped and classified.

The final polygon of substantial size in this unit is the C3 elk winter habitat polygon, which makes up 10% of the Storm King unit. The existing seral stage composition differs substantially from that called for in the mosaic objective. Currently, there are about 150 too few acres of early seral stage, and current patches are much too small, 80 too many acres of early mid stage (all of this closer to mid seral than early mid seral), and 80 too few acres of late mid stage. There is an excess of late/old seral stage vegetation by about 150 acres. Vegetation treatments should focus on creating early seral in 50-200 acre patches mostly from late seral vegetation, and removing trees from some of the mid seral stages to create additional early mid seral vegetation, while allowing other mid seral to advance toward late mid. The current late stage vegetation matrix is appropriate for the unit.

Spring Creek/Dry Creek Unit

One of the larger polygons in the Spring/Dry Creek area is the High Elevation PJ/Shrub Natural Mosaic polygon which makes up 25% of the unit. This mosaic is designed to emulate the seral stage mosaic that would occur under a natural disturbance regime. Current vegetation conditions are substantially different from those identified in the objectives. Early seral vegetation is in excess by about 1,000 acres, while late mid vegetation is 700 acres short, and late/old stage vegetation is missing about 1,000 acres. Vegetation treatments which convert areas to younger age classes should be avoided in this area. Late and old age class vegetation should be protected. Late stage vegetation currently forms the matrix, and this function should be maintained and expanded. Existing early and mid seral patches are smaller than called for in the mosaic objective. These patches should tend more toward 100 acres or more in size. Planned actions in the Spring Creek/Dry Creek Vegetation Management Strategy should be followed to move this polygon closer to objectives. Part of the existing condition is the legacy of the many pinyon-juniper chainings that took place in the 1960s and have been retreated in the 1990s.

Another large polygon in this unit is the Sage Grouse Habitat polygon which makes up 30% of the unit. The objectives behind this polygon are to optimize habitat for the rare Gunnison Sage Grouse. Current conditions in this polygon deviate somewhat from mosaic objectives, with around 600 additional acres of early seral needed, and about 1,100 too many acres of late and old vegetation. While some of the late stage vegetation may be located in draws or on steep slopes where most treatment types are impracticable, most of the early seral should be created from the old stage. The mosaic objective also indicates that an additional 500 acres of mid seral vegetation (mature, dense sagebrush) is needed. The existing matrix stage (early mid seral) meets objectives, but patch sizes of early seral vegetation are slightly smaller than called for in the objective, and mid seral patches also undersized.

The Wildland Urban Interface/High Elevation PJ polygon makes up 20% of the unit. The objective of this polygon is to increase wildfire controllability in the flammable high elevation PJ zone to protect powerlines and structures. In order to make the most effective evaluation of conditions, the savanna condition was considered as early seral stage vegetation. The current distribution of seral stages varies somewhat from that identified in the mosaic objective. About 800 additional acres of early seral stage vegetation are needed, and that should come from late stage vegetation which is in excess. While the analysis shows that late mid vegetation is missing, it is likely that a portion of the vegetation categorized as late stage actually falls into the late mid stage. The existing vegetation pattern (patch sizes and matrix) are similar to those specified in

the mosaic objective, with late seral vegetation forming the matrix, and the existing patch sizes of early and early mid seral vegetation ranging between 5-50 acre patches, with an average size of 5-8 acres.

The Wildland Urban Interface/Low Elevation PJ/Sage polygon makes up 13% of this unit. The objective of this polygon is to increase wildfire controllability in the less flammable low elevation sagebrush and pinyon-juniper zone. Around 700 additional acres of early seral and 600 acres of additional early mid seral, and 500 acres of mid seral stage are needed to be created from existing late and old seral stages. These represent significant conversions, and caution should be practiced before large scale projects. The following three measures should be followed prior to vegetation treatments: 1) a determination should be made about the extent of drought and pinyon die-offs and the degree to which they have already converted later seral stages to earlier ones. This die off was not taken into account in this analysis. 2) the fire ecologist should review the existing mosaic pattern to determine if it will be effective in managing wildfire, and 3) planned actions in the Spring Creek/Dry Creek strategy should be implemented before new projects are designed. The current pattern of vegetation also deviates from the mosaic objective, with a matrix of later stage vegetation where the objective identifies an intermix of all stages. However, existing patch sizes for the earlier vegetation seral stages are similar to those identified by mosaic objectives.

The last polygon of significant size in this unit is the Low Elevation PJ/sagebrush Natural Mosaic polygon, which makes up 10% of the unit. The current seral stage distribution in this unit appears to be well within 10% ranges of the targets specified in the mosaic objective, although patch sizes are somewhat smaller than specified. Despite small discrepancies in patch sizes, no substantive vegetation treatments to convert seral stages should be implemented in this unit to attain the mosaic objective.

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.

