LAND HEALTH ASSESSMENT

EAGLE RIVER SOUTH WATERSHED

2003

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I. INTRODUCTION

Each year the Glenwood Springs Field Office conducts an assessment of a watershed to determine whether or not the Colorado Standards for Public Land Health are being met. The 2001 land health assessment was conducted in the Rifle Creek watershed. For the 2002 assessment, the staff decided to move to a geographic area managed by a different range specialist to allow the other range specialist time to implement the decisions and recommendations that resulted from the Rifle Creek assessment. The South Eagle landscape was chosen primarily because of staff concerns regarding OHV impacts to land health within this watershed.

II. DESCRIPTION OF THE AREA

The South Eagle Landscape Unit lies south of the Eagle River roughly from Dotsero, Colorado to Squaw Creek (east of Wolcott, Colorado) and from Cottonwood Pass to Bellyache Ridge. There are approximately 49,000 acres of public land within the unit. Elevations within the watershed range from approximately 6,300 feet along the Eagle River between Dotsero and Gypsum in the northern part of the watershed to 9,400 feet at the National Forest boundary on Hardscrabble Mountain in the southern part of the unit.

The South Eagle Landscape Unit lies within the Southern Rocky Mountains ecoregion and features a wide diversity of topography, geologic materials, vegetation, climate, and soils. The landscape is generally characterized by steep hills and ridges, rolling mesas and narrow drainages that flow into the gently sloping valley of the Eagle River. The mesas are generally gently sloping to strongly sloping, but the sides are commonly steep or very steep.

The soils in the northern part of the South Eagle Landscape are derived from gypsum and are generally low in productivity. Because these soils are extremely unstable when water is applied, the GSFO RMP designated the area as an Erosion Hazard Zone.

The Eagle River corridor is also in a rain shadow and the semi-arid climate inhibits soil development. Low annual precipitation, hot summer temperatures and high evaporation rates slows the chemical and biological processes needed for soil development and production of vegetation. The upper elevations of the watershed receive moderate amounts of precipitation and vegetative production increases proportionately.

The rugged topography and elevational range within the South Eagle watershed creates a number of different ecological zones with an array of associated vegetative communities. The floodplains along the Eagle River are generally comprised of cottonwood and riparian shrubland communities. Other perennial streams within the watershed typically support cottonwood forests in the lower reaches and aspen communities in the steeper upper reaches. The steep, north-facing cliffs above the river are dominated by Douglas-fir forests. The rolling foothills and terraces above the valley floor consist largely of sagebrush shrubland with pinyon-juniper woodlands along the ridges. Soils high in gypsum content are exposed on some of the lower slopes and drainages. These sites support sagebrush, winterfat, and numerous species of moss, fungi and lichens. Sometimes greasewood and rabbitbrush are also found in these areas. At the

middle elevations are Gambel's oak and mixed mountain shrublands, turning to aspen woodlands and mixed-conifer forests at the higher elevations.

III. METHODS

The assessment process utilized an interdisciplinary team approach that included the following expertise/skills: ecology, hydrology/watershed, range, riparian, threatened and endangered species, vegetation, water quality and wildlife/fisheries. Affected grazing permittees, the Colorado Division of Wildlife and other interested stakeholders were also invited to participate in the assessment process.

To conduct the assessment, the interdisciplinary team chose sites within each allotment in the watershed, with the exception of the Falk and Red Canyon 2 Allotments. The Falk Allotment is a 373-acre allotment, with 302 acres of private land and only 71 acres of public land. The private lands are mostly flat to gently sloping lands along Brush Creek, whereas the public land portion is on a steep side slope above the private land. For these reasons, it was felt the public lands would receive very little use and were a low priority for assessment. The Red Canyon 2 Allotment was also not visited during the assessment due to its inaccessibility. This allotment consists of two separate parcels of mostly steep slopes and is currently unallotted for livestock grazing.

The number of sites to be assessed within each allotment depended on the size, complexity, and topography of the allotment. Each of the major ecological sites in the watershed was sampled, with greater emphasis being placed on those ecological sites that provide the most livestock and wildlife forage. An assessment was also conducted on each stream and lake within the watershed. Between May and September 2002, a total of 52 upland sites and 19 stream reaches were assessed in 13 allotments. The location of each assessment site was GPSed and entered into GIS. Photographs were taken at each site.

Several different data forms were utilized to assess the condition of the landscape in relation to the standards for land health.

Standards 1 and 3: The assessment forms used were a modified version of those presented in Technical Reference 1734-6, Interpreting Indicators of Rangeland Health. The qualitative assessment forms include a vegetative cover worksheet, a physical and biotic checklist, and a wildlife habitat checklist. The physical and biotic checklists were derived from the indicators for the 5 Colorado Standards for Public Land Health and describe various attributes of physical and biological community health which are observable in the field. The physical and biotic checklists include nine attributes of soil health and six attributes of vegetative health. At each assessment site, each of the attributes was given a rating of "plus", "minus" or "intermediate" based on its condition relative to the appropriate ecological site description or ecological reference area for that ecological site.

Standard 2: Riparian Proper Functioning Condition (PFC), as described in BLM Technical Reference 1737-9-15, was the method used to determine riparian condition. The PFC assessment evaluates most of the indicators listed for healthy riparian systems as described in Colorado Standards for Public Land Health. The team determined whether each stream reach

was Properly Functioning, Functioning-at-risk, or Not Functioning, based on the preponderance of ratings for the indicators.

Only those streams with intermittent or perennial flow were considered capable of supporting significant riparian vegetation, and thus only those were assessed for Standard 2.

Standard 4: Existing GIS data was used to determine if any special status species were known to occur within the landscape. The GIS data used is a compilation of records supplied by BLM, the Colorado Natural Heritage Program, and the Colorado Division of Wildlife. If known populations or potential habitat were documented in GIS, they were visited and evaluated for population and/or habitat conditions.

Standard 5: Water quality was determined at each stream where a PFC assessment was conducted. Water quality parameters measured for this assessment were flow, temperature, specific conductance, salinity, and pH.

Site visits to assess the indicators occurred between May and September of 2002. The compiled ratings for the attributes at each site were used to determine whether each site exhibited either: none to slight departure from the conditions expected for the ecological site (meets the standard), moderate departure from expected (meeting with problem areas or not meeting depending on the nature of the departure), or extreme departure from expected (not meeting the standard).

These individual site ratings were then used to determine the status of each stream and allotment within the watershed with respect to the applicable land health standards. Generally, if over 10% of a stream reach or 20% of the sites within an allotment were found not to be meeting one or more of the Standards, the entire stream reach or allotment was determined not to meet the Standard. Exceptions might apply if the sites not meeting standards are of significant ecological importance, such as habitat for T&E species, etc. Also, certain landscape scale indicators (e.g. "landscapes exhibit connectivity of habitat or presence of corridors to prevent habitat fragmentation" or "landscapes are composed of several plant communities that may be in a variety of successional stages or patterns") were appropriately evaluated only at the landscape scale.

IV. CURRENT CONDITIONS

A. Soils

Of the 52 sites visited, 16 sites met all nine of the indicators for healthy soils. Another 21 sites had intermediate ratings for one or two soil attributes. The allotments that met all of the indicators or had only one or two intermediate soil ratings were: Horse Mountain, Salt Creek/Forest, Squaw Creek, Bellyache and Bellyache Ridge.

The remaining 15 sites had either 3 or more intermediate ratings or one or more "minus" ratings for soil attributes. These were scattered across 7 allotments, generally in the lower elevation, more xeric sites.

Soil conditions are often a reflection of vegetative condition. A healthy vegetative community usually has diverse vegetative structure and a diverse mix of deep and shallow-rooted species interspersed across the landscape. A healthy vegetative community helps to hold the soil in

place, build up organic matter, etc. On the other hand, as palatable species drop out of the community, the niches that these species occupy become vacant, i.e. loss of deep-rooted species, diversity of structural heights, etc. The community becomes more homogeneous and total vegetative cover declines. This leaves the soil vulnerable to wind and water erosion.

Soil problems were noted in the pinyon/juniper woodlands, sagebrush communities, and a greasewood community.

The pinyon/juniper woodlands showed little evidence of fire or other natural disturbance. As the tree canopy increases in density, the understory vegetation cannot compete for light and nutrients and begin to disappear from the community. The amount of bare ground increases and the sites become more susceptible to erosion. Water flow patterns and litter redistribution were common.

Indicators of problems in the sagebrush and greasewood communities included: evidence of water flow patterns and pedestalling, amount of bare ground higher than expected, microbiotic crusts generally in protected areas with a minor component outside of protected areas, gullies showing signs of active erosion or headcutting, and litter amount more or less than expected and moderate movement of smaller particles due to surface water flows. Problem areas for soil conditions seemed to be most prevalent in the Brush Creek, East Hardscrabble, Salt Creek/Bellyache, and Wolcott Isolated Tract allotments. Isolated problems were noted in the Eagle River, North Bellyache, and West Hardscrabble allotments.

B. Vegetation/Noxious Weeds/Special Status Plants

Of the 52 upland sites visited, 12 sites had “plus” ratings for all 6 of the indicators of healthy plant communities. Another 21 sites had “intermediate” ratings for one or two vegetative attributes. The remaining 19 sites had either 3 or more “intermediate” ratings or one or more “minus” ratings for vegetative attributes.

The Horse Mountain, Salt Creek/Forest, Squaw Creek, Bellyache and Bellyache Ridge Allotments met all of the indicators or had only one or two intermediate ratings for vegetative factors. Although the problem areas seemed to be concentrated in the Brush Creek, East Hardscrabble, Salt Creek/Bellyache, and Wolcott Isolated Tracts, each of the remaining 4 allotments also had some vegetative concerns noted.

1. Upland Plant Communities

Across the landscape, vegetative issues generally related to lack of species abundance or diversity (particularly grasses and forbs), heavy browsing on shrubs and late seral stage sagebrush communities (dead or decadent plants) with fewer grasses and forbs than expected, and invasion of sagebrush parks by pinyon pine or Utah juniper. Some of the vegetation treatments, which took place at least 15 years ago, still showed poor regeneration of sagebrush. Some sites were dominated by crested wheatgrass, smooth brome, or Kentucky bluegrass to the exclusion of native grasses and forbs.

The xeric, lowest elevation sites generally supported a mix of sagebrush, greasewood, and/or winterfat. Those sites that also had high gypsum content often had only a few grass or forb

species but a diverse and dense cover of biological soil crusts. Due to their low vegetative cover and proximity to nearby towns, those sites were often popular OHV areas with an extensive network of roads, 2-track routes and single track trails. These areas exhibited loss of protective vegetation and biological soil crusts and accelerated soil erosion.

Sagebrush communities vary from poor to good condition. In many sagebrush communities, the shrubs were heavily hedged or decadent, showing poor vigor and little regeneration of younger age-class plants. Sagebrush stands appear to be lacking in forb production and, in some cases, in grass production as well. At some sites, undesirable species such as houndstongue, cheatgrass, smooth brome, and crested wheatgrass, were out-competing more desirable native perennial grasses and forbs.

Of great concern across the broader landscape was the general decline of sagebrush communities due to ever increasing encroachment by juniper, and to a much lesser degree, pinyon pine. Of the forty sites capable of supporting sagebrush communities, 15 sites noted some level of encroachment by pinyon or junipers. Pinyon-juniper woodlands are becoming more dense than they were historically and are expanding into other plant communities.

Six sagebrush sites visited had been brushbeat. These vegetative treatments set the seral stage of the site back to an earlier ecological condition or at least to a mosaic of early and late seral stages. These brushbeat sites had negligible invasion by Pinyon or juniper. Some brushbeat sites had responded with increased cover and production of native herbaceous species. However, some sites that were seeded to crested wheatgrass following the brushbeating, now formed a virtual monoculture of crested wheatgrass and also showed evidence of excessive soil loss. Browse species were beginning to reestablish in some of the brushbeat sites, however, on most sites, sagebrush is slow to recover.

The central portion of the West Hardscrabble Allotment burned in the late 1980's. Some burned areas were regenerating well, with good cover, productivity, and diversity of grasses and forbs, and a fair to good re-establishment of browse species. A few burned sites had a lack of species diversity and lower productivity than expected. Initially, following the fire, the area was heavily infested with various noxious weeds. These infestations have been treated with herbicide on multiple occasions. The weed treatments appeared to be quite successful as few noxious weeds were found in the burned areas during the 2002 assessment.

The prolonged drought that has affected Colorado was evident in lower productivity of all lifeforms, but was probably most detrimental to grasses and forbs. Bunchgrasses that appeared to be dead, or perhaps dormant, were scattered throughout lower elevation sites in the watershed.

Pinyon-juniper habitats varied in condition as well. Overall, the pinyon/juniper trees were in good condition with a mixed age class of trees. However, the understory condition was variable. Earlier seral P/J stands have a mix of shrub species and a more diverse grass and forb component. However, as P/J sites reach maturity, all showed dramatic declines in the shrub and forb component, and, to a lesser extent, a decline in grasses as well. Where shrubs were still

present they were generally severely hedged or decadent with little or no recruitment.

A portion of the pinyon-juniper habitat located within the West Hardscrabble Allotment burned in the late 1980's, and revegetated with a good grass and forb mix. However, shrub and tree cover has been slow to recover.

Mixed mountain shrub and oak habitats are generally in good to excellent condition. These mid to high elevation habitats receive more moisture and generally produce good forage for a variety of wildlife species. Oak is dense in some small portions of the landscape. These dense oak stands impede some wildlife species= ability to access available understory forage resources. Understory vegetation is generally diverse and productive with a good perennial grass and forb component.

Oakbrush and mixed mountain shrub communities were typically in good condition with good productivity and fair to good diversity of species. Understory vegetation is generally diverse and productive with a good perennial grass and forb component. Some sites are dominated by Kentucky bluegrass.

Aspen stands are present only at the upper elevations in the extreme southern portion of the watershed. In general, aspen stands are in good condition with good productivity of grasses and forbs and fair to good species composition. However, some aspen stands are dominated by older age class trees with little recruitment or regeneration of clones. At one assessment site, the young aspen suckers and saplings were being heavily browsed and this was limiting the ability of the aspen to regenerate.

Lodgepole pine and spruce/fir stands comprised a very small part of the watershed at the uppermost elevations. Most stands had good structural diversity with a moderate amount of snags and dead and down material. Fire suppression has reduced openings in many of these habitats resulting in less diversity and productivity. Understory was comprised of the low shrub, mountain lover, and a thin cover of herbaceous plants. These sites are generally less productive due to the closed canopy, which reduces sunlight and increases competition for nutrients, thereby limiting understory plant growth. Where openings exist within the more densely forested areas, herbaceous production is good with good diversity of grasses and forbs.