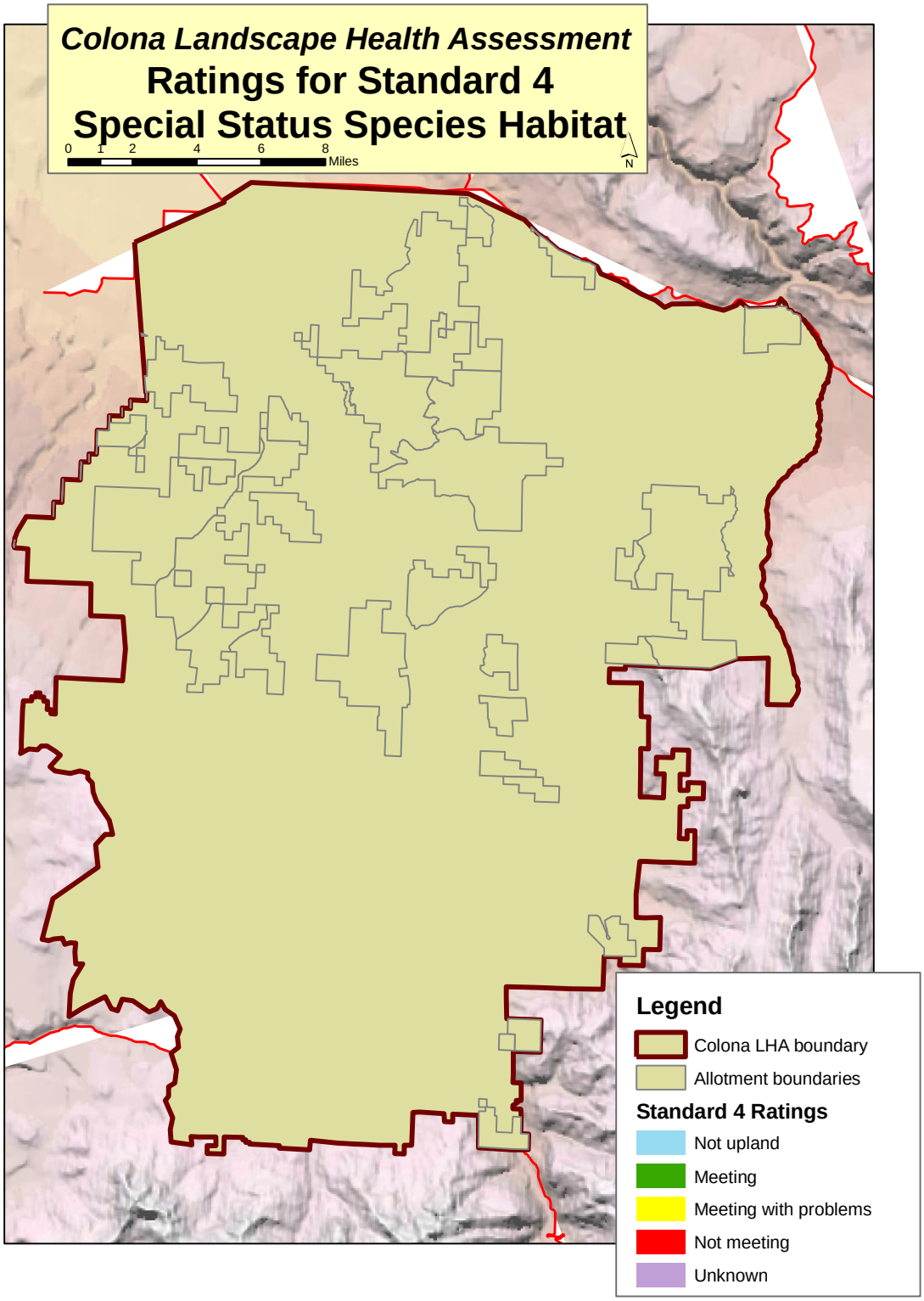
Acreage Figures

Meeting Standard 4		**Not Meeting Standard 4**	**Unknown**
Meeting	Meeting with problems		
18,052	29,918	2,234	5,090

Note on Standard 4 Rating

Healthy plant communities typically translate to healthy habitats for wildlife and plants, particularly for wide-ranging or generalist species. However, because endemic and special status wildlife are typically restricted in their range and have more specific habitat requirements, those portions of the polygon containing habitat for these species were evaluated independently. As a result, in some cases, a particular polygon may have been found to be meeting Standard 3 for native animal communities but not meeting or meeting with problems for Standard 4, or vice-versa. The indicators listed in the "Specific Problems" subsection for Standard 3 (Wildlife) are also the basis for this evaluation. Please refer to the introductory Wildlife Section in this document for a discussion on species' population status and trends.

Figure 5.1 Standard 4 Ratings for Colona 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.

Mileage Figures: Stream Miles Evaluated Against Standard 5

Stream Type	**Meeting Standard 5**		**Miles Not Meeting**	**Unknown**
	Miles Meeting	**Miles Meeting but Problem Areas**		
Perennial	2.8	2.6	0	0
Intermittent	6.7	8.0	4.2	0
Ephemeral	12.7	5.8	1.4	0
Total	22.2	16.4	5.6	0

See figure 6.1 for map showing polygon ratings.

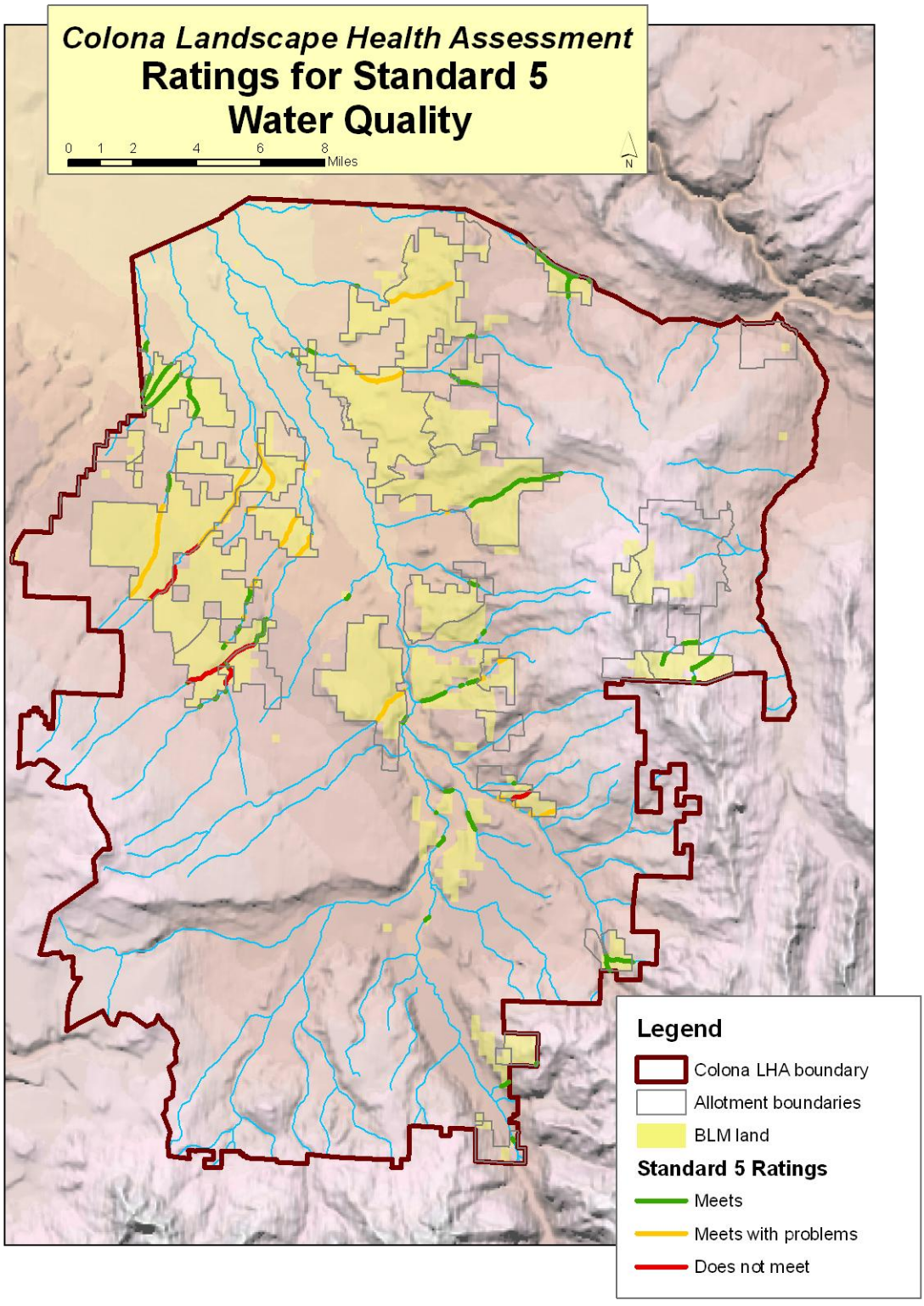
There was no indication that water quality was being degraded by chemical constituents. Because of the intermittent flow regime of the area's streams, Cow Creek is the only tributary where water quality data was available (see table 6.1). Nitrate and phosphate concentrations, being largely responsible for eutrophication of aquatic environments, are in relatively low concentrations in the Cow Creek. Data from USGS Open File report 97-233 showed 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. Cow Creek was below the basin-wide average for both of these constituents. As shown in Table 1.9, Selenium in Cow Creek was 0.1 ppb.

Table 6.1 Water Quality Summary for Cow Creek in the Colona LHA area

Stream	Date	Flow Rate (CFS)	EC umhos/cm	Temp. C	Dominant Ions	Selenium mg/l	Nitrate mg/l	Phosphate mg/l
Cow Creek UTM: 268277 4225666	7/13/2006	52.3	99	12.2	calcium-bicarbonate	0.0001	U1	0.01

1- Analyte was analyzed for but not detected

Figure 6.1 Colona LHA area Standard 5 Polygon Ratings.



A bacterial analysis of Cow Creek was collected in the summer of 2006 (see Table 1.10.) The State Recreation Classification of "P" imposes an E.coli limit of 205 Colony Forming Units (CFU)/100 ml of sample. Cow Creek was well below the state limit for E.coli. To make a conclusive determination on Cow Creek's compliance with the state standards for bacteria, it would require a more intensive sampling regime, because of the temporal variability of bacterial concentrations in natural water bodies.

Table 6.2 Bacterial Concentrations in Cow Creek.

Date	Water Source	Evidence of Livestock Grazing	E. Coli CFU/100 ml	Total Coli CFU/100 ml	Temp. C	State Stnd. E. Coli CFU/100 ml
7/20/2006	Cow Creek UTM:268277 4225666	NO	10	440	12	205

Table 6.3 shows the aquatic macroinvertebrate sample results for Cow Creek. The sample results are compared against average indicators for 408 sample sites in the Southern Rocky Mountain Ecoregion. The data shows Cow Creek to have significantly lower invertebrate abundance than the regional average in all of the evaluated indicators. The low value of disturbance tolerant invertebrates indicates the lack of suitable available habitat for invertebrate survival. A combination of factors is most likely responsible, those being: stream water depletions from irrigation diversions, an excessively wide, shallow, and braided channel, large supply of bedload from the higher energy upstream channel that drains from the San Juan Mountains, and a widely fluctuating flow regime dominated by snowmelt in the spring and very low base flows during the irrigation season and early winter months. There is no suggestion that chemical constituents are responsible for the state of the macroinvertebrates.

Several instream factors control the composition and abundance of stream invertebrates, including river flow rate and water velocity, channel substrate size and concentration of suspended solids, winter processes such as river icing, the composition and density of aquatic and riparian vegetation, and the chemistry of the river's water. Table 1.14 shows data for Cow Creek which was sampled for aquatic macroinvertebrates. Generally, the abundance of macroinvertebrates in Cow Creek is indicative of less than desirable habitat conditions. Cow Creek is lower in invertebrate abundance, and especially lower abundance of preferred species, than the average for the Southern Rockies Ecoregion.

Table 1.14 Stream Macroinvertebrates

Stream	Date	Total Abundance[1]	EPT Abundance[2]	Dominant Family[3]	Disturbance Intolerant Abundance[4]	Disturbance Tolerant Abundance[5]
Cow Creek	7/13/2006	789	645	Uenoidae (caddisfly)	39	0
Southern Rockies Ecoregion Average (mean of 577 samples at 408 sites)		4,117	2,332		1,091	274

1- The number of aquatic macroinvertebrates per unit area is an indicator of habitat availability and is influenced by flow regime and changes in water quality.

2- The number of aquatic macroinvertebrates among the insect Orders: Ephemeroptera, Plecoptera, and Tricoptera. These insect orders are commonly considered sensitive to water quality degradation.

3- The family of macroinvertebrates with the highest occurring number of individuals.

4- Macroinvertebrates with a Hilsenhoff Biotic Index of between 0-2, which indicates clean water taxa, intolerant of pollution.
5- Macroinvertebrates with a Hilsenhoff Biotic Index of between 9-10, considered pollution tolerant taxa.

Accelerated yield of sediment from upland soil and stream channel erosion is the most widespread water quality issue in the LHA area. Much of the sediment derived from the LHA uplands is detached and transported during intense rainfall events in the 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. Low amounts of plant litter and plant basal cover, and high amounts of bare soil surface (soil surface with no plant, rock, or litter cover) are indicative of soils susceptible to high rates of erosion. Most of the watersheds in the LHA area have one or more of the soil surface indicators showing problems. On watersheds that have two soil surface indicators showing problems, the drainages that intersect problem areas are rated as meeting standard 5 with problems (Figure 6.1). Stream channels where all or portions of the drainage area showed problems with all three indicators, do not meet Public Land Health Standard 5.

Lastly, roads and trails in need of maintenance can be large sources of sediment into receiving surface waters. This LHA did not evaluate the condition of all roads and trails in the LHA area but did take note of problem areas when encountered. An example would be the secondary road on Log Hill Mesa in T 47 N, R 8 W, Section 30, shown in Figure 6.2 below.

Figure 6.2 Road related erosion contributing to water quality problems.

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 Colona LHA"

Recommendations

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

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

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

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

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

Coordinate or participate in research on controlling cheatgrass invasions in new disturbances as well as reducing existing invasions. Implement measures/mitigation to reduce spread of cheatgrass and other invasive annuals for all permitted activities.

Complete the road and trail map, and use it in a GIS to identify road-caused soil loss. This analysis should be used to direct road maintenance and rehab areas so that road and travel related erosion is reduced. Monitor use to better understand soil impacts from OHVs. Where necessary, close and rehab abandoned roads and trails to prevent further erosion. Complete RMP amendment to limit travel to existing routes. Pursue route designation to further limit road-related damage to soils.

Standard 2 Riparian
Continue to work on the control of tamarisk, knapweed, oxeye daisy and other invasive exotics that infest riparian communities in the LHA area. Take a leadership role in the development and implementation of weed management plans with Montrose and Ouray Counties, the State of

Colorado, CDOW and the USFS to manage weeds across landscapes with intermingled land ownership patterns. Incorporate weed management responsibilities into grazing permits on allotments where BLM has done initial treatment, and for new range projects.

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

Acquire an updated map of water rights and instream flows (online from the Colorado Water Conservation Board) within the Colona 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. Incorporate mitigation in BLM issued right of ways associated with private water right developments that includes installing equipment to monitor instream flow rights and make sure they are upheld.

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

Standard 3 Native Plant and Animal Communities

Improve cool season perennial grass and forb cover by adjusting livestock grazing where it is a contributing factor to low cover. Investigate overall shortage of warm season grasses to determine if it is a regional problem or a climate/soils related phenomenon. Prevent grazing on regrowth during the growing season by limiting time of use to 2 weeks or less in a given pasture or grazing area. Minimize instances where livestock graze the same areas in both spring and fall seasons. Provide for occasional, year-long rest.