2. Riparian Habitat

Most of the riparian areas within the watershed were in good to excellent condition and supported the appropriate riparian vegetation for the channel type and elevation. However, portions of Third Gulch and several other riparian areas had infestations of noxious weeds, such as Canada thistle and musk thistle that were crowding out desirable native riparian species. Alkali Creek and McHatten Creek had issues relating to upland conditions contributing to stream degradation. McHatten Creek and Third Gulch had inadequate riparian vegetation to protect the stream, and the riparian zones had not achieved their potential extent and were not widening.

3. Noxious Weeds and Exotic Species

Musk thistle, and/or Canadian thistle were found on 11 sites. These sites tended to be in riparian

areas or wet meadows. Russian knapweed or houndstongue were found on 6 sites. These areas tended to be along roads or in openings in sagebrush sites that receive concentrated grazing use.

The presence of cheatgrass was noted on 6 sites. Cheatgrass was the dominant species on one upland site just west of Gypsum and south of the Eagle River. This site is within the Eagle River Allotment, which is unallotted for grazing by domestic livestock. Judging by the density of pellet groups, this site appears to be a winter concentration area for big game animals. Cheatgrass was also dominant in the lower part of Spring Gulch in the Red Hill Allotment. This is a decadent sagebrush/winterfat community with some residual perennial grasses, but an abundance of cheatgrass as well. Although cheatgrass was not dominant on any of the other sites, it is considered a significant risk factor for further invasion following disturbances throughout the lower elevations of the landscape.

Crested wheatgrass and smooth brome, both invasive exotic species, were often used in past vegetative treatments. Smooth brome is the dominant grass on 2 sites. Crested wheatgrass is considered a dominant species on 5 sites and forms a near monoculture on 2 sites. When used as the only species in seed mixes, crested wheatgrass tends to form monocultures that inhibit the re-establishment of desirable native species. Crested wheatgrass is a bunch grass and in monocultures, it does not provide very good protection against soil erosion. All crested wheatgrass sites exhibited signs of pedestalling and excessive water flow patterns between plants.

4. Special Status Plants

Penstemon harringtonii

The only special status plant species known to occur on public lands within the Eagle River South landscape is the BLM Sensitive, *Penstemon harringtonii*. *Penstemon harringtonii* occurs in open sagebrush parks between 6,800 and 9,200 feet generally on rocky loam or rocky clay loam soils. Prior to conducting the fieldwork portion of the assessment, *P. harringtonii* was known from 17 occurrences within the South Eagle watershed. These were scattered amongst the following allotments: Red Hill Common, East and West Hardscrabble, Brush Creek, Salt Creek/Bellyache, North Bellyache and Bellyache. The most extensive occurrences were in Second Gulch and Mayer Gulch, where the species occurs more or less continuously along either side of the roads in each drainage.

The land health assessment process is not designed to provide the specific kind of data required for evaluating rare species. No concerted effort was made to count each population or conduct systematic and statistically significant monitoring efforts. Instead, in areas with previously known populations, the ID team tried to assess whether the general habitat conditions would continue to support healthy, viable populations of the plant or whether certain management activities might be creating risks to the populations.

In 1996, a long-term monitoring study was established for one population of *Penstemon harringtonii* within the South Eagle watershed. Each individual at this study site is counted and its coordinates plotted annually to assess changes in population size over time. Although analysis of the population data has not yet been received for the year 2002, in prior years the

population has not shown a significant change in numbers.

Recent inventory data (Boyle, 2003) indicates that *P. harringtonii* populations in the East and West Hardscrabble Allotments are more numerous and extensive than previously thought. Major concentrations were found in lower Hardscrabble Gulch, near North Hardscrabble Mountain, Lower Alkali Creek, Hockett Gulch, and lower Hernage Creek. A number of smaller locations were scattered throughout suitable habitat in these allotments.

Boyle noted that *P. harringtonii* often occurs in linear patches following an eroded watercourse downhill, and also often in protected sites under sagebrush shrubs. In some cases, populations appeared to follow livestock or game trails across a hillside, which suggests that ungulates may disperse *P. harringtonii* seeds, or that *P. harringtonii* can colonize disturbed sites. Livestock is probably not a factor in seed dispersal since livestock are not in either the East or West Hardscrabble Allotments at the time the plants set seed.

Some areas where *P. harringtonii* occurred were being heavily grazing by cattle with both trampling and herbivory damage to the populations noted. Plants were being crushed and flower stalks were either being broken off or eaten before seeds had matured and dispersed.

Off-road vehicle use was evident at a number of *P. harringtonii* occurrences. Motorized and non-motorized vehicle use causing trail proliferation and widening will crush individual plants and may negatively impact populations of *P. harringtonii* and reduce available habitat. Vehicle use also destroys biological soil crusts and other vegetation and encourages the invasion of weeds, all of which reduce quality and quantity of habitat for *P. harringtonii*.

C. Wildlife

The wildlife community and habitat health assessment was made using CDOW data and qualitative knowledge in addition to data collected during the land health assessment process. The land health assessment process by itself does not provide adequate information. A much more complex and time consuming effort would be necessary to collect sufficient information for an accurate assessment of the health of the wildlife community. More data would be needed for many wildlife species and their habitats, such as small mammals, predators, birds, amphibians and reptiles. For deer and elk, population trend data from CDOW was used along with habitat condition information. For other species, site specific and landscape level habitat conditions were used as a general indication of health of the wildlife community.

Habitats within the Eagle South Landscape assessment area support a variety of common wildlife species, and a few less common Special Status fish and wildlife. The diverse habitats in this landscape are home to numerous birds, mammals, fish, amphibians, and reptiles.

Habitats in this landscape range from predominantly sagebrush flats in the lower elevations to pinyon/juniper woodlands, mixed mountain shrub, oak, aspen, aspen/mixed conifer, and some mixed conifer in the highest elevations. Riparian habitat consisting of a variety of vegetative species is also present and is mainly associated with the major perennial streams of the area. Riparian habitat is extremely important to a variety of fish and wildlife species many of which

depend on riparian habitats for all or a portion of their life requirements.

Sagebrush stands provide important habitat for a variety of obligate species of birds, and are particularly important as food and cover for wintering big game within the Eagle South landscape. Pinyon-juniper woodlands provide important foraging and nesting habitat for some raptor species and many migratory song birds, and provide security, foraging, and thermal cover for a variety of small game, big game, and nongame wildlife. Mixed mountain shrub and oak habitats are important to turkey, black bear, mule deer and elk among others.

Aspen are important habitats for a variety of species including big game, turkeys, blue grouse, black bears, and rabbits, among others. Aspen provide forage, and thermal and hiding cover, as well as birthing and nursing habitat for big game, and nesting habitat for some species of raptors and cavity nesting birds. Lodgepole pine and spruce-fir stands provide thermal, security, and bedding cover for big game and are important for cavity nesting birds, some raptors, and many owl species. Snowshoe hare, red squirrels, and many other species of small mammals as well as Canada lynx prefer these habitats. Mapped Canada lynx habitat exists within the conifer portions of the landscape assessment area.

The current condition of fish and wildlife habitats varies across the landscape. Fisheries and aquatic habitats are generally in good condition. Upland habitats have been altered by roads (both authorized and unauthorized), powerlines, pipelines, fences, public recreation use, residential and commercial development, vegetative treatments and livestock and wild ungulate grazing. These human uses contribute to degradation of habitat quality, fragmentation of habitat for several species and the expansion of areas supporting noxious and exotic vegetative species. See the Vegetation section for a discussion of the condition of vegetative communities that provide important wildlife habitat.

Fisheries

Of the 16 perennial streams located within the assessment area, only portions of 5 are considered to be capable of harboring/sustaining a fishery. These are Abrams Creek, Gypsum Creek, Brush Creek, Spring Creek, and the Eagle River. Brush Creek and Gypsum Creek are entirely on private lands and were not included in the assessment. Only a small portion of Spring Creek and the Eagle River cross public lands. Spring Creek, Eagle River and Abrams Creek were in good condition with sedges, rushes, willows, alder, dogwood, currant, wood's rose, conifers, aspen and cottonwoods present where expected.

McHatten, Grundell, Hernage, Alkali, Salt, Travis, and Frost Creeks, and Hardscrabble, Second, Third, Fitzpatrick, Sawmill, Trail, Old Man, and Hardscrabble Gulches appear to have limited fisheries potential due to a lack of sufficient water flows, and absence of instream holding pools (winter habitat). Water quality and riparian conditions were not noted as being limiting factors regarding fisheries potential.

D. <u>Riparian</u>

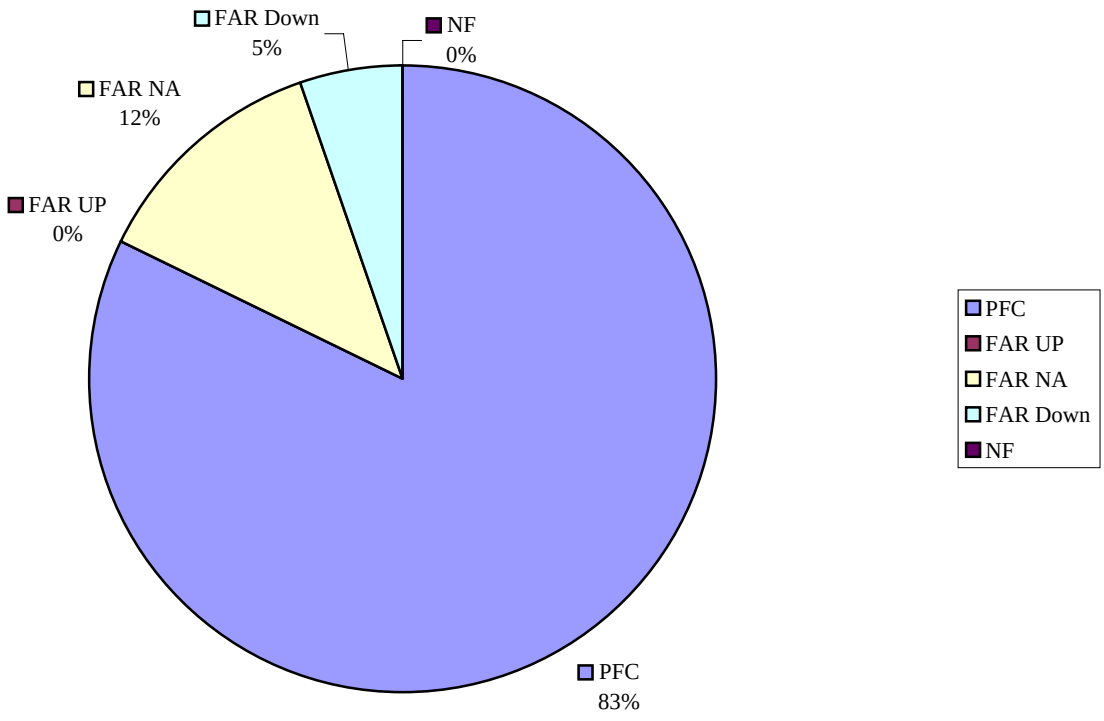
Nineteen stream reaches were assessed for proper functioning condition. The tables below

summarize the findings of the 2002 PFC assessment and any previous assessments that were conducted on riparian areas within the Eagle River South landscape. For the reaches assessed as FAR, apparent trend was determined. Upward trend is indicated by Up, not apparent by NA, and downward trend by Down.

Riparian Name	Miles	1994 - 1997 Rating					2002 Rating				
		PFC	FAR Up	FAR NA	FAR Down	NF	PFC	FAR Up	FAR NA	FAR Down	NF
Abrams Creek Upper Reach	3.3						X				
Abrams Creek Lower Reach	2.0	X					X				
Alkali Creek Lower Reach	1.4		X				X				
Alkali Creek Upper Reach	1.0		X						X		
Eagle River	0.5						X				
Fitzpatrick Gulch	0.4	X					X				
Frost Creek	0.6	X					X				
Grundell Creek	1.8		X				X				
Hardscrabble Gulch	2.2			X			X				
Hernage Creek Upper Reach	3.4	X					X				
Hernage Creek Lower Reach	0.4						X				
McHatten Creek	1.5	X								X	
Old Man Gulch	1.0						X				
Salt Creek	0.5	X					X				
Sawmill Gulch	3.8						X				
Spring Creek	1.2	X					X				
Third Gulch	2.6			X					X		
Trail Gulch	0.9	X					X				
Travis Creek	0.4						X				

SUMMARY 2002 Rating

Measure	PFC	FAR Upward	FAR Not Apparent	FAR Down	NF	Total
Miles	23.8	0.0	3.6	1.5	0.0	28.9



E. Water Quality

The assessment area lies principally in the Gypsum, Spring, Alkali, and Brush Creek basins which feed the Eagle River. Both Gypsum and Brush Creeks originate on White River National Forest land, and then flow across BLM and private ground. The headwaters of Spring and Alkali Creeks are on BLM while the lower reaches are on private. Most of the streams evaluated in this assessment are tributaries to Gypsum and Brush Creek. Eagle Valley Evaporite geology underlies the lower portion of the assessment area. The water produced from these areas is generally a calcium-sulfate type.

Brush Creek was gaged by USGS from 1950 through 1972. The average flow at the gaging station was 44.1 cfs. Data indicated seasonal variation of flow with the highest flows occurring in May and June from snowmelt, and baseflow conditions occurring during the winter. Irrigation diversions, small impoundments, and diversion into Gypsum Creek, modified the natural flow

conditions. The smaller tributaries to Brush Creek including Abrams Creek, Hernage Creek, Salt Creek, Frost Creek, Third Gulch, Trail Gulch, and Sawmill Gulch, can flood from either snowmelt or convective summer storms. Gypsum Creek was gaged by USGS from 1950 through 1955 and 1965 to 1972. The average flow at the station was 32.4 cfs. Flow data show a seasonal variation of flow with the highest occurring in June and July from snowmelt, and baseflow conditions occurring during the winter. Irrigation diversions, a municipal supply diversion for the town of Gypsum, slight regulation by L.E.D.E. Reservoir, and import from West Brush Creek, have modified the natural flow conditions. Tributaries to Gypsum Creek including Grundell Creek, Hardscrabble Gulch, and Old Man Gulch generally experience flood flows from convective summer storms.

The State of Colorado has established water quality standards for streams in the state based on existing or potential water uses. The use classifications for streams in the assessment are Aquatic Life Cold Water 1; Recreation 1; Water Supply; and Agriculture. Aquatic Life Cold Water 1 streams have physical characteristics to support a wide variety of cold water biota, usually including trout in Colorado. The recreation 1 standard waters are suitable or intended to become suitable for recreational activities in or on the water when the ingestion of small quantities of water is likely to occur. Water supply classified streams are suitable or intended to become suitable for potable water supplies. The Agricultural waters are classified for agricultural uses, either livestock watering or crop irrigation. A comprehensive list of standards for physical, biological, inorganic and metals parameters have been established to protect these uses.