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

Complete route mapping across the LHA area. Implement more intensive monitoring of OHV use focusing on the potential for loss of native plant and animal species, and the increase in invasive plants. Use this information to help develop regional Best Management Practices for road and trail placement and management. Complete RMP amendment to limit travel to existing routes, and then pursue route designation to further limit travel-related damage to vegetation and weed spread.

Prevent disturbed areas—particularly fires—from transitioning to dominance by invasive annuals. Evaluate findings from the UFO treatment studies, Baker and Goetz (2006), and Shinneman (2006) to determine whether seeding is correlated with cheatgrass, and their other conclusions on factors associated with cheatgrass spread. Based on review of data, determine best management practices including seeding, spraying with Roundup or Plateau, and priority areas for combating cheatgrass. When seeding, use the best adapted seed possible as determined by treatment monitoring studies, and use the products of the UP native plant material development effort as they become available.

Where the spread of weeds is not a threat, improve warm and cool season grass and forb cover,

shrub vigor and abundance, and the vegetation mosaic by reintroducing fire and other natural disturbances, or simulating their effects:

1) Review Fire Management Plan landscape units and objectives. Make corrections to maps where polygons are incorrectly labeled.
2) Develop vegetation management strategies for each vegetation management unit. Use mosaic analysis (Chapter 4, this document) to guide vegetation treatment design, both in terms of quantity and pattern.
3) Review findings by Eisenhart (2004) and Shinneman (2006) and retool mosaic descriptions in the UFO Fire Management Plan (USDI BLM 2002) for natural landscape conditions based on this new data.
4) Where new mosaic objectives are developed, reevaluate existing mosaic versus desired mosaics to develop acreage figure recommendations for treatment.
5) Continue to implement the planned projects—especially from the Spring Creek/Dry Creek Vegetation Management Strategy--to achieve the mosaic objectives. Evaluate impacts from drought and pinyon and sagebrush decline to determine if each project is still needed.

Improve weed management by:

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

In seriously degraded plant communities implement vegetation restoration activities to reduce competition from weeds or woody species, and seed with native species. Conduct literature review and trials to investigate restoration of challenging areas including: Mancos shale soils, crested wheat seedings, and semidesert sites.

During amendment of the Uncompahgre Basin Resource Management Plan, consider how to include special designations for CNHP, TNC or SREP Potential Conservation Areas, biodiversity conservation areas and wildlife movement corridors.

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

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

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

Promote Neotropical Migratory Bird (NTMB) species by:

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

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. Evaluate these sites for black-footed ferret habitat potential.

Work to restore historical sagebrush communities near Simms Mesa and in other potential habitat (currently seeded with crested wheatgrass). Continue to assess the potential for increasing the amount of suitable habitat within the unit for reintroduction and expansion of Gunnison sage grouse populations.

If feasible, propose native mountain shrub plantings and restoration, particularly at overbrowsed sites and in areas where benefits will be maximized for sensitive species (grouse, songbirds, raptors, etc.) (this will likely require wildlife exclosure).

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.

Monitor recreation, grazing, weeds, and other impacts on clay-loving wild buckwheat and habitat; propose closure of roads and trails in critical areas.

Continue to monitor site conditions and trends for Canada lynx and consider installing permanent vegetation transects for this purpose. Most of these sites were found to be meeting standards, but some were meeting with problems (no sites were found to be not meeting)

Expand baseline data for raptor nests, habitats, and/or territories.

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

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

Consider amending the Uncompahgre Resource Management Plan to expand the Fairview South ACEC for clay-loving wild buckwheat to include the substantial population of clay loving wild buckwheat to the south of the existing boundary.

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

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

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

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

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

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

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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".

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

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APPENDIX

Table S1 Dominant soil units in the Colona LHA area and descriptions of their characteristics.

Soil Map Unit	Soil Description and Attributes	BLM Acreage in Unit
3	Lazear-Ustic Torrifluvents complex, 2 to 12 percent slopes Elevation: 5,450 to 7,300 feet Mean Annual precipitation:10 to 12 inches Lazear soils: 65% of unit Landform: terraces Depth to restrictive feature: 5 to 8 inches to bedrock Drainage class: well drained Permeability: moderately rapid Available water capacity: very low Runoff class: Very high Water erosion potential: slight Wind erosion potential: moderate Ecological site: Shallow clay loam Pinyon Pine-Utah Juniper Forest Type #110 Potential native vegetation: Utah juniper, twoneedle pinyon saline wildrye, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, black sagebrush, galleta, true mountain mahogany, western wheatgrass Ustic Torrifluvents soils 25% of unit Landform: Flood plains on cuesta valleys Drainage class: Somewhat poorly drained Permeability: moderate Available water capacity:low Runoff class: very low Water erosion potential: slight Wind erosion potential: moderate Ecological site: Semidesert loamPotential native vegetation: western wheatgrass, basin wildrye, indian ricegrass, basin big sagebrush	27
30	Barboncito-Rock outcrop complex, 3 to 20 percent slopes Elevation: 5,800 to 7,000 feet Mean annual precipitation: 10 to 12 in. Barboncito soils 70% of unit Landform: Summits on mesas, dipslopes on cuestas Depth to restrictive feature:11 to 19in. Available water capacity: very low Runoff class: High Water erosion potential: moderate Wind erosion potential: moderate Ecological site: Semidesert loam Potential native vegetation: Utah juniper, twoneedle pinyon Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, needleandthread, sand dropseed, western wheatgrass, Gambel's oak, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, plains pricklypear, true mountain mahogany, blue grama, scarlet globemallow Rock outcrop 30% of unit Rock outcrop consists of exposures of hard, unweathered sandstone of the Dakota formation and areas covered by less than 4 inches of mineral soil. Landform: Ledges on cuestas, free faces Depth to restrictive feature: 0 to 4in Runoff class: very high	27

32D	Barx-Samala complex, 3 to 15 percent slopes Elevation: 6,200 to 7,000 feet Mean Annual precipitation: 10 to 12 inches Barx soils 75%of unit Landform: Mesas, dipslopes on cuestas Permeability: moderate Available water capacity: moderate Runoff class: Low Water erosion potential: slight to moderate Wind erosion potential: moderate Ecological site: Semidesert loam Potential native vegetation: Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow Samala soils 25% of unit Landform: Mesas, dipslopes on cuestas Permeability: moderate Available water capacity: low Runoff class: Low Water erosion potential: slight to moderate Wind erosion potential: moderate Ecological site: Semidesert loam Potential native vegetation: Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow.	665
34D	Blancot fine sandy loam, 3 to 15% slopes Elevation: 6,000 to 7,000 feet Mean annual precipitation: 10 to 12 inches Blancot soils 90% of unit Landform: Summits on mesas, structural benches, valley sides on cuesta valleys Drainage class: Well drained Permeability: moderately slow Available water capacity: moderate Runoff class: Medium Water erosion potential: slight Wind erosion potential: moderate Ecological site: Semidesert loam Potential native vegetation: Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow.	144

130	Shavano-Ustic Torrifluvents complex, 3-25% slopes Elevation: p 5,600 to 6,500 feet 1,707 to 1,981 meters Mean annual precipitation: p 10 to 12 inches 254 to 305 millimeters Shavano soils 60% of unit Landform: Hills Depth to restrictive feature: 30 to 40 inches Drainage class: Well drained Slowest permeability: moderate Available water capacity: low Runoff class: High Water erosion potential: slight Wind erosion potential: moderate Ecological site: Semidesert Loam Potential native vegetation: Utah juniper, twoneedle pinyon Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, needleandthread, sand dropseed, western wheatgrass, Gambel's oak, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, plains pricklypear, true mountain mahogany, blue grama, scarlet globemallow Ustic Torrifluvents soils 30% of unit Landform: Flood plains, flood-plain steps on cuesta valleys Drainage class: Well drained Slowest permeability: moderate Available water capacity: moderate Runoff class: Medium Water erosion potential: slight Wind erosion potential: moderate Ecological site: Semidesert Loam Potential native vegetation: Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow.	746
160	Arabrab fine sandy loam, 3 to 15 percent slopes Elevation: 7,300 to 7,700 feet Mean Annual precipitation: 12 to 16 inches Arabrab soils 90% of unit Landform: Summits on mesas, dipslopes on cuestas Depth to restrictive feature: 7 to 19 inches Drainage class: Well drained Slowest permeability:moderately slow Available water capacity:very low Runoff class: Very high Water erosion potential: slight Wind erosion potential: low Ecological site: Loamy foothills Potential native vegetation: Utah juniper, twoneedle pinyon Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, needleandthread, sand dropseed, western wheatgrass, Gambel's oak, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, plains pricklypear, true mountain mahogany, blue grama, scarlet globemallow.	2811

262	Arabrab-Evepark-Parkelei complex, 3-20% slopes Elevation: 7,000 to 8,000 feet Annual precipitation: 12 to 16 inches Arabrab soils 40% of unit Landform: Summit on mesas, dipslopes on cuestas Depth to restrictive feature: 7 to 19 inches to bedrock lithic Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: very low Runoff class: Very high Water erosion potential: slight to moderate Wind erosion potential: moderate Ecological site: Loamy foothills Potential native vegetation: Utah juniper, twoneedle pinyon Sandberg bluegrass, bottlebrush squirreltail, needleandthread, sand dropseed, western wheatgrass, Gambel's oak, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, plains pricklypear, true mountain mahogany, blue grama, scarlet globemallow Evpark soils 40% of unit Landform: Dipslopes on cuestas, mesas Summits on cuestas, mesas Depth to restrictive feature: 20 to 37 inches Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: low Runoff class: High Water erosion potential: slight to moderate Wind erosion potential: moderate Ecological site: Loamy Foothills Potential native vegetation: muttongrass, western wheatgrass, Wyoming big sagebrush, black sagebrush, Indian ricegrass, bottlebrush squirreltail, needleandthread, prairie Junegrass, Utah serviceberry, Gambel's oak, true mountain mahogany.	4841
600	Beje-Moento complex, 3 to 15% slopes Elevation: 7,000 to 8,100 feet Annual Annual precipitation: 16 to 24 inches Beje soils 70% of unit Landform: Hills on cuestas Depth to restrictive feature: 9 to 18 inches Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: very low Runoff class: Very high Water erosion potential: slight Wind erosion potential: moderate Ecological site: Pine Grasslands Potential native vegetation: ponderosa pine, Arizona fescue, Parry's oatgrass, mountain muhly, Gambel's oak, elk sedge, pine dropseed, bottlebrush squirreltail, mountain big sagebrush, mountain snowberry, nodding brome, slender wheatgrass. Moento soils 20% of unit Landform: Structural benches, hills on cuestas Depth to restrictive feature: 21 to 31 inches Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: low Runoff class: High Water erosion potential: slight Wind erosion potential: moderate Ecological site: Pine Grasslands Potential native vegetation: ponderosa pine,Arizona fescue, Parry's oatgrass, mountain muhly, Gambel's oak, elk sedge, pine dropseed, bottlebrush squirreltail, mountain big sagebrush, mountain snowberry, nodding brome, slender wheatgrass.	350

800	Typic Torriorthents, 5 to 25 percent slopes Elevation: 5,200 to 6,300 feet Annual precipitation: 8 to 14 inches Typic Torriorthents soils 85% of unit Landform: Erosion remants, hills Depth to restrictive feature: 4 to 40 inches Drainage class: Well drained Slowest permeability: slow Available water capacity: very low Runoff class: Very high Ecological site: Silty Saltdesert Potential native vegetation: galleta, shadscale, Indian ricegrass, saline wildrye, Douglas Rabbitbrush, Gardner's saltbush, bottlebrush squirreltail.	969
801	Typic Torriorthents-Badland complex, 25 to 75 percent slopes Elevation: 5,200 to 6,300 feet Annual precipitation: 8 to 14 inches Typic Torriorthents soils 70% of unit Landform: Erosion remants, hills Depth to restrictive feature: 4 to 40 inches Drainage class: Well drained Slowest permeability: slow Available water capacity: very low Runoff class: Very high Ecological site: Silty Saltdesert Potential native vegetation: galleta, shadscale, Indian ricegrass, saline wildrye, Douglas Rabbitbrush, Gardner's saltbush, bottlebrush squirreltail.	4998
B31	Mags-Lazear-Rock outcrop complex, 3 to 50 percent slopes Elevation: 5,500 to 7,300 feet Annual precipitation: 10 to 12 inches Mags soils 50% of unit Landform: Summit on mesas, structural benches Drainage class: Well drained Slowest permeability: slow Available water capacity: high Runoff class: High Water erosion potential: slight to severe Wind erosion potential: moderate Ecological site: Semidesert loam Potential native vegetation: Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow Lazear soils 25% of unit Landform: Summits on mesas, dipslopes on cuestas, structural benches Depth to restrictive feature: 5 to 8 inches Drainage class: Well drained Slowest permeability: moderately rapid Available water capacity: very low Runoff class: Very high Water erosion potential: slight to severe Wind erosion potential: moderate Ecological site: Shallow clay loam, Pinyon Pine-Utah Juniper Forest Type #110 Potential native vegetation: Utah juniper, twoneedle pinyon saline wildrye, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, black sagebrush, galleta, true mountain mahogany, western wheatgrass.	62