The land health assessment team checked water quality on all sites inventoried for riparian condition during the 2002 field season. Water quality parameters measured were flow, temperature, specific conductance, pH, and salinity. These data were supplemented by data collected in the early 1980s by BLM and USGS at the gaging stations mentioned above. The following table, Discharge and Water Quality Data of Streams in the Eagle South LHA Area, contains a partial list of available data. The first section of the table lists the results of the data collected by BLM during the land health assessment. The last section is a summary of selected data collected by both BLM and USGS. The flow is presented in cubic feet per second (cfs), temperature in degrees Celsius (C), specific conductance in microsiemens (usiemens), pH in standard units, salinity in parts per thousand (0/00), and sediment in milligrams per liter (mg/l). A relatively comprehensive set of ions, heavy metals, bacteriological, and other data are available from USGS for both Gypsum and Brush Creeks. Since the mainstems of those creeks do not flow over BLM administered lands, those data are not presented and interpreted here.

Discharge and Water Quality Data of Streams in the Eagle South LHA Area

Stream Name	Date	Flow (cfs)	Temp. (C)	Cond. (usiemens)	pH	Salinity 0/00	Sediment (mg/l)
Alkali Creek nr Gypsum	5/23/02	0.59	8.2	193	8.3	0	
McHattan Ck (5S,85W,Sec 23,NWSE)	5/30/02	0.028	14.5	258	8.4	0	
Spring Creek nr Gypsum (abv culvert)	5/30/02	.53	16	310	8.3	0	
Abrams Ck @JPO-2 diversion	6/4/02	0.14	6	140	8.5	0	
West Middle Fork Abrams Ck abv confluence	6/4/02	.223	6.5	141	8.3	0	

East Middle Fork Abrams Ck abv confluence	6/4/02	.375	9	180	8.3	0	
Abrams Ck @ Mrs Paye Ditch diversion	6/4/02	.074	14	1600	8.2	1.25	
Hernage Creek Spring	6/21/02	.002	11.5	179	8.2	0	
Third Gulch Spring	6/27/02	.005	12	1225	8.5	1	
Salt Creek trib to Brush Ck nr Eagle	6/28/02	.06	13	262	7.8	0	
Trail Gulch trib to Brush Ck nr Eagle	6/28/02	.018	17	440	8.6	0	
Grundell Creek	7/8/02	0.07	13	318	8.7	0	
Hardscrabble Gulch	7/8/02	.11	13	203	8.4	0	
Old Mann Gulch	7/8/02	.09	17.5	650	8.4	0	
Fitzpatrick Gulch	7/9/02	.002	10	1820	7.9	1.5	
	mo./yr.		mean	mean	mean		Range
Brush Creek (7 samples)	1-9/81	15-78	6.8	796	8.0	-	26-372
Salt Creek (2 samples)	8-9/81	2.5-3.9	13.5	2225	8.75	-	
Abrams Creek (3 samples)	5-8/81	0.1-0.7	8	957	8.5	-	

These data indicate the higher elevation stream segments generally have better water quality than lower elevation segments. The water quality parameters measured in the Eagle River South assessment area are very limited, however, the data do not show any violations of the water quality standards established to protect the classified uses. The only stream within the assessment area which is included on the 303(d) list or 305(b) report for Colorado is the Eagle River. This list and report includes impaired water bodies, those streams that do not meet water quality standards with technology based controls alone. The fact that the other streams evaluated in this assessment are not on the 303(d) list suggests these water bodies are currently meeting standards. Only the reach of the Eagle River from Gore Creek to the Colorado River is included on the 303(d) list, because of elevated levels of manganese from the Eagle mine. The mine is not within the assessment area.

V. MANAGEMENT ACTIVITIES

A. Livestock Grazing

Permitted Use

Allotment Name	Allotment No.	Livestock No./Kind	Grazing Begin Date	Grazing End Date	% Public Land	Animal Unit Months (AUMS)
East Hardscrabble	08502	581 C	05/06	06/20	100	879
Brush Creek	08503	22 C	06/01	06/15	73	8
West Hardscrabble	08504	613 C	05/16	06/30	100	927
		30 C	10/16	10/31	100	15
Eagle River	08505	Unallotted				
Red Hill	08507	391 C	05/10	06/24	100	591
		25 C	05/06	06/20	100	670
		75 C	04/01	04/17	1	1
		30 C	07/05	07/15	1	1
		120 C	10/05	10/15	1	1
Wolcott Isolated Tr	08710	10 C	06/01	09/30	100	40
N. Bellyache	08712	180 C	05/16	06/15	100	183
Horse Mtn.	08719	110 C	06/01	10/15	8	40

Salt Creek-Bellyache	08721	456 C 50 C	06/01 10/16	06/16 10/22	100 100	240 12
Salt Creek Forest	08722	177 C	06/16	07/23	13	29
Falk	08723	50 C	05/15	05/31	32	9
Squaw Creek	08727	Unallotted				
Red Canyon 2	08728	Unallotted				
Bellyache	08734	100 C	05/10	07/09	9	18
Bellyache Ridge	08772	Unallotted				

Grazing Management Summary

The Wolcott Isolated Tract was being grazing by horses instead of cattle at the time of the land health assessment. The permittee was informed that the permit is for cattle and was instructed to remove the horses from the allotment.

All of the other allotments with exception of West Hardscrabble and Salt Creek Forest are managed as the table above shows. The West Hardscrabble Allotment is under an allotment management plan (AMP), approved December 19, 1991. Grazing use is managed under a five pasture deferred system. The Salt Creek Forest Allotment is currently under an allotment management plan that is administered by the Eagle Ranger District of the White River National Forest. The allotment is incorporated into the Box Springs Pasture, which includes BLM and National Forest lands, since there is no fence that separates the two. The plan is a four-pasture deferred rotation system. The AMP specifies grazing use on the Box Springs Pasture as 177 Cattle 9/8 - 10/15 (even years) and 6/16 - 7/23 (odd years).

Big Game Management

In addition to domestic livestock grazing within the landscape area, wild ungulate grazing (primarily mule deer and elk), is a factor contributing to range conditions, particularly in the low and mid-elevation sagebrush habitats located within big game winter range and winter concentration areas. Large portions of the Eagle River South Landscape are mapped as mule deer and elk winter range. In addition, severe winter range, and winter concentration areas are mapped for portions of the area. The Colorado Division of Wildlife (CDOW) manages both species and has specific management objectives for each that are discussed below.

Elk

Elk residing within the assessment area are managed in Data Analysis Unit (DAU) E-16, which encompasses Game Management Units (GMU) 44, 444, 45, and 47. GMU 44 is the unit in which the entire Eagle River South Landscape resides. The current population objective for elk in the DAU is proposed to be 6,000 animals. The current population estimate for DAU E-16 is 7,900 animals.

The elk population was historically lower than it is today, and the population has steadily increased since the 1950's. The 1953 post-season estimate was approximately 1,800 elk. By 1979, the population had grown to approximately 4,800 elk. Since that time the population has steadily increased to its current estimated population.

The elk population in this DAU is currently at its peak. The CDOW, as well as local Habitat

Partnership Program participants, ranchers, and other interested/affected publics recognize that this population is above desired levels. Land use conflicts are currently not a big concern for the area and to date, little concern has been raised regarding habitat condition and capability, and winter use of private property and game damage issues have been minimal.

Elk numbers within GMU 44 and the Eagle River South area are higher then desired and some areas are showing signs of concentrated winter use by both mule deer and elk. However, few significant habitat related concerns exist in the area. Some winter range habitats (browse species in particular) are in less than desirable conditions due to concentrated and repeated winter use. However, the majority of habitats in the Eagle River South area are in fair to good condition given recent climatic conditions. Efforts by the CDOW to increase harvest and reduce elk to meet population objectives will likely result in improved winter range habitat conditions within the assessment area.

Mule deer

Mule deer within the landscape assessment area are managed in DAU D-14, which encompasses GMU 44. GMU 44 is the unit in which the entire Eagle River South Landscape area resides. The current population objective for deer in DAU D-14 is 7,000 animals. The current population estimate for this DAU is approximately 7,800 animals.

The mule deer population in D-14 was high in the late 1950's and early 1960's when the population peaked at approximately 17,600 animals in 1962. Since then, the population has fluctuated due a variety of factors including the severe winters of 1972-73, 1978-79, 1983-84, and 1993-94. Overall, the population has been steadily declining since the 1960's. However, in the past few years the population appears to have begun a slight rebound. Few significant habitat related concerns exist in the area. Some winter range habitats (browse species in particular) are in less than desirable conditions due to concentrated and repeated winter use. However, the majority of habitats in the Eagle River South area are in fair to good condition given recent climatic conditions. Efforts by the CDOW to increase harvest and reduce mule deer numbers to meet population objectives will likely result in improved winter range habitat conditions within the assessment area.

Mule deer and elk numbers vary naturally due to a variety of environmental and biological factors, and in response to hunting pressure. As a result, populations have varied dramatically over the past several decades. Mule deer numbers were substantially higher in the early 1960's and have since declined. Elk numbers within the landscape area are currently at their peak. Past use coupled with ongoing current use of limited winter range habitats by both species may at least in part account for the less than desirable range conditions (especially browse species condition) found in some areas. Many browse species show poor vigor and moderate to severe hedging within select portions of the landscape assessment area. Mule deer and elk concentration on winter range and use of browse species can reduce plant vigor and productivity over time.

The amount and availability of winter range is of concern in portions of the Eagle River South Landscape area. BLM lands comprise approximately 23.7 % of GMU 44 in both E-16 and D-14. Of the mule deer winter range located in GMU 44 approximately 52% is located on BLM lands,

while 36% of elk winter range is located on BLM lands within GMU 44. The remainder of mule deer winter range is broken down as follows: approximately 41% private lands, 6% USFS lands, and 1% state lands. The remainder of elk winter range is broken down as follows: approximately 34% private lands, 29% USFS lands, and 1% state lands. As private lands within the assessment area continue to be developed and native rangelands are converted to low quality or unsuitable habitat, more emphasis and importance is placed on the remaining public lands that contain important winter range. Questions have been raised in the past as to the greater landscape's ability to support large populations of big game with respect to limited amounts of crucial winter habitat. Winter range habitats in the Eagle River South Landscape area may be near, at, or above animal carrying capacity, contributing to the less than desirable condition of some winter range habitats within portions of the landscape area.

The management of mule deer and elk are the responsibility of the CDOW. However, the BLM is responsible for the management of wildlife habitats under its jurisdiction and works cooperatively with the CDOW in managing these habitats on public lands within the landscape area. The DAU objectives for both mule deer and elk are currently being revised and updated. The BLM participated in meetings and supports the proposed population objectives for both mule deer DAU D-14 and elk DAU E-16. Both have objectives below the current population estimates for both species and the CDOW will work to reduce numbers to objective levels. These efforts should help to improve habitat conditions in the area. In addition to population management, opportunities exist within this landscape to proactively treat and improve winter range habitat and sagebrush and pinyon-juniper plant communities in particular. Potential habitat improvement projects and strategies are discussed below in the Recommendations Section.

C. Vegetation Treatments

Six of the upland assessment sites had been brushbeat in the past, and several other areas were known to have been brushbeat, but were not visited as part of this assessment. Brushbeating was generally conducted in alternate rows 5-20 feet wide. The brushbeating killed mature sagebrush and resulted in a mosaic of early and late seral stages. Most of the brushbeat sites had been seeded to crested wheatgrass. These sites continue to be dominated by crested wheatgrass to the near exclusion of any native perennial grasses or forbs. This has resulted in a decline in habitat diversity and accelerated erosion as the bunchgrass nature of crested wheatgrass does not provide protection for the soils between the clumps of grass.

Those sites that were not seeded to crested wheatgrass have a more diverse understory of native perennial grasses and forbs and less evidence of soil erosion.

D. Off-Highway Vehicle Management

In the 1984 Glenwood Springs Resource Area Resource Management Plan, off-road vehicle, now referred to as off-highway vehicle (OHV), use was limited to existing roads and trails on the Red Hill Common Allotment and a portion of the West Hardscrabble Allotment. On approximately 1,000 acres of public lands east of Eagle, OHVs were limited to designated roads and trails. In most cases, these restrictions were designed to protect steep, fragile and erodable soils. In the 1980's and early 1990's very little OHV use occurred within the Resource Area. However, within

the last 10 years, this situation has changed dramatically, and many of the more accessible portions of the Resource Area, particularly those close to towns and other residential developments, are seeing rapid increases in OHV activity. In a few locations within the Eagle River South Landscape, OHV use is causing a failure to attain the land health standards for vegetation, soils and rare plants. This problem will be more completely addressed in the evaluation section.

VI. EVALUATION/CONCLUSIONS

A. Analysis/Interpretation of Findings Relative to Land Health Standards

Standard 1. Upland Soils

Of the 52 upland sites visited, 36 were meeting Standard 1, 12 were considered to be marginally meeting the Standard with problem areas, and 4 were found not to be meeting Standard 1. Problem areas for soil conditions seem to be most prevalent in the Brush Creek, Salt Creek/Bellyache, and North Bellyache allotments. Isolated problems were noted in the Eagle River, East Hardscrabble, West Hardscrabble, and Wolcott Isolated Tract allotments.

Brush Creek

Two sagebrush sites were visited in this small allotment. On one site, sagebrush was fairly dense and the amount of bare ground was higher than it should be for the range site. Water flow patterns were evident, litter was being moved due to overland flows and deposited in scattered concentrations, and plants in flow paths were becoming pedestalled.

At the second site, all of the above issues were noted, as well as the fact that few biological soil crusts were seen outside of the protection of shrubs, and soil infiltration was being inhibited due to minor compaction layers.

Brush Creek is Not Meeting Standard 1.

East Hardscrabble

East Hardscrabble Allotment is marginally meeting Standard 1. The upper elevation oakbrush and mountain shrub sites are in very good condition with no evidence of loss of soil cover or soil productivity. However, the lower elevation, drier sagebrush parks have some soil problems. Sagebrush density varied from moderate to high, and the understory is in poor condition. There was more bare ground and fewer grasses and forbs than expected, even in light of the drought. The amount of litter was also less than expected relative to the total vegetative cover. Microbiotic crusts are present only under the protective cover of the sagebrush. Soils were not adequately protected from erosion and pedestalling and water flow patterns were readily apparent.