R3	Rock outcrop, Ustic Torriorthents, and Aridic Haplustepts soils, 25 to 200 percent slopes Elevation: 5,000 to 8,200 feet Annual precipitation: 10 to 16 inches Ustic Torriorthents soils 35% of unit Landform: Escarpments on mesas, escarpments on cuestas Depth to restrictive feature: 4 to 40 inches Drainage class: Excessively drained Slowest permeability: moderately rapid Available water capacity: very low Runoff class: High Water erosion potential: slight to very severe Wind erosion potential: moderate Ecological site: stoney saltdesert #404 Potential native vegetation: Utah juniper, twoneedle pinyon, galleta, shadscale, Indian ricegrass, fourwing saltbush, plains pricklypear, scarlet globemallow Aridic Haplustepts soils 30% of unit Landform: Escarpments on cuestas, escarpments on mesas Depth to restrictive feature: 4 to 85 inches Drainage class: Well drained Slowest permeability: moderate Available water capacity: low Runoff class: High Water erosion potential: slight to very severe Wind erosion potential: moderate Ecological site: Unspecified Potential native vegetation: Indian ricegrass, bottlebrush squirreltail, western wheatgrass, Utah serviceberry, true mountain mahogany.	972
X30	Barboncito-Gapmesa complex, 3 to 15 percent slopes Elevation: 5,800 to 7,000 feet Annual precipitation: 10 to 12 inches Barboncito soils 50% of unit Landform: Summits on mesas, dipslopes on cuestas Depth to restrictive feature: 11 to 19 inches Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: very low Runoff class: High Water erosion potential: slight Wind erosion potential: moderate Ecological site: Semidesert loam Potential native vegetation: Utah juniper, twoneedle pinyon Sandberg bluegrass, bottlebrush squirreltail, needleandthread, sand dropseed, western wheatgrass, Indian ricegrass, Wyoming big sagebrush, plains pricklypear, blue grama, scarlet globemallow Gapmesa soils 45% of unit Landform: Dipslopes on cuestas Depth to restrictive feature: 20 to 40 inches Drainage class: Well drained Slowest permeability: moderate Runoff class: High Water erosion potential: slight Wind erosion potential: moderate Ecological site: Semidesert Loam Potential native vegetation: Utah juniper, twoneedle pinyon Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow.	1768

X31B	Lazear-Blancot-Rock outcrop complex, 3 to 25 percent slopes Elevation: 5,800 to 7,000 feet Annual precipitation: 10 to 12 inches Lazear soils 50% of unit Landform: Summits on mesas, dipslopes on cuestas Depth to restrictive feature: 5 to 8 inches Drainage class: Well drained Slowest permeability: moderately rapid Runoff class: Very high Water erosion potential: slight to moderate Wind erosion potential: moderate Ecological site: Shallow clay loam, Pinyon Pine-Utah Juniper Forest Type #110 Potential native vegetation: Utah juniper, twoneedle pinyon saline wildrye, Indian ricegrass, Utah serviceberry, Wyoming big sagebrush, black sagebrush, galleta, true mountain mahogany, western wheatgrass. Blancot soils 30% of unit Landform: Summits on mesas, structural benches, valley sides on cuesta valleys Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: moderate Runoff class: Medium Water erosion potential: slight to moderate Wind erosion potential: moderate Ecological site: Semidesert Loam Potential native vegetation: Indian ricegrass, galleta, New Mexico feathergrass, Wyoming big sagebrush, blue grama, bottlebrush squirreltail, fourwing saltbush, needleandthread, western wheatgrass, winterfat, plains pricklypear, scarlet globemallow.	104
X31M	Walknolls-Rock outcrop complex, 20 to 60 percent slopes Elevation: 6,000 to 7,500 feet Annual precipitation: 10 to 12 inches Walknolls soils 50% of unit Landform: Valley sides on cuesta valleys, Summits on mesas Depth to restrictive feature: 12 to 18 inches Drainage class: Well drained Slowest permeability: moderately rapid Available water capacity: very low Runoff class: Very high Water erosion potential: slight to severe Wind erosion potential: moderate Ecological site: Shallow clay loam, Pinyon Pine-Utah Juniper Forest Type #110 Potential native vegetation: Utah juniper, twoneedle pinyon, saline wildrye, Indian ricegrass, Wyoming big sagebrush, black sagebrush, galleta, western wheatgrass.	1505
X32	Blancot-Gapmesa complex, 3 to 20 percent slopes Blancot soils 55 %of unit see description under Soil Map Unit# X31b Gapmesa soils 40% of unit see description under Soil Map Unit# X30	761

X61	Moento-Beje-Rock outcrop complex, 5 to 35 percent slopes Elevation: 7,000 to 8,100 feet Annual precipitation: 16 to 24 inches Moento soils 45% of unit Landform: Shoulders on mesas, structural benches, cuestas Depth to restrictive feature: 21 to 31 inches Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: low Runoff class: High Water erosion potential: slight to severe Wind erosion potential: moderate Ecological site: Pine Grasslands Potential native vegetation: ponderosa pine, Arizona fescue, Parry's oatgrass, mountain muhly, Gambel's oak, elk sedge, pine dropseed, bottlebrush squirreltail, mountain big sagebrush, mountain snowberry, nodding brome, slender wheatgrass. Beje soils 35% of unit Landform: Hills on mesas, dipslopes on cuestas Depth to restrictive feature: 9 to 18 inches Drainage class: Well drained Slowest permeability: moderately slow Available water capacity: very low Runoff class: Very high Water erosion potential: slight to severe Wind erosion potential: moderate Ecological site: Pine Grasslands Potential native vegetation: ponderosa pine, Arizona fescue, Parry's oatgrass, mountain muhly, Gambel's oak, elk sedge, pine dropseed, bottlebrush squirreltail, mountain big sagebrush, mountain snowberry, nodding brome, slender wheatgrass.	1509

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

Polygons from UFO Fire Management Plan																			
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**												
Kinnikin **B1:Wildland -Urban Interface** **5,940 acres** **Patch Sizes:**	31%	20	55*		15	10	4	0.3	32.1	28	7							23	
							4		**33**		**35**			**0**				**23**	
	Early seral patches range from 1-45 acres in size with an average of 4 acres. In the southern part of the unit, early mid vegetation is found in 1-114 acre patches with a mean size of 6 acres, while it forms the matrix vegetation in the northern part of the unit. Late mid stage vegetation is absent in this unit. Late seral vegetation ranges from 1-41 acres with an average patch size of 7 acres in the northern part of the unit, while it forms the matrix in the southern part of the unit. The prescription calls for a matrix of early mid stage, with the older vegetation occurring mostly as isolated small patches (less than 5 acres in size), and a few patches up to 50 acres in size. Early seral vegetation is supposed to be occurring in a variety of patch sizes ranging from <5 acres to >50 acres in size.																		
Kinnikin **C6/D2: Valley Bottom Natural Mosaic** **4,985 acres** **Patch Sizes:**	26%	20	80*		NA	NA	2		41	25								18	
							2		**41**		**25**			**0**				**18**	
	Early seral patches range from <1-7 acres, with a mean size of 3 acres. Early mid vegetation forms the matrix stage in this unit. Late mid stage is absent from the unit. Late stage vegetation occurs in patches ranging from 1 to 315 acres with a mean patch size of 16 acres. The prescription calls for a matrix of early-mid stage with early seral acreage distributed equally between patches smaller than 20 acres and patches larger than 20 acres. Late stage vegetation is not supposed to occur in this unit, and the fact that it does indicates possible problems with the boundary of the unit.																		
Kinnikin **C7/D3: Black Cyn Natural Mosaic** **4,969 acres** **Patch Sizes:**	24%	20	30		20*	30*	**4**		**7**	**18**	**10**	**7**	**12**	**1**	**38**				
							4		**7**		**28**		**20**		**38**				
	The early seral patches range in size from <1-38 acres, with a mean size of 5 acres. Early mid patches range from <1-119 acres with a mean patch size of 9 acres in the southern part of the unit, but form the matrix stage in the northern portion. Late mid seral vegetation occurs in patches ranging from 1-426 acres with a mean patch size of 16 acres. Old age class vegetation forms the matrix in the southern part of the unit, and in the northern part of the unit is found in patches ranging from 1-19 acres with a mean size of 9 acres. The prescription calls for the matrix to be formed from a combination of late mid and late stage vegetation, with half of the earlier vegetation stages in patches under 10 acres, 30% between 10-50 acres, and 20% over 50 acres in size.																		