Eagle River

The Eagle River allotment is currently unallotted for livestock grazing. The allotment consists of a narrow strip of land extending west of Gypsum and south of the Eagle River. Part of the allotment was riparian habitat; the remainder was dry upland habitat with high alkaline content. The riparian portion of the allotment was meeting all the indicators for healthy soils; the upland

portion had some concerns related to excessive bare ground, water flow patterns and lack of litter cover. This site appeared to receive heavy winter and spring use by elk. The allotment is meeting Standard 1 with some problem areas as noted above.

North Bellyache

The North Bellyache allotment is mostly sagebrush parks interspersed with some pinyon-juniper woodlands and a small amount of nearly barren soil of gypsum origin on the west end of the allotment. Most of the sagebrush parks in the North Bellyache allotment have been brushbeat in the past. These treatments do not appear to have been seeded with crested wheatgrass and most of them have filled in well with native vegetative cover.

However, the western end of the allotment is experiencing increasing OHV activity and the roads and trails are creating some erosion concerns. In particular, the area immediately east of the town of Eagle has numerous trails crisscrossing the hillsides on fragile, gypsum soils. Loss of biological soil crusts and pedestalling of plants were evident. This allotment is meeting Standard 1, however, the OHV situation is creating some problem areas that put the allotment at risk.

Salt Creek/Bellyache

Soils on most portions of the Salt Creek Bellyache allotment were productive, with adequate vegetation and biological soil crusts to protect the soil from erosion and allow moisture infiltration. Isolated portions of the allotment had issues with soil conditions. The bottoms of Road Gulch and the drainage to the south were treated with a brushbeater on several occasions, most recently in 1989-1990. The treatments had also been seeded to crested wheatgrass. The condition of the Road Gulch treatment looked as bad as or worse than the untreated areas. There were signs of soil crusting inhibiting establishment of vegetation. Bare ground was higher than expected and water flow patterns and pedestalling were widespread throughout the Gulch. A deep, raw gully drains through the gulch. Although portions of the gully were healing, the majority of the gully had vertical sides and no vegetative growth to protect the sides or bottom from further erosion. A smaller gully appeared to be starting to the north.

The west-facing slopes on the northeast side of the allotment had some soils issues also. This may be a concentration area for livestock, as there were more signs of livestock use here than anywhere else on the allotment. The area was also experiencing a moderate amount of wildlife use. The amount of bare ground was moderately higher than expected and there was less litter than expected for the amount of vegetative cover. Water flow patterns were evident and were causing movement of smaller-sized classes of litter.

Although, much of the allotment had more bare ground and less litter than expected, this situation may be due in part to the drought that western Colorado is experiencing. On balance, the Salt Creek/Bellyache Allotment is meeting Standard 1 with problem areas as discussed.

West Hardscrabble

West Hardscrabble is a relatively large allotment but roughly 25-30% of the allotment is mature pinyon-juniper woodlands with little understory vegetation or gypsiferous soils with sparse

vegetative cover. The central part of the allotment is sagebrush or mixed mountain shrubs and pinyon-juniper. Much of the center of the allotment burned in the 1980's. The southern, higher elevation portion of the allotment contains oakbrush and aspen.

Unregulated OHV use along the open pinyon-juniper hillsides and gypsiferous knolls on the northwestern part of the allotment is causing some problems with erosion due to loss of biological soil crusts and other vegetative cover to protect the soil.

The middle portion of the allotment, which was primarily mixed mountain shrubs and pinyon-juniper stands, burned in the late 1980's. Grasses were regenerating well and in some areas, forbs and shrubs such as snowberry, serviceberry, and antelope bitterbrush were also regenerating well, but the sagebrush has been slow to regenerate.

The unburned sagebrush and mixed mountain shrub sites had either decadent or dense sagebrush with fewer grasses and forbs than expected. Bare ground was higher than expected and pedestalling and water flow patterns were evident. Pinyon-juniper encroachment was at an advanced stage on at least one site.

The oakbrush and aspen sites were in good condition overall. The soils on these sites were adequately protected with vegetative cover. One aspen site was receiving heavy grazing and browsing pressure, by both domestic livestock and big game animals.

The West Hardscrabble allotment is Meeting Standard 1, but with some problem areas.

Wolcott Isolated Tracts

The Wolcott Isolated Tracts allotment consists of 2 separate parcels of public land encompassed with adjacent private lands. The allotment is permitted for cattle but the west side was being grazed by horses at the time of the land health assessment. Utilization was in the heavy range and bare ground was higher than expected. There were some signs of soil compaction causing decreased infiltration and increased runoff of precipitation. Water flow patterns were evident, but were generally short.

The east side of the allotment is physically separated from the western side by approximately one mile. Private lands between the two parcels are being developed for a golf course and residential housing. The east side does not appear to receive any domestic grazing use. Soils on the eastern side were adequately protected by rock and vegetation and no soils issues were identified.

The Wolcott Isolated Tracts allotment is meeting Standard 1 with some problem areas as identified above. The allotment does not meet the Guidelines for Livestock Grazing Management in that the allotment is grazed from June 1st to September 30th which encompasses the entire critical growth period.

The following table summarizes the evaluation of Standard 1 for each of the allotments within the Eagle River South landscape.

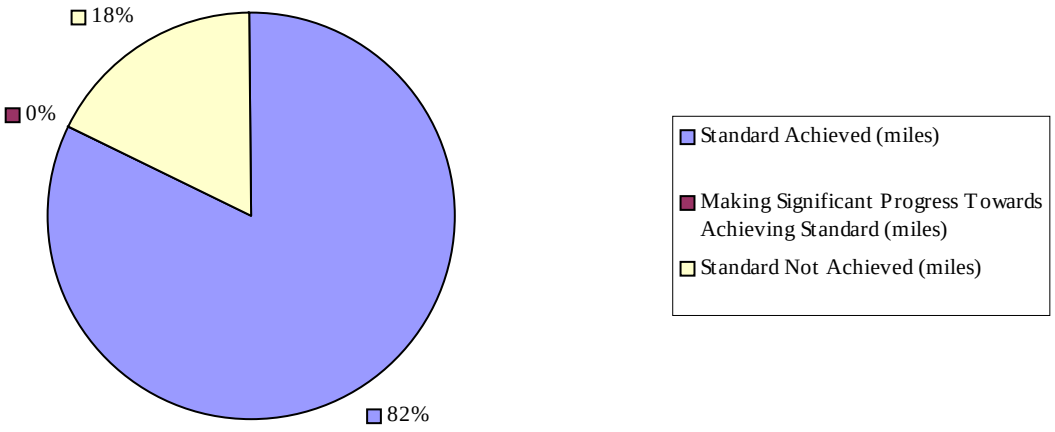
Evaluation of Standard One: Soils				
Allotment	Acres Achieving or Moving Towards Achieving	Acres Achieving with Problem Areas	Acres Not Achieving	Acres Not Achieving Due to Livestock Grazing
Bellyache	532			
Bellyache Ridge	1,777			
Brush Creek			109	??
Eagle River		138		
East Hardscrabble		8,018		
Falk	71			
Horse Mountain	285			
North Bellyache		2,754		
Red Canyon 2	850			
Red Hill Common	12,467			
Salt Creek/Bellyache		4,368		
Salt Creek/Forest	741			
Squaw Creek	261			
West Hardscrabble		16,300		
Wolcott Isolated Tract		137		
Unallotted/Unnamed	~160			
TOTAL	**17,144**	**31,715**	**109**	**??**

Standard 2. Riparian Systems

The tables below depict the evaluation of current resource condition within the landscape with respect to Standard 2. Since the approach of the PFC assessment is to evaluate most of the indicators for Standard 2, the resultant functional rating (PFC, FAR, NF) for each riparian area determines whether the Standard is being achieved. A PFC rating means most or all of the indicators (within the systems potential) have been met, and therefore Standard 2 has been achieved. A FAR rating means several indicators have not been met and generally Standard 2 will not have been achieved. Likewise, a NF rating means that most or all of the indicators have

not been met and consequently Standard 2 has not been achieved.

Stream/Drainage Name	Allotment	Standard Achieved (miles)	Making Significant Progress Towards Achieving Standard (miles)	Standard Not Achieved (miles)
Abrams Creek Upper Reach	West Hardscrabble	3.3		
Abrams Creek Lower Reach	East Hardscrabble	2.0		
Alkali Creek Lower Reach	West Hardscrabble	1.4		
Alkali Creek Upper Reach	West Hardscrabble			1.0
Eagle River	Red Canyon	0.5		
Fitzpatrick Gulch	Red Hill	0.4		
Frost Creek	East Hardscrabble	0.6		
Grundell Creek	West Hardscrabble	1.8		
Hardscrabble Gulch	West Hardscrabble	2.2		
Hernage Creek Upper Reach	East Hardscrabble	3.4		
Hernage Creek Lower Reach	East Hardscrabble	0.4		
McHatten Creek	West Hardscrabble			1.5
Old Man Gulch	Red Hill	1.0		
Salt Creek	Salt Creek Forest	0.5		
Sawmill Gulch	East Hardscrabble	3.8		
Spring Creek	West Hardscrabble	1.2		
Third Gulch	East Hardscrabble			2.6
Trail Gulch	Salt Creek Bellyache	0.9		
Travis Creek	Wolcott Isolated Tract	0.4		
Totals		**23.8**	**0.0**	**5.1**



B. Causal Factors

Stream/Drainage Name	Causal Factor
Alkali Creek Upper Reach	Many of the slopes adjacent to the riparian zone lack sufficient upland vegetation coverage, which makes the riparian zone more susceptible to convective storm events. Wildfire suppression and gypsum soils (have limited potential to produce vegetative coverage) are probably the cause.
McHatten Creek	Heavy livestock use and trampling is one of the main causal factors. Extreme drought conditions (and lack of upland water sources) may have been a major influence on grazing distribution causing an inordinate amount of livestock use in this area. Convective storm events and numerous big game trails/use are also causal factors resulting in the excessive erosion/deposition noted in the riparian area.
Third Gulch	Heavy trailing use by livestock along the side of the gulch and crossing the gulch was the main causal factor. Where this occurred, trampling damage and heavy browsing of riparian woody species was evident in places. It should be noted that the situation above was not occurring along the entire 2.6 mile of the reach. Where trailing use was not occurring, the system was generally in good condition.

Standard 3. Healthy Plant and Animal Communities

Of the 52 upland sites visited, 37 were found to be meeting Standard 3, 10 were considered to be marginally meeting the standard but with problem areas and 6 were found not to be meeting Standard 3. The sites that were not meeting or were meeting with problem areas were scattered

across 8 allotments: Brush Creek, East Hardscrabble, Eagle River, North Bellyache, Red Hill Common, Salt Creek/Bellyache, Wolcott Isolated, and West Hardscrabble. In addition, in the northern portion of the landscape, adjacent to more developed private lands, habitat fragmentation and loss of habitat connectivity were of concern. However, only two allotments (Brush Creek and East Hardscrabble) had deficiencies sufficient to be considered not meeting the standard as a whole. Sites not achieving the standard were generally located in sagebrush and pinyon-juniper habitats.

The older, untreated sagebrush parks were being invaded by pinyon/juniper trees. In some cases, the tree encroachment is at an advanced stage. Many of these areas are meeting or marginally meeting the standards now, but the encroachment was beginning to have a negative effect on the indicators. Shrubs and perennial grasses and forbs were declining in cover and productivity, soil infiltration rates were reduced, habitat quality and usability for sagebrush dependent species has declined. Some type of treatment to remove the trees will be necessary in the near future to sustain land health.

Many of the sagebrush parks south of the Eagle River have been brushbeat sometime in the past. Results of these brushbeatings were mixed. In most cases, the sagebrush has been very slow to regenerate or was not regenerating at all and the remaining shrubs did not appear to show any signs of improved vigor or productivity. On most sites, the grass cover and productivity had improved, but forb cover was poor and forbs were lacking in species diversity.

On a few sites, the condition of the treated area looks worse than adjacent untreated areas. Road Gulch is an example of an area which has not improved following vegetative treatment. The area was brushbeat and reseeded to crested wheatgrass. Bare ground was higher than expected, soil crusting and extensive water flow patterns were evident. Gullies were deep and not healing. Very few native grasses and forbs remain.

As with most of the low elevation sagebrush areas in Glenwood Springs, the South Eagle area provides important winter range habitat for big game species. Sagebrush and other browse species are often moderately to severely hedged. As private ranches continue to be converted to residential developments and golf courses, and the amount of available winter range declines, this situation will be exacerbated. If improvement in browse conditions and wildlife habitat is the objective, brushbeating may not be the answer, since it is apparent that sagebrush has not recovered from most of the brushbeatings that took place in this watershed.

The drought has also had a noticeable effect in this watershed. The previous 3-4 years had less than average precipitation, with 2002 being one of the most severe droughts in Colorado history. Throughout most of the watershed, the drought was evident in decreased productivity and increased mortality on grasses, forbs and shrubs.

The following table summarizes the Evaluation of Standard 3. Those allotments that are not achieving the standard or are achieving the standard but with problem areas identified are discussed below.

Evaluation of Standard Three: Plant and Animal Communities				
Allotment	Acres Achieving or Moving Towards Achieving	Acres Achieving with Problem Areas	Acres Not Achieving	Acres Not Achieving Due to Livestock Grazing
Bellyache	532			
Bellyache Ridge	1777			
Brush Creek			109	??
Eagle River		138		
East Hardscrabble			8,018	
Falk	71			
Horse Mountain	285			
North Bellyache		2,754		
Red Canyon 2	850			
Red Hill Common		12,467		
Salt Creek/Bellyache		4,368		
Salt Creek/Forest	741			
Squaw Creek	261			
West Hardscrabble		16,300		
Wolcott Isolated Tract		137		
Unallotted	~160			
TOTAL	**4,677**	**36,164**	**8,127**	**??**

Brush Creek

Brush Creek Allotment is a small allotment just west of Brush Creek which consists mostly of sagebrush and a small amount of pinyon/juniper. The allotment did not meet Standard 3 due to a lack of herbaceous vegetation and the presence of noxious weeds/invasive plants such as crested wheatgrass, smooth brome and Canada thistle. Drought conditions obviously contributed to the poor vigor of herbaceous vegetation, however, this allotment had less herbaceous vegetation than other areas of the landscape at the same elevations. A pipeline and a road both traverse the allotment. The pipeline route was apparently seeded to crested wheatgrass and the understory is now a monoculture of crested wheat. The permittee took non-use of this allotment in 2002, so it

was not clear whether livestock grazing was a significant factor in failing to achieve the standards.

Other factors included fragmentation of the greater landscape due to housing developments and roads. There is still good habitat connectivity to other public lands located to the west of the allotment. Brush Creek allotment is Not Meeting Standard 3.

Eagle River

The Eagle River Allotment was meeting Standard 3, but with some problems noted. Shrubs were heavily hedged and the understory vegetation was dominated by cheatgrass. Judging by the density of pellet groups seen, the area receives heavy winter and spring use by elk. Big game use is probably the main cause of the land health issues on this allotment.

East Hardscrabble

East Hardscrabble was Not Meeting Standard 3. The main problems with this allotment were found on the lower elevation sagebrush sites. On these sites, sagebrush was in generally poor condition and grass and forb cover was poor. Pinyon-juniper encroachment was a significant problem on nearly all of the low- to mid-elevation sagebrush sites. The effects of the drought were most severe in the lower elevations of the allotment with decreased leader growth on shrubs and poor vigor on grasses. These lower elevations also experience heavy winter use by big game and disproportionately greater use by livestock. Houndstongue and/or Canada thistle were found on several sites throughout the allotment.

Upper elevations in the southern one-third of the allotment were in better condition. Mixed mountain shrub and aspen/conifer habitats appeared less affected by the drought and grazing/browsing. These sites had better vigor and productivity of all life forms and good species diversity.

The northern two-thirds of the allotment are heavily roaded, which contributes to habitat fragmentation. Also, private lands which border this allotment to the north and east, have housing developments, roads, powerlines, etc. which contribute to poor habitat connectivity on a larger scale.

The riparian zone along lower Third Gulch (East Hardscrabble Allotment) had intermittent stands of cottonwoods and aspens, but the herbaceous cover was dominated by noxious weeds and invasive plants with shallow root systems incapable of protecting the banks from major storm events. Young woody vegetation was being heavily browsed resulting in poor vigor and even some mortality. There is a fence close to the stream channel which runs parallel to the drainage. The alignment of the fence contributes to the tendency of livestock to concentrate along the riparian zone.

North Bellyache

This allotment is immediately east of the town of Eagle and readily accessible to recreationists. The allotment appears to be a very popular OHV and mountain bike area. The extensive network of roads and trails have resulted in the loss of biological soil crusts and vegetation,

which degrades wildlife habitat and leaves the soil vulnerable to erosion.

Many of the sagebrush parks on this allotment were treated with a brushbeater in the past. Regeneration of sagebrush has been slow. However, the treatments in this allotment do not appear to have been seeded with crested wheatgrass and therefore, still contain a diverse mix of native grasses. The allotment also contains important winter habitat for wildlife and receives heavy big game use.

North Bellyache was meeting Standard 3, but with problem areas. Problems in this allotment were related to destruction of vegetation due to OHV activity, lack of forbs, moderate to heavy browsing on sagebrush, pinyon-juniper encroachment and the lack of sagebrush recruitment following brushbeating.

Red Hill Common

For the most part, the Red Hill Common allotment was meeting the standards. Overall, ground cover was adequate to protect soils and vegetation was in fair to good condition. However, certain concerns were raised regarding hedging on shrubs, pinyon-juniper encroachment into sagebrush sites, and a lack of forbs. Cheatgrass dominates the understory in several low-elevation sagebrush sites and poses a risk of expansion following fire or other disturbances.

Salt Creek/Bellyache

Most of the Salt Creek/Bellyache Allotment was in good condition; however, portions of the allotment had land health concerns. The most serious problem with this allotment is the condition of the old brushbeating treatments in the bottom of Road Gulch and the gulch to the south that appear to have been seeded to crested wheatgrass. The brushbeatings were now dominated by crested wheat which has inhibited the establishment of native perennial grasses and forbs. In Road Gulch, winterfat and four-wing saltbush were regenerating in some of the brushbeat rows, however, sagebrush regeneration was still lacking.

The untreated hillsides looked considerably better with good vegetative diversity and decent productivity given climatic conditions. Juniper encroachment was occurring in the sagebrush/mixed mountain shrub communities throughout the allotment and in some areas was already at an advanced stage. Many portions of the allotment appeared to receive alot of big game use, which may be contributing to moderate hedging and decreased vigor on shrubs and fewer forbs than expected.

Portions of the allotment, particularly the eastern side, show moderate signs of big game use, with moderate to heavy hedging on browse species. The gas pipeline and the road up Trail Gulch are heavily infested with noxious weeds, including Russian knapweed, houndstongue, musk thistle, and white top.

The northeastern corner of the allotment also had some vegetative concerns. The vegetative community was diverse although there was less grass and forb cover than expected for the range site. Arrowleaf balsamroot, which increases with grazing and surface disturbance, was more prevalent than expected. The shrubs varied from normal growth form to dead or decadent. This

may be a concentration area for livestock, as there were more signs of livestock use here than anywhere else on the allotment. The area also experiences a moderate amount of wildlife use.

Private land surrounds much of this allotment and roads, houses, and powerlines were all contributing to fragmentation. However, limited public access to the majority of the allotment keeps human use levels to a minimum.

Salt Creek/Bellyache is achieving Standard 3, but has a number of problem areas.

West Hardscrabble

Problems with this allotment were generally old, decadent sagebrush stands, encroachment of juniper, lack of forb production, slow recovery of sagebrush in burned areas, and OHV use in the northwestern part of the allotment.

Unregulated OHV use on the hillsides and in the pinyon-juniper woodlands in the Spring Creek access area just south of the Eagle County airport in the northwestern part of the allotment is causing a loss of biological soil crusts and other vegetative cover. These areas are now susceptible to erosion. The extensive network of authorized and unauthorized roads and trails, combined with housing and commercial development to the north and west, and a regional airport to the north are causing fragmentation of habitat for some wildlife species.

Untreated sagebrush stands showed a decline in grass and forb production and either an increase in density of sagebrush and or else a decrease in density as a result of sagebrush mortality and juniper encroachment. Many of the sagebrush and P/J stands in the central portion of this allotment were burned in the mid-1980's. All of the burned areas exhibit a noticeable increase in grass production, however, forb production and sagebrush regeneration were lacking.

West Hardscrabble is currently achieving Standard 3, but has problem areas.

Wolcott Isolated Tract

This small allotment consists of two separate parcels, an eastern and a western unit. The year 2002 was a drought year; however, utilization levels in the western unit were heavy. The site had less vegetative cover than expected for the range site, with few perennial grasses and forbs. Juniper encroachment was also a concern. The eastern unit showed few signs of livestock grazing and the vegetative cover and productivity was good. However, smooth brome, which was probably seeded along the powerline, dominated this site and was extending out into the rangeland away from the powerline disturbance. Native grasses and forbs were being crowded out by the aggressive, exotic brome.

Private lands surround this small allotment and habitat continuity is compromised due to roads, houses, highways, and golf courses. However, limited public access to the majority of the allotment keeps human use levels to a minimum.

This allotment is meeting Standard 3, but with some identified problems. Primary concerns related to livestock grazing are the season-long grazing use which does not conform to the

Guidelines for Livestock Grazing Management in that it does not allow periodic growing season rest or deferment, or opportunities for seed dissemination, regrowth or recovery.

Standard 4. Special Status Species and Their Habitats

Fish & Wildlife

The following special status wildlife species or their habitat are known or suspected to occur within the Eagle River South Landscape area. Bald eagles, Canada lynx, golden eagles, Colorado River cutthroat trout, and greater sage grouse may be present. Potential habitat may exist for other Sensitive Species including Gunnison's sage grouse and a variety of migratory birds species are known in the area.

Canada lynx

Mapped Canada lynx habitat and/or landscape linkages exist within portions of the East Hardscrabble, West Hardscrabble, Bellyache, and Wolcott Isolated allotments. In all, 8,545-acres of "other" habitat, and 1,745-acres of winter habitat is located within the South Eagle Watershed. A total of approximately 11,500-acres is located within a landscape linkage of which approximately 2,900-acres is BLM land and the remainder is private and state land. Vegetation in the higher elevation portions of these allotments provides summer foraging, and some limited winter foraging and denning habitat for lynx. Lynx habitat in each allotment is generally comprised of aspen with some pockets of lodgepole pine, spruce and fir. Some solid stands of lodgepole, and spruce fir are also present. The treed ridgetops and riparian habitats located in these allotments may serve as movement and dispersal corridors. Other habitat consists of sagebrush and pure aspen within 500 meters of aspen mixed conifer or pure conifer.

Allotments containing lynx habitat had a minimum of one upland site visited within the mapped habitat. Thirty-three of fifty-two sites visited within the assessment area were found to be meeting Standard 3 for healthy plant and animal communities. Range conditions in mapped lynx habitat located within the higher elevations of the subject allotments looked good. Only individual sites scattered within the lower elevation portions of the assessment area located within the mapped landscape linkage, were found to not be meeting Standard 3. Overall condition of habitats located within the landscape linkage was sufficient given recent climatic conditions, to facilitate movement of lynx through the area. The bigger concern regarding movement and dispersal is the general fragmentation of habitats due to several factors including private land proximity and development, Interstate 70, roads, powerlines, and pipelines.

Based on the condition of the higher elevation upland and riparian habitats mapped as lynx habitat, and the overall condition of habitats located within landscape linkages located on public lands, Standard 4 for Canada lynx is being met within the Eagle South Landscape area. There is risk that with continued future development of private lands and OHV use on public lands, the landscape linkage could be compromised.

Bald eagles

Bald eagle winter range and winter roost habitat is located along portions of the Eagle River and up portions of Gypsum and Brush Creek, within the landscape area. Very little public land is located along the majority of these streams, and as such, BLM management and programs have little direct influence on the wintering habitats for this species. However, where large cottonwood and or

conifer trees occur on public land portions of these rivers and streams, habitat looked good.

In addition to water-based foraging opportunities, public lands within the Landscape area also provide upland foraging habitat for bald eagles. Mapped winter foraging areas are mapped for this species on BLM lands within the assessment area. Bald eagles generally use upland habitats as a means to scavenge on winter-killed big game, and other species. Although site-specific locations are not achieving Standard 3, the overall area is meeting this standard and supplies suitable quantities of upland forage capable of maintaining elk and mule deer above current CDOW populations objectives for both species. Thus an adequate amount of potential carrion is available within the greater landscape area. Based on the above information, Standard 4 is being met for this species within the Eagle River South Landscape.

Colorado River cutthroat trout
This species occurs within Abrams Creek and possibly Spring Creek within the assessment area. In addition, suitable habitat and flow occurs within portions of the Eagle River, and Gypsum and Brush Creek, and it is likely that these waters historically contained this native species.

Competition with non-native salmonids including rainbow, brook, and brown trout is the major factor contributing to the absence/decline of this native species in Brush and Gypsum Creek. Water quality and riparian conditions in Abrams Creek were providing good aquatic habitat. Standard 4 is being achieved for Abrams Creek as it contains a genetically pure population of wild, self-sustaining Colorado River cutthroat trout. The population appears to be stable despite water diversions that divert a significant amount of flow, and prior to placement of a fish screen, may have accounted for seasonal losses of fish. The status of the Spring Creek population is unknown. Standard 4 is not being met on the remainder of waters capable of supporting a fishery (Brush Creek, Gypsum Creek, and Eagle River) due to the following reason(s):

Reasons for Standards Not Being Met
* Stocking of non-native trout species and competition with non-native species.

There is no public land along Brush Creek or Gypsum Creek and only one short stretch of public land (0.5 miles) bordering the Eagle River in this watershed. BLM manages habitat, not fisheries or wildlife populations. The riparian and aquatic habitat along the Eagle River appears suitable for supporting Colorado River cutthroat trout. Therefore, problems with not meeting Standard 4 for Colorado River cutthroat trout in these streams are beyond the scope of BLM's management authority.

Migratory Birds and Raptors
The assessment area provides both foraging and nesting habitat for a variety of migratory birds. Two species characteristic of pinyon/juniper woodlands, the pinyon jay and black-throated gray warbler are listed on the USFWS's Bird of Conservation Concern List. Additional pinyon/juniper birds that may nest in the area include the black-chinned hummingbird, gray flycatcher and juniper titmouse. Within the sagebrush habitats the sage sparrow and Brewer's sparrow may occur. Many species of raptor occur within the assessment area including red-tailed hawks, golden eagles, northern goshawks, Cooper's hawks, kestrels, and a couple of owl species. In addition to these

species, many other species on the Fish & Wildlife Service's Birds of Conservation Concern list could occur in the area.

Overall, the assessment area appears to be meeting the needs of migratory birds. However, limited bird count data exists for the area. Habitat condition is generally good, although site-specific areas are not meeting Standard 3. The greater concern is the continued fragmentation of habitat and losses of large blocks of contiguous habitat required by many bird species. Continued private land development and the proliferation of roads and trails on public lands from recreation and OHV use will continue to reduce habitat quality and quantity. Given current overall habitat condition and availability, Standard 4 for migratory birds and raptors is being achieved within the Eagle River South Landscape area.

Greater sage grouse (Gunnison's sage grouse)
Habitat is mapped for these species in the Red Hill Common, East and West Hardscrabble, North Bellyache, Horse Mountain, and Salt Creek Bellyache allotments. The West Hardscrabble and Red Hill Common allotment are mapped as historic habitat, as no birds have been seen in these areas in several years. In all, a total of approximately 8,420-acres is mapped as historic habitat in the Red Hill and West Hardscrabble allotments, of which approximately 8,200-acres is BLM.

The North Bellyache, East Hardscrabble, Horse Mountain, and Salt Creek Bellyache allotments contain mapped winter range and brood rearing habitat. No birds have been seen in these areas for some time as well, although isolated bird droppings were found in the North Bellyache Allotment in 2003. These allotments contain approximately 9,600-acres of mapped winter range and brood rearing habitat of which approximately 4,300-acres is located on BLM managed land.

A limited amount of potential/suitable habitat still exists within the South Eagle Watershed, but no birds have been seen in recent years, and no historic or active lek sites have been identified. Habitat fragmentation and loss of habitat resulting from roads, residential and commercial development, off highway vehicle use, public recreation, powerlines and pipelines has reduced connectivity of sagebrush vegetation vital to this species. In addition, fire suppression, drought, and livestock and wild ungulate grazing have all impacted habitat quality for sage grouse. Sagebrush habitats are being invaded by juniper trees, and drought and grazing have reduced vegetative productivity and diversity.

The Colorado Division of Wildlife (CDOW) does not intensively manage the watershed for sage grouse. It is likely that the lands encompassed by the Salt Creek Bellyache, East Hardscrabble, and Horse Mountain allotments may become historic habitat in the event no evidence of sage grouse are found in subsequent years. However at the current time, based on Standard 3 upland assessment sites, the majority of the sagebrush habitat found on these allotments provides some limited winter and brood rearing habitat that could still support sage grouse for at least a portion of their lifecycle. Until such time as the CDOW remaps these lands as historic habitat, these allotments are currently achieving Standard 4 for sage grouse but with problems noted above.