<table>
<tr><th rowspan="2">Subunit, Polygon type, Acreage</th><th rowspan="2">% of Sub-unit</th><th colspan="5">Desired % of each Vegetation Seral Stage
See top of table for definitions</th><th>Estimated % of each Vegetation Seral Stage
See top of table for definitions</th></tr>
<tr><th>e</th><th>em</th><th>m</th><th>lm</th><th>l</th><th>e-----------em----------m---------lm----------l</th></tr>
<tr><td rowspan="2">Kinnikin
C3: Elk Winter Habitat
2,360 acres

Patch Sizes:</td><td>12%</td><td>30</td><td colspan="2">10</td><td>20*</td><td>40*</td><td>4 22 8 2 58
4 22 8 0 60</td></tr>
<tr><td colspan="7">Early seral patches range from 1-14 acres, with a mean of 4 acres. Early mid vegetation forms the matrix in the northern part of the unit, and is found in the southern part in patches ranging from 1-146 acres with a mean size of 9 acres. Later mid vegetation occurs in patches ranging from 1-32 acres with a mean patch size of 6 acres. Late stage vegetation forms the matrix, particularly in the southern part of the unit. The prescription calls for a matrix of late mid and late stages combined, with most of the early and early mid stage vegetation in patches ranging from 50-200 acres in size.</td></tr>
<tr><td rowspan="2">Kinnikin
C2: Deer Winter Habitat
1,339 acres

Patch Sizes:</td><td>7%</td><td>25</td><td colspan="2">25</td><td>25*</td><td>25*</td><td>9 2 39 1 26 6 5 4
9 2 39 27 15</td></tr>
<tr><td colspan="7">Early seral vegetation ranges from <1-42 acres, with an average patch size of 8 acres. Early mid vegetation forms the matrix stage. Later mid vegetation occurs in patch sizes ranging from 1-246 acres with a mean size of 36 acres. It almost forms a matrix stage on the east side of the unit. Late age class vegetation occurs in 1-31 acre patches with a mean size of 8 acres. The prescription for this unit calls for late mid and late vegetation to form the matrix together, while numerous small (1-5 acre) and medium (6-25 acre) patches of early vegetation dominate with only a small percentage of early stage vegetation occurring in larger patches of 26-100 acres.</td></tr>
<tr><td rowspan="2">Billy Creek
B1: Urban Interface
3,165 acres

Patch Sizes:</td><td>26%</td><td>20</td><td colspan="2">55*</td><td>15</td><td>10</td><td>4 2 4 13 1 3 19 2 47 4
5 5 14 22 53</td></tr>
<tr><td colspan="7">Early seral patches range from <1-40 acres in size, averaging 7 acres. Early mid seral patches range from <1-117 acres, with a mean of 8 acres. Mid seral patches range from 1-262 acres, with a mean of 27 acres. Late and old stages form the matrix at the northern end of the vegetation management unit, while there is no obvious matrix in the southern portion. The prescription calls for a matrix of early mid stage, with the older vegetation occurring mostly as isolated small patches (less than 5 acres in size), and a few patches up to 50 acres in size. Early seral vegetation is supposed to be occurring in a variety of patch sizes ranging from <5 acres to >50 acres in size.</td></tr>
<tr><td rowspan="2">Billy Creek
C8/D4: Natural Mosaic, East Slope Unc. Plateau
2,916 acres
Patch Sizes:</td><td>27%</td><td>20</td><td colspan="2">20</td><td>20*</td><td>40*</td><td>19 4 14 29 1 1 3 30
21 16 30 4 30</td></tr>
<tr><td colspan="7">The early seral stage patches range from <1-177 acres with an average of 21 acres. Late mid patches range from 5-33 acres with an average of 17 acres. Late stage vegetation is in patches ranging from <1-301 acres, averaging 37 acres. The early mid stage forms the matrix. The prescription calls for a matrix of late mid and late stage vegetation with most of the earlier seral/structural stages in medium size patches (50-200 acres), with just a few smaller and larger patches.</td></tr>
</table>

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		
Billy Creek **D3: Natural Mosaic Black Canyon** **2,659 acres** **Patch Sizes:**	22%	20	30		20*	30*	1 **1**		2 **2**	6	9 **15**		1 **1**		79 **79**		
There are very few early seral patches, but for the small number present, size ranges from 3-24 acres, with a mean of about 10 acres. Early mid patches range from 1 to 111 acres with a mean of 9 acres. Later mid vegetation is in patches ranging from 1-34 acres with an average patch size of 13 acres. The late stage vegetation forms the matrix. The prescription calls for the matrix to be formed from a combination of late mid and late stage vegetation, with half of the earlier vegetation stages in patches under 10 acres, 30% between 10-50 acres, and 20% over 50 acres in size.																	
Billy Creek **C3: Elk Wintering Area** **1,817 acres** **Patch Sizes:**	15%	30	10		20*	40*	3 **3**		5 **5**	20	 **20**	6	20 **26**	3	35 1 **39**		
Early patches range from 1 to 6 acres in size with a mean size of 3 acres. Early mid patches range from <1-196 acres and average around 13 acres. Late mid vegetation occurs in patches ranging from 1-129 acres with a mean patch size of 23 acres. Old age vegetation forms the matrix in the northern part of the unit, while there does not appear to be a matrix stage in the southern part. The prescription calls for a matrix of late mid and late stages combined, with most of the early and early mid stage vegetation in patches ranging from 50-200 acres in size.																	
Billy Creek **C2: Deer Wintering Area** **778 Acres** **Patch Sizes:**	6%	25	25		25*	25*	0 **0**		18 **18**	6	 **6**		 **0**		75 **75**		
Early and late mid stage vegetation patches are absent from this unit. Early mid patches range from 1-37 acres with a mean of 7 acres. The matrix appears to be late stage vegetation. The prescription for this unit calls for late mid and late vegetation to form the matrix together, while small (1-5 acre) and medium (6-25 acre) patches of early vegetation dominate with only a small percentage of early stage vegetation occurring in larger patches of 26-100 acres.																	
Storm King **D10: Storm King Ridge Natural Mosaic** **3,587 Acres** **Patch Sizes:**	66%	20	30	30		20	4 **4**		 **10**	1	9 **1**	1	 **29**		28 **55**	55	
Early stage vegetation occurs in 1-111 acre patches with a mean patch size of 16 acres. Early mid seral vegetation occurs in 1-15 acre patches with a mean patch size of 3 acres. Mid and late mid vegetation together occur in 1-515 acre patches with a mean size of 18 acres. Late stage vegetation forms the matrix. The prescription calls for an intermix of seral stages with no matrix stage. Early and early mid patches are primarily small (<5 acres) to medium (5-50 acres) in size, while patch size distribution shifts to medium to large patches for the later stages.																	