Portions of the Red Hill Common and West Hardscrabble allotment are mapped as historic habitat. Birds used to inhabit these lands but have not been seen in many years. Due to a variety

of factors, Standard 4 for sage grouse is not being met on these allotments. Although only portions of each allotment contain historic sage grouse habitat, for reporting purposes, the entire allotments' acreages of 12,467 for the Red Hill Common and 16,300 for the West Hardscrabble are reported as not meeting Standard 4.

BLM can implement some management actions to improve sagebrush/sage grouse habitat on public lands located within the assessment area. However, due to the multitude of factors impacting sage grouse in the area, it is difficult to determine weather habitat improvements on BLM lands alone, would appreciably improve sage grouse's ability to reestablish in the Red Hill Common or West Hardscrabble allotments. Several other factors outside of the management control of the BLM have contributed to the apparent loss of this species from these two areas.

Although important to sage grouse, sagebrush vegetation found within the assessment area is also important in providing habitat for an array of other species including many species of migratory birds, as well as crucial mule deer and elk winter range. The BLM will strive to improve sagebrush habitats as funding and priorities allow (see Section VI.C., Proposed Actions).

Standard 4 for greater and Gunnison sage grouse is not currently being met on the Red Hill Common and West Hardscrabble allotments for the following reasons:

Reasons for Standards Not Being Met
* OHV and other Human Recreation Use – Habitat Fragmentation, loss of habitat, abandonment of area
* Lack of Fire - Juniper Encroachment, loss of sagebrush habitat
* Ungulate Grazing – heavy livestock grazing in some areas combined with heavy big game winter use resulting in loss of vegetative diversity and productivity
* Drought – poor productivity and vigor of vegetation
* Physical loss of habitats on private lands in the area due to development – thus reducing the continuity and value of habitat located on BLM lands.

Plant Species
The special status plant species, *Penstemon harringtonii*, is known to occur on Red Hill Common, East and West Hardscrabble, Brush Creek, Salt Creek/Bellyache, North Bellyache and Bellyache allotments within the Eagle River South landscape. No attempt was made to observe or count all known occurrences. Instead, the ID team evaluated the general habitat conditions to determine if they were suitable for supporting sustainable populations of *P. harringtonii*.

Conditions on most of these allotments appear suitable for sustaining viable populations of *P. harringtonii*. On the Brush Creek allotment, smooth brome grass seeded on the pipeline may be inhibiting establishment of *P. harringtoni*i. Also poor understory conditions elsewhere in the allotment may be having an adverse affect on the plant. In several of the allotments, including Salt Creek/Bellyache and North Bellyache, juniper encroachment into sagebrush parks poses a long-term threat to the continued survival and recruitment of *P. harringtonii*.

Recent inventory data of portions of the East and West Hardscrabble Allotments (Boyle, 2003) indicates that *P. harringtonii* populations are more numerous and extensive than previously thought. However, two large populations on the West Hardscrabble Allotment and a number of smaller populations on both allotments, were being heavily grazing by cattle. Many *P. harringtonii* plants had been trampled by cattle. Flower stalks on many plants were either broken off or eaten before seeds had matured and dispersed. Long-term monitoring data would be needed to determine whether grazing and trampling are causing a decline in the population size. However, loss of reproductive capability (flower stalks) may have a negative impact on the ability of the populations to regenerate and thus sustain their long-term viability.

Several populations were being impacted by extensive OHV use. The roads and trails created by unregulated OHV use are causing direct loss of plants as well as fragmentation and loss of suitable habitat.

Impacts were most prevalent in the West Hardscrabble Allotment. This allotment is currently not meeting Standard 4 for *P. harringtonii*. Other allotments are currently meeting the standard, but with some problems.

Reasons for Standards Not Being Met
* OHV and other Human Recreation Use – Loss of plants, Habitat fragmentation, Loss of habitat
* Lack of Fire - Juniper encroachment causing loss of suitable habitat
* Ungulate Grazing – heavy livestock grazing, in some areas, combined with heavy big game or rabbit use *may* be impacting sustainability of populations
* Drought – poor productivity and vigor of vegetation

Standard 5. Water Quality

All waters in the assessment area appear to be meeting the standards for water quality established by the State of Colorado. Water quality standard 5 is being met on surface waters.

B. Causal Factors For Any Standards Not Achieved

Causal factors behind the land health problems are discussed here for all standards taken together. The reason for this is that one cause may impact several standards at once. In addition, most of the land health problems observed in the landscape are not clearly attributable to one single causative factor, nor are they always related to a cause that is presently occurring. Many problem areas appear to be a result of several causative factors that occur either at the site level, the allotment level or across the entire landscape.

Historic Grazing

Throughout much of western Colorado, the numbers of livestock grazing public lands were once much higher than they are today. In addition, in the lower elevations close to towns, grazing typically occurred during winter, spring and fall. Indicators that historic livestock grazing contributed to the failure to meet a standard include lack of forb and grass cover and diversity, increased density of woody species such as sagebrush, and dominance by annual plants.

Current Grazing

There were several areas of concentrated grazing or trampling damage that contributed to an allotment failing to meet a standard or to meet a standard with problems. Usually these were livestock distribution issues, as portions of the allotment exhibited heavy utilization, while other areas of the same allotment had slight to light use. In some cases the interdisciplinary team was unable to make a determination as to whether *current* livestock grazing was a significant factor in failing to meet a standard. Particularly on Brush Creek, which was in nonuse during the land health assessment, further utilization data needs to be gathered to determine whether livestock grazing is a significant contributing factor.

Old Vegetative Treatments

Throughout much of the Eagle River South landscape, vegetative treatment in the form of brushbeating was widely used in the last 20-40 years to improve livestock forage production and, in some cases, wildlife winter habitat. The use of and subsequent dominance by nonnative grass species such as crested wheatgrass or smooth brome, or where improper management following the treatment resulted in poor groundcover or invasion by exotic annuals has caused certain areas of the landscape to fail to meet standards.

A prescribed fire in the West Hardscrabble allotment removed a portion of the sagebrush-mixed mountain shrublands and pinyon-juniper woodlands in the central part of the allotment. Although grass production and diversity seems good, the lack of forbs and sagebrush regeneration in this burned area caused it to be meeting the standards but with some problems.

Roads and Off-Highway Vehicle Activity

Mountain biking and OHV activity are concentrated in the lower elevations of the landscape immediately adjacent to towns and other residential areas. Recreational vehicle use has destroyed the biological soil crusts and other vegetative cover and exposed the soil. Vehicles have compacted the soil, caused a loss of top soil, and have increased the susceptibility of the soil to wind and water erosion. Roads and trails can also be a barrier to movement for some species because they are a strip of bare ground and because they are a focus of human activity and disturbance. OHV use is responsible for several portions of the West Hardscrabble and the North Bellyache allotments' failure to meet standards or to meet standards with problems.

Fire Suppression

Aggressive fire suppression policies of the last 100 years and the lack of fine fuels necessary to carry burns have interrupted the natural fire regime in this landscape. This has created larger patch sizes of late seral conifers with fewer openings or "edges" or stand-replacing events. This has led to a decline in diversity at the landscape scale. Pinyon-juniper woodlands are increasing in canopy density and areal extent, and are currently dominated by old age class woody species. Residual shrub and grass species are low in vigor and do not show signs of regeneration.

Most of the lower elevation sagebrush stands within the landscape are old and even-aged, with a lack of diversity in seral stages. Of even greater concern, is the widespread encroachment of junipers and occasionally pinyon pines into sagebrush communities. Historically, the boundaries between shrubland and woodland were maintained by periodic fires, but the long intervals since

fires occurred in this area have allowed the trees to expand into territories formerly dominated by shrubs. These conditions are evidence supporting lack of fire as a causal factor in failing to meet a standard or meeting the standard with problems.

Noxious Weed Infestation

Nineteen (19) of 52 sites were found to have one or more of the following noxious weeds: Russian knapweed, Canada thistle, Musk thistle, Houndstongue or cheatgrass. Only two sites failed to meet the standards in part because they were dominated by noxious weeds, however, weeds are considered a threat for expansion at all sites where they occurred.

Heavy Browsing on Shrubs

Hedging of shrubs caused by repeated browse utilization by wildlife or livestock can result in reduced productivity and vigor of shrubs or even death. Moderate to heavy hedging on palatable shrubs was noted on eighteen sites across the landscape. These areas were generally concentrated in the lower elevation sagebrush and pinyon-juniper stands that provide most of the big game winter range within the landscape. Both mule deer and elk numbers are currently estimated to be above the CDOW's desired population objectives for these species.

Private Land Development and other Habitat Fragmentation

Private lands dissect the Eagle River South landscape along Gypsum Creek and Brush Creek and on Bellyache Mountain. Private lands also border the landscape to the north along the Eagle River. These private lands, which historically were largely agricultural, are experiencing increasing development for residential housing, golf courses, and commercial and industrial facilities. This development has fragmented habitat for a number of wildlife species, most notably for sage grouse. Three of the allotments within this landscape historically supported sage grouse, but only a few pellet groups indicate that any use has occurred within the last few years. The CDOW and BLM agree that this landscape probably can no longer support viable populations of sage grouse, due mostly to loss of habitat on private lands and discontinuity of this habitat from larger blocks of sagebrush.

C. Proposed Actions (based on budget, feasibility studies, NEPA analysis)

1. Remove the fence along Third Gulch or else create a separate riparian pasture and shorten the grazing period in this pasture to allow for periodic rest and recovery during the growing season.
2. Change grazing management on the Wolcott Isolated Tract Allotment. Do not allow horse grazing use, or at least provide periodic growing season rest to improve vegetative health on public lands. In the long-term, pursue disposal of the Wolcott Isolated Tract, since they are small, isolated parcels of public land, habitat connectivity is largely compromised due to development on adjacent private lands, and the only public access is off I-70.
3. Establish key areas within the West Hardscrabble Allotment at the largest, most significant, *Penstemon harringtonii* populations. Within these key areas, establish an average grazing utilization limit of 40% by weight on herbaceous upland vegetation. Monitor these *P. harringtonii* populations to determine if livestock grazing is negatively impacting population maintenance and regeneration.
4. Instruct permittees to place salt blocks more than .25 mile away from the largest *Penstemon*

harringtonii populations to discourage livestock concentrations within these populations.
5. Develop a travel management plan for the West Hardscrabble area (and other areas of OHV use) as part of the upcoming GSFO RMP amendment. This plan should address land health issues, such as ways to minimize impacts to soils, vegetation and rare plants.
6. Where sagebrush habitat is in relatively good condition except for the encroachment of pinyon and juniper trees, remove invading pinyon and juniper trees (e.g. upper sagebrush parks on Second and Third Gulch in E Hardscrabble Allotment, sagebrush stands east of McHatten Reservoir in West Hardscrabble, sagebrush parks along Co Rd 21 in North Bellyache, sagebrush on northeast side of Red Hill Common)
7. Where sagebrush habitat is generally in poor condition due to dense or decadent sagebrush and lack of native perennial grasses and forbs, design vegetative treatments to improve the age class diversity of sagebrush and improve cover of native forbs and grasses (e.g. Brush Creek Allotment, lower elevation sagebrush stands along Second and Mayer Gulch, sagebrush park west of McHatten Reservoir, sagebrush stands on north side of Red Hill Common)
8. Increase weed prevention and control efforts within the landscape. Third Gulch riparian area and the pipeline adjacent to Trail Gulch are in need of weed treatment. Target other sites with relatively small infestations of noxious weeds that are "new" to the landscape, such as Russian and spotted knapweed.

Bibliography

1. Boyle, S., and L. Connaughton. 2003. Biological Inventory - Hardscrabble Area, for USDI Bureau of Land Management. 18 p.

DETERMINATION DOCUMENT
FOR ASSESSMENT OF STANDARDS

EAGLE RIVER SOUTH ASSESSMENT AREA
September 2003

A. Achievement of the Standards

The land health assessment for the Eagle River South Landscape Unit evaluated 48,968 acres of public land and 28.9 miles of riparian areas to determine whether or not the five Public Land Health Standards are being achieved. The following table shows the amount of land achieving or not achieving all the Standards:

Achieving all standards or making significant progress		Not achieving one or more standards (livestock is a significant factor)		Not achieving one or more standards due to causes other than livestock		Total Allotments/Acres within Landscape	
Allotments	Acres	Allotments	Acres	Allotments	Acres	Allotments	Acres
11	12,074	2	24,318	2	12,576	15	48,968

For reporting purposes, the allotment was the smallest unit used for the standards determination. Therefore, in order to make the above determination, each allotment and stream reach within the Eagle River South landscape was first rated according to each of the five Rangeland Health Standards separately. In some cases, only portions of an allotment or stream were not meeting a standard, so the preponderance of evidence or ecological significance of the issues were factors weighed to determine whether the entire allotment, on balance, was achieving or not achieving the standard. Some allotments were meeting the standards overall, but certain problem areas were identified. See the Eagle River South Land Health Assessment Report, 2003 for more details. The following table indicates the results of the assessment by individual standard.

Standard	**Achieving or Making Significant Progress**	**Not Achieving**
Standard 1–Soils (acres)	48,859	109
Standard 2-Riparian (miles)	23.8	5.1
Standard 3-Healthy Communities (acres)	40,841	8,127
Standard 4-T&E Species (acres/miles)	20,201 28.4	28,767 0.5
Standard 5-Water Quality (miles)	28.9	0

Eleven allotments were achieving or making significant progress towards achieving each of the standards. These allotments were: Bellyache, Bellyache Ridge, Eagle River, Falk, Horse Mountain, North Bellyache, Red Canyon 2, Salt Creek/Bellyache, Salt Creek Forest, Squaw

Creek, and Wolcott Isolated Tract. The following table lists those allotments which were not achieving one or more standards. A checkmark indicates which standard(s) was not achieved:

Allotment	Standard 1	Standard 2	Standard 3	Standard 4	Standard 5
Brush Creek (109 ac)	X		X		
East Hardscrabble (8,018 ac)		X	X		
Red Hill Common (12,467 ac)				X	
West Hardscrabble (16,300 ac)		X		X	

B. Description of the Problem and Causal Factors

The **Brush Creek Allotment** is not meeting Standards 1 and 3. The allotment did not meet Standard 1 because of a lack of ground cover and a higher amount of bare soil than expected for the ecological sites. Biological soil crusts were lacking or were only present under the protection of sagebrush. Water flow patterns and pedestalling of plants was evident.

The allotment did not meet Standard 3 due to inadequate herbaceous cover and dominance by noxious weeds/invasive plants such as crested wheatgrass, smooth brome and Canada thistle. A pipeline and road traverse the allotment. The pipeline was apparently reseeded to the non-native crested wheatgrass which now dominates the area around the pipeline. Other factors failing to meet Standard 3 included fragmentation of the landscape due to housing developments and roads.

The causes of failing to meet the standards on this allotment are a combination of:

* lack of fire or other natural disturbance
* seeding of previous disturbances to invasive exotic grasses
* housing developments, roads and other human caused fragmentation
* heavy historic livestock grazing
* possible current livestock grazing (permitted or trespass). This needs to be investigated with further utilization studies.

The upper elevations of **East Hardscrabble Allotment** are in good condition and are meeting all the Standards. The lower elevations are meeting Standard 1 with some problems, but not meeting Standard 2 or 3.

The riparian zone and adjacent uplands in lower Third Gulch were not meeting Standard 2 due to bank trampling damage and heavy browsing of riparian woody species. Noxious weeds and invasive plants such as Canada thistle, Kentucky bluegrass and smooth brome were common along portions of the stream. These species do not have adequate root systems to protect the stream channel from erosion during high flow events. There is a fence in the bottom of Third Gulch that parallels the stream. The alignment of the fence contributes to the tendency of livestock to concentrate along the riparian zone.

Primary problems related to Standard 3 occur in the lower elevation sagebrush parks. Sagebrush density varied from moderate to high but vigor was poor. There was more bare ground and fewer grasses and forbs than should occur on these range sites. Juniper encroachment was a significant problem in most of the sagebrush parks. The amount of litter was also less than expected relative to the total vegetative cover. Biological soil crusts remain only in protected areas under the cover of shrubs. Soils were not adequately protected from erosion and pedestalling and water flow patters were readily apparent.

The lower elevations of the allotment experience heavy winter use by big game and disproportionately greater use by livestock. Fire suppression may account for much of the juniper encroachment problem. The northern two-thirds of the allotment are heavily roaded which contributes to habitat fragmentation. Also, private lands, which border this allotment to the north and east, have housing developments, roads, powerlines, and other disturbances which contribute to poor habitat connectivity on a landscape scale. These are all factors degrading sage grouse habitat.

The causes of failing to meet the standards on this allotment are a combination of:

* livestock distribution (concentrated use in lower sagebrush parks and Third Gulch riparian)
* lack of fire or other natural disturbance
* heavy big game winter use
* housing developments, proliferation of roads and trails, and other human developments causing habitat fragmentation

The **Red Hill Common Allotment** did not meet Standard 4 for sage grouse. Although grouse historically occurred here, they have not been documented in the area for many years. Primary issues related to sage grouse habitat involve habitat fragmentation and pinyon-juniper encroachment. Private lands, which border this allotment to the north and east, have housing developments, roads, powerlines, and other disturbances which contribute to poor habitat connectivity on a landscape scale. The allotment met the other standards with isolated problem areas identified. Overall, ground cover was adequate to protect soils and vegetation was in fair to good condition. However, certain concerns were raised regarding hedging on shrubs, pinyon-juniper encroachment into sagebrush sites, cheatgrass infestation in the lower-elevation sagebrush sites, and a lack of forbs.
These land health issues can be largely attributed to:

* private land development
* fire suppression
* heavy big game winter use
* heavy historic livestock grazing

The **West Hardscrabble Allotment** did not meet Standard 2 (for Upper Reach Alkali Creek and McHatten Creek) or Standard 4 (specific to sage grouse and *Penstemon harringtonii*). Although the allotment, overall, met Standards 1 and 3, widespread concerns were noted. Problems were generally related to extensive OHV use in the northwestern part of the allotment, old, decadent sagebrush stands with poor forb production and encroaching junipers, slow recovery of sagebrush in burned areas, and livestock grazing.

This allotment historically supplied habitat for sage grouse, however, none have been observed here for many years. This is attributed largely to habitat fragmentation due to extensive roads and trails and development of adjacent private lands.

Several large occurrences and numerous small occurrences of *P. harringtonii* were found on the West Hardscrabble Allotment. However, many of the occurrences showed impacts due to off-road vehicle activity and livestock grazing. Also juniper encroachment into much of the occupied habitat (sagebrush parks) poses a long-term threat to the continued survival and recruitment of this species.

The riparian area of McHatten Creek showed heavy livestock utilization and trampling damage. This is apparently a distribution problem since some portions of the allotment received only slight to light use. The upper reach of Alkali Creek had concerns related to lack of sufficient upland vegetative cover to protect the riparian zone from erosion and deposition during convective storm events. Wildfire suppression and low potential productivity of gypsum soils were considered the main causes.

Causes of failure to meet standards or to meet standards with problems are a combination of:

* unmanaged OHV use
* fire suppression
* livestock distribution (concentrated grazing in McHatten Creek and in some *P. harringtonii* habitat)

C. Interim Actions Taken to Make Progress toward Achieving Standards

1. The Glenwood Springs Resource Management Plan designated the area east of the town of Eagle as limited to "Designated Roads and Trails" only. The travel management plan decision for this area had not been implemented at the time of the assessment. At the end of 2002, the BLM began collaborating with local government and interested parties to designate roads and trails, close certain unauthorized trails and rehabilitate those trails causing the greatest visual scarring and environmental damage. These actions should improve soil and vegetative conditions on the North Bellyache allotment.

2. Where livestock grazing was causing immediate concerns with land health standards, the permittees were instructed to remove livestock from the area. Coordination meetings were held with the permittees on East and West Hardscrabble Allotments informing them of the riparian concerns and discussing possible solutions.

3. Non-use was taken on the East Hardscrabble Allotment in 2003, and on the Brush Creek Allotment in 2002 and 2003, due to the drought and to improve rangeland health.

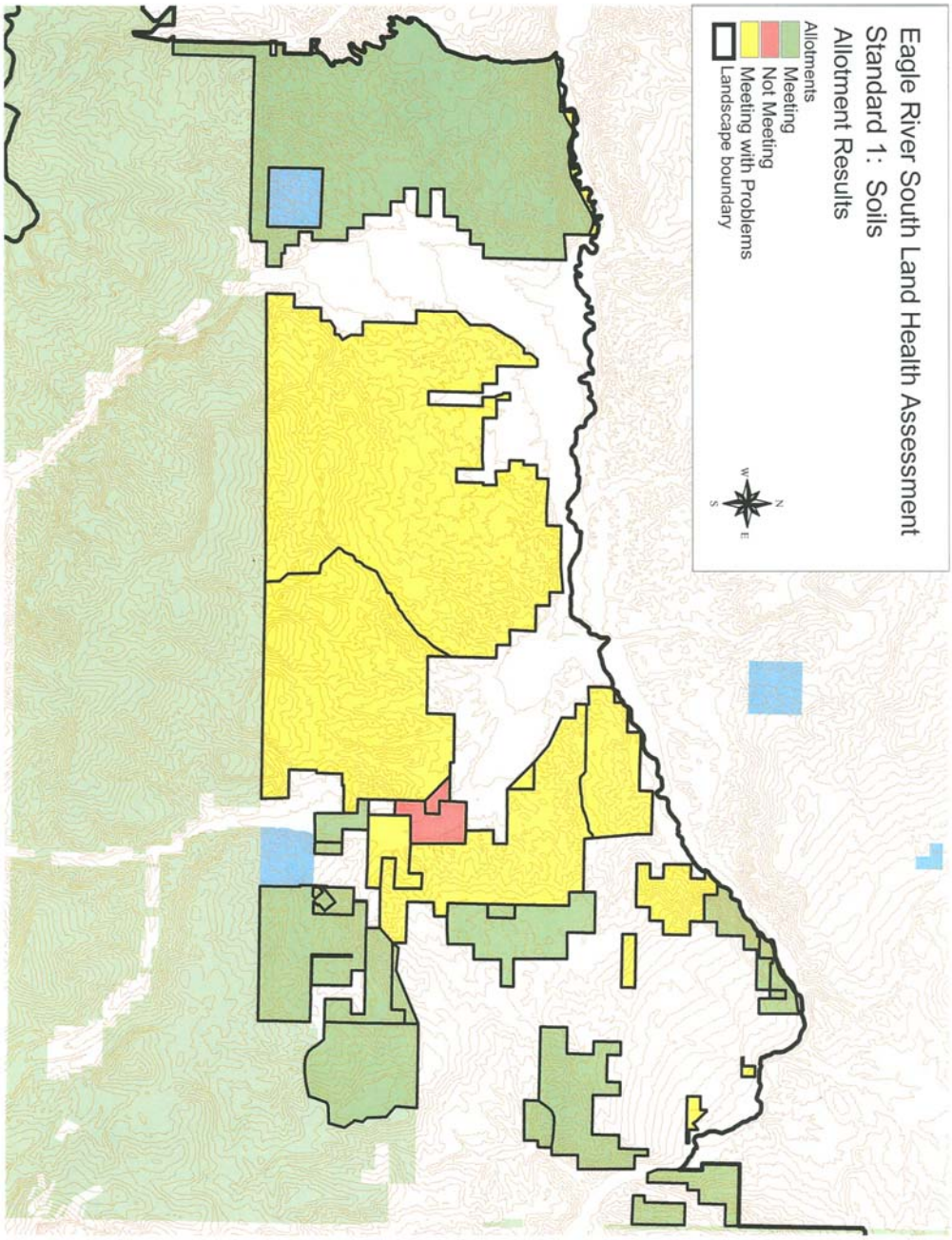
4. An Environmental Assessment is currently being prepared for a project to maintain the Eagle Wildlife Area spring development and pipe the water to a set of troughs at the head of McHatten Creek. This project is designed to draw livestock out of McHatten Creek and improve grazing distribution within the West Hardscrabble Allotment.

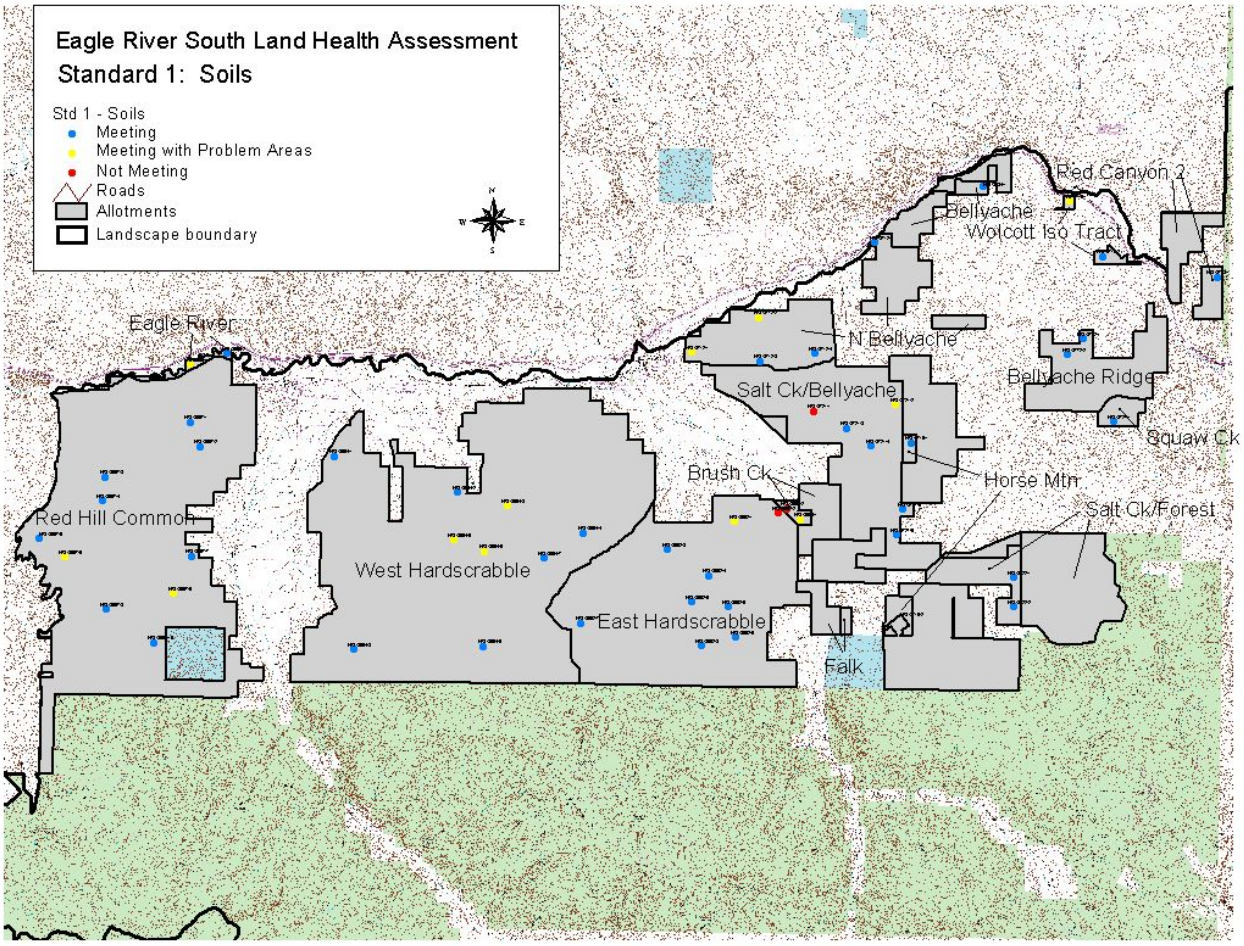
5. In an effort to improve the condition of a decadent sagebrush stand with cheatgrass in the understory, the vegetation in the lower portion of Spring Gulch in the Red Hill Allotment will be treated with a brushbeater and seeded to native grasses and sagebrush in fall of 2003. This project will serve as a test to determine if sagebrush and native perennial grasses can be successfully reestablished under these conditions.