Storm King **D3: Black Canyon Natural Mosaic** **1,016 Acres** **Patch Sizes:**	19%	20	30	20*	30*	18 **18**	4	8 **12**	6	39 **45**	13		13	2	4	6 **12**								
Early seral vegetation occurs in patches ranging from 1-129 acres in size, with an average size of 16 acres. Early mid and mid vegetation occurs in patches ranging from 1-252 acres, with a mean size of 12 acres. Later mid vegetation occurs in patches ranging from 1-105 acres with a mean size of 15 acres. Late seral vegetation ranges from 2-58 acres with a mean patch size of 10 acres. There is no evident matrix stage. The prescription calls for a matrix of late-mid and old age vegetation in combination, while early and early mid stages are largely made up of small (<10 acre) patches with only 20% in large (>50 acre) patches.																							
Storm King **C3: Elk Wintering Habitat** **515 Acres** **Patch Sizes:**	10%	30	10	20*	40*	1 **1**		2 **0**		23 **25**	4		5 **4**			63 **68**								
Early seral vegetation occurs in patches ranging from 1-2 acres in size, while early mid vegetation is missing. Mid stage vegetation is arrayed in patches ranging from 1-108 acres averaging 18 acres in size. Late mid vegetation occurs in patches from 1-14 acres in size with a mean size of 4 acres. Old age class vegetation makes up the matrix. The prescription calls for a matrix of late mid and late stages combined, with most of the early and early mid stage vegetation in patches ranging from 50-200 acres in size.																							
Subunit, Polygon type, Acreage	**Polygons from Spring Creek/Dry Creek Vegetation Management Strategy** **% of Sub unit**	**Desired % of each Seral Stage** E=early (herbaceous) EM=early mid (shrub/grass) M=mid (shrub/young tree) LM=late mid (tree-shrub L=late (tree) O=old (old growth tree) *not all stages are specified in each mosaic description E	EM	M	LM	L	O	**Estimated % of each Seral Stage** E=early (herbaceous) EM=early mid (shrub/grass) M=mid (shrub/young tree) LM=late mid (shrub/mature tree; tall shrub) L/O=late (mature/old tree) S=savanna (widely scattered mature/old trees in shrub or grass community) 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/O----S**															
Spring/Dry Cr. **High Elevation PJ/Shrub Natural Mosaic** **4,856 Acres Patch Sizes:**	25	5	5	15	15*	30*	30*	22 **26**	8	11 **15**	14	2 **16**		**0**	40 **40**		3 **3**							
Early seral vegetation patches range in size from 1-107 acres with an average size of 11 acres. Early mid stage vegetation is in patches of 1-79 acres with an average patch size of 7 acres. Mid stage vegetation ranges from 1-52 acre patches with a mean size of 5 acres. Late mid vegetation is largely absent, while late stage vegetation forms the matrix. Savanna type vegetation has been created in patches ranging from 2-74 acres with a mean size of 21 acres. The prescription calls for a matrix of intermingled late mid, late and old stages, while earlier stages are dominated by large patches (>100 acres), with 20-30% also occurring in small (<5 acre) patches, and only 10-20% of the acreage of early-mid stages in medium sized (5-100 acre) 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	O	E	EM	M	LM	L/O	S	
Spring/Dry Cr. **Sage Grouse Habitat** **5,973 Acres** **Patch Sizes:**	30	10-15	60-70*	10-15	10-20			0 4 59 3 33 **2 61 3 0 33 0**						
Early seral patch sizes range from 1-70 acres with a mean size of 16 acres. Early mid seral vegetation forms the matrix. Mid stage patches range from 1-14 acres with a mean patch size of 4 acres. Late mid stage is absent, while late stage vegetation occurs in patches from 1-152 acre patches with a mean size of 17 acres. The prescription calls for a matrix of early mid seral sagebrush, with the majority of early stage vegetation in 20-100 acre patches, with a small proportion of the early acreage in small or larger patches, and the old age classes similarly distributed.														
Spring/Dry Cr. **Urban Interface in High Elevation PJ** **3,978 Acres** **Patch Sizes:**	20	30	20		40*	10*		1 8 8 7 2 69 4 **5 12 9 0 69 4**						
Early seral vegetation occurs in patches that range from 1-82 acres with an average of 8 acres. Early mid vegetation ranges from 1-82 acre patches with a mean size of 5 acres. Late mid stage vegetation is absent, while late stage vegetation forms the matrix. The prescription calls for a matrix of later mid and late stage vegetation, with the majority of early stage vegetation in medium sized patches (5-50 acres), and the remaining 30-40% of the acreage in small (<5 acre patches)														
Spring/Dry Cr. **Urban Interface in Low Elevation sage and PJ** **2,563 Acres** **Patch Sizes:**	13	30	40	20	10			15 2 81 1 **0 15 2 0 81 1**						
Early seral vegetation is absent from this unit, but early mid vegetation ranges from 1-87 acres with a mean of 7 acres, while mid seral vegetation occurs in patches from 1-4 acres with a mean size of 2 acres. Late stage vegetation forms the matrix. The prescription calls for an intermix of stages in linear patches oriented to the northeast which consists of numerous small to medium size 5-50 acre patches dominated by grass/forb and grass/forb/shrub with occasional patches of sage/PJ and late/old growth PJ scattered throughout.														
Spring/Dry Cr. **Low Elevation PJ Shrub** **2,048 Acres** **Patch Sizes:**	10	5	25	10	15*	20*	25*	4 6 28 5 54 2 **7 31 5 18 18 18 2**						
Patch sizes of early seral vegetation range from 1-56 acres with a mean size of 10 acres. Early mid seral vegetation patch sizes range from 1-176 acres with a mean patch size of 9 acres. Mid seral vegetation patches range from 1-18 acres with a mean size of 3 acres. Late mid and late stage vegetation form the matrix, particularly in the center of the unit. The prescription calls for a matrix of later mid and late seral stages with the majority (60%) of the earlier vegetation occurring in patches of 5-100 acres, with about 20% occurring in smaller patches, and 20% in larger (>100 acre) patches.														