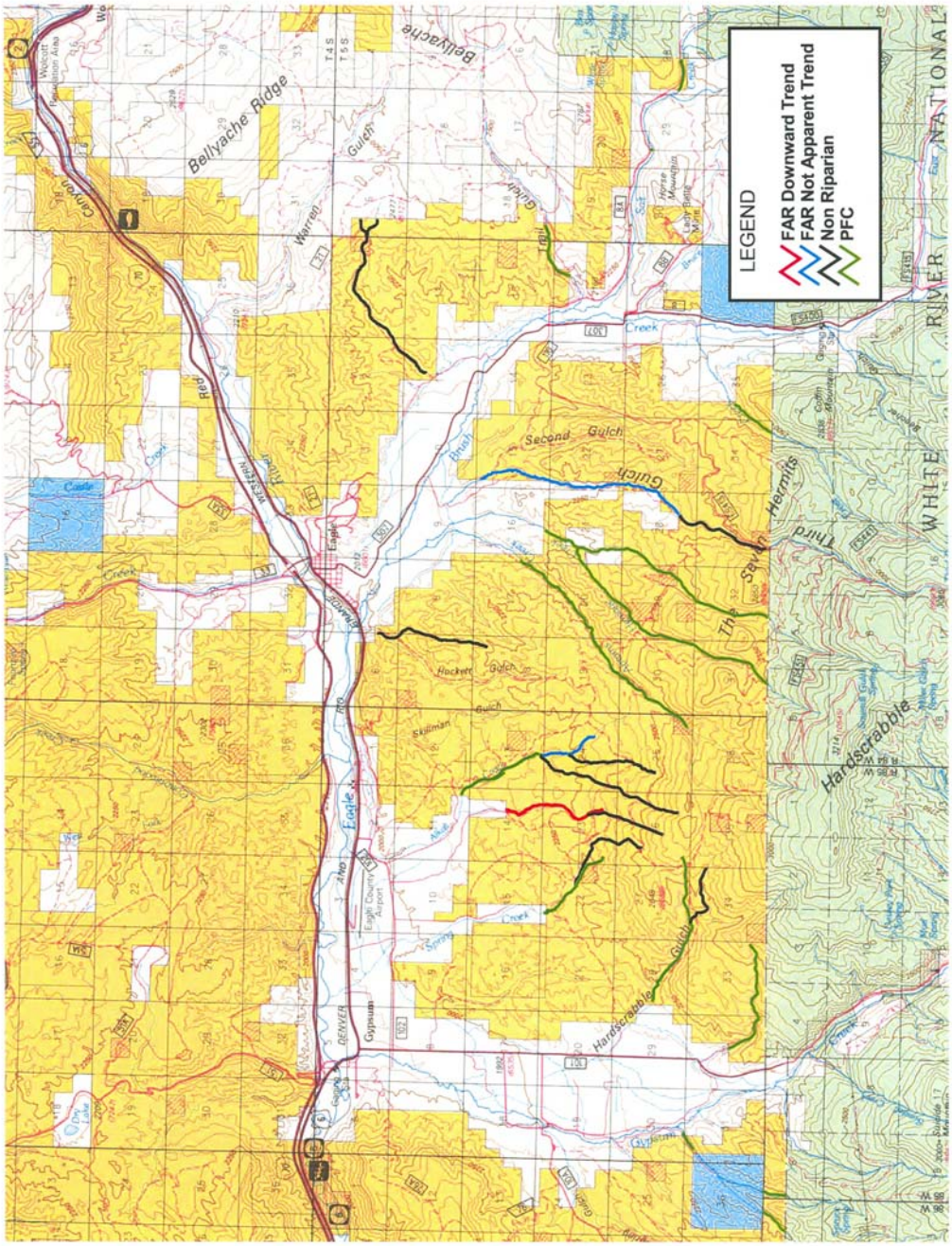
6. Grazing utilization studies will be initiated on Brush Creek and West Hardscrabble Allotments to determine whether current livestock grazing is a significant causal factor in failing to achieve the standards.

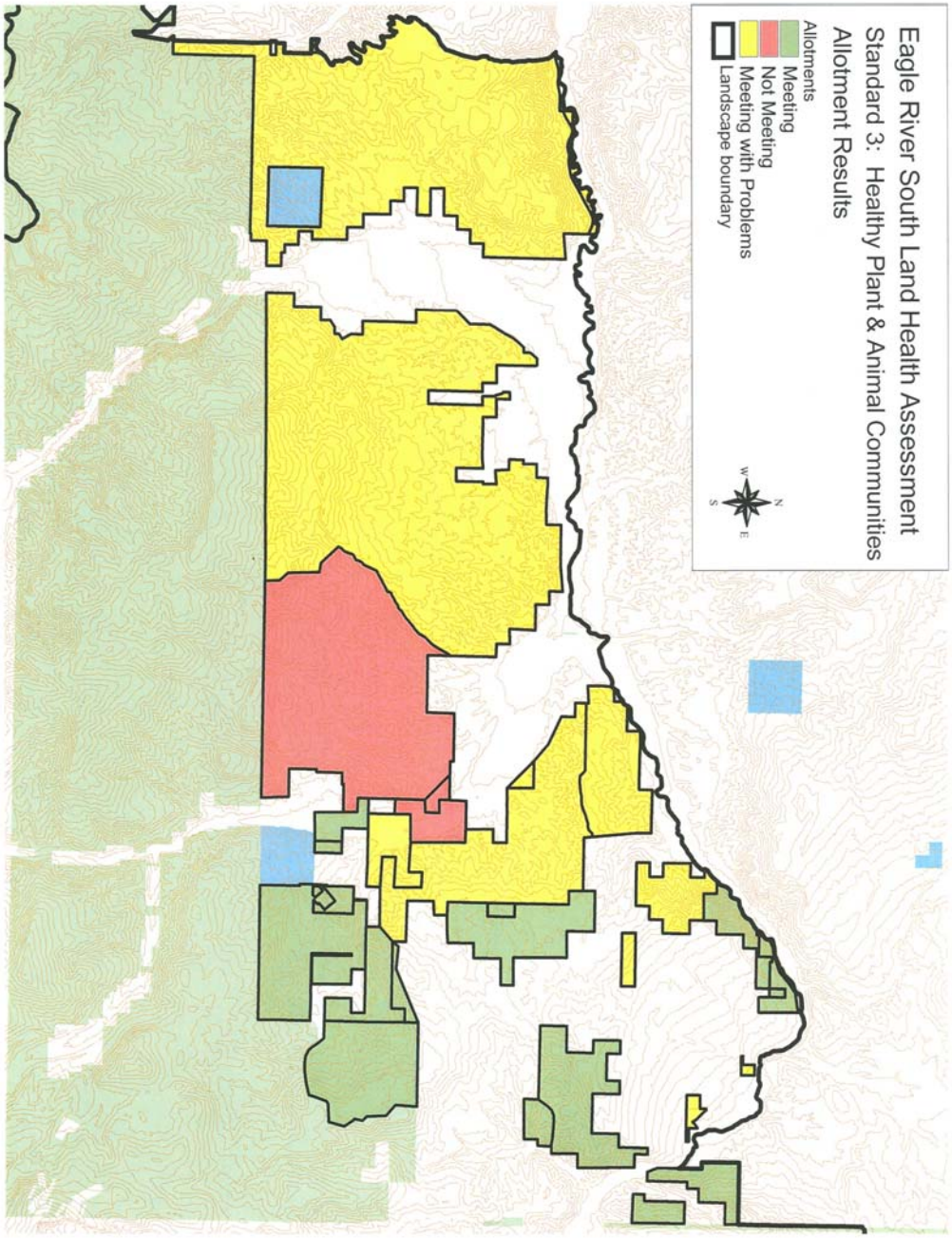
Other proposed actions to address land health issues can be found in the Eagle River South Land Health Assessment Evaluation Report, BLM, September 2003.

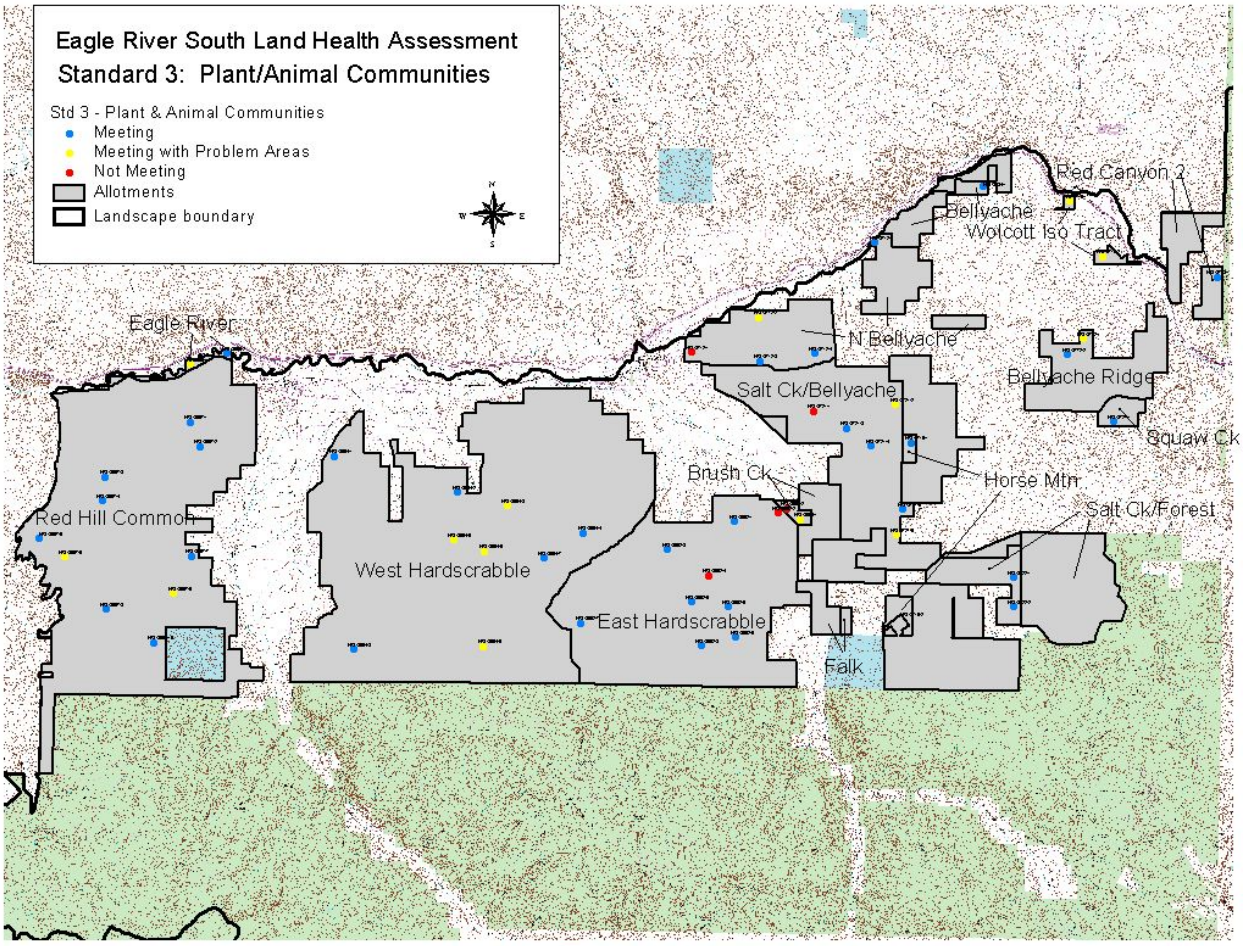
Signature of Authorized Officer James E Connor Date 12/9/03

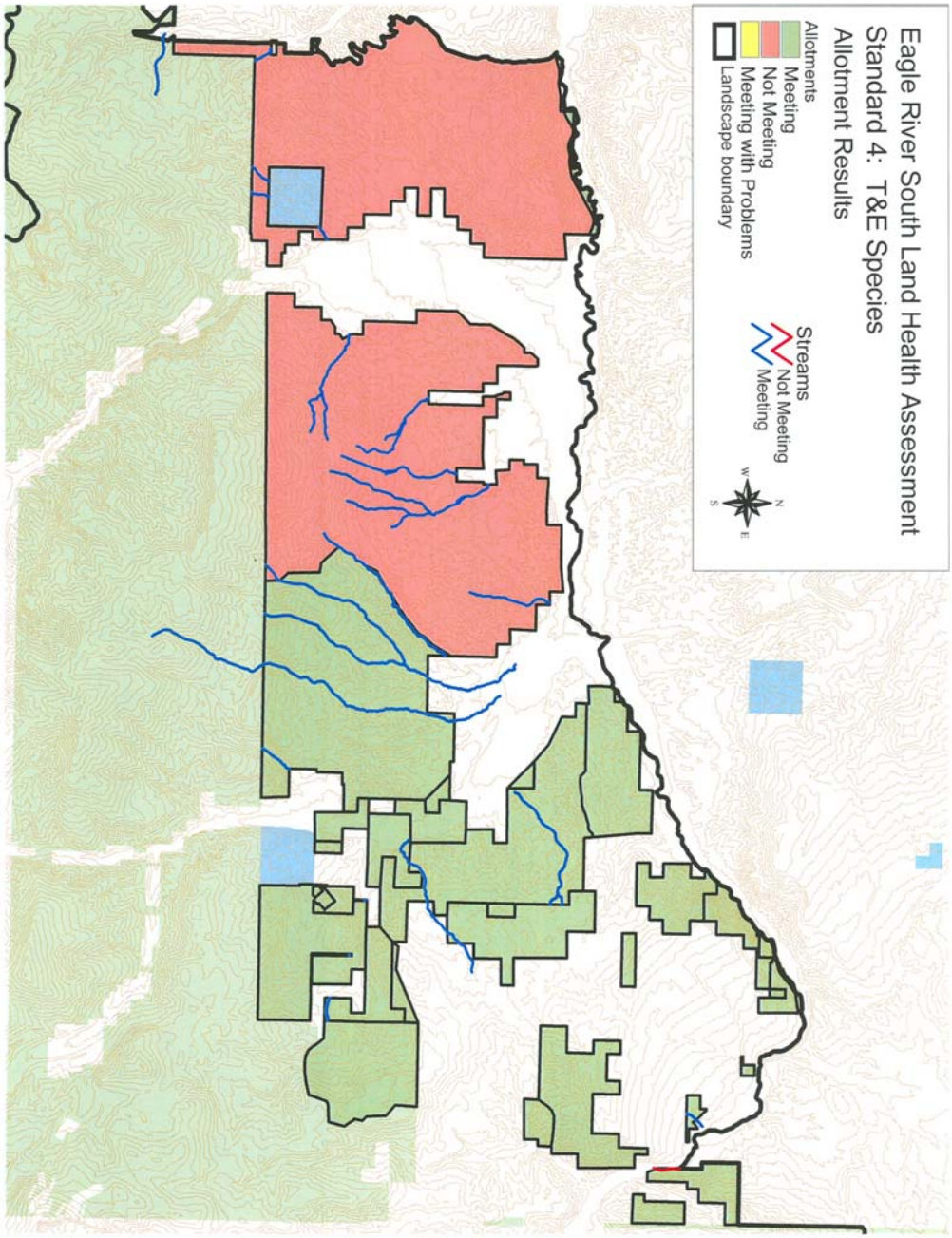

Eagle River South Land Health Assessment
Standard 1: Soils
Allotment Results
Allotments
Meeting
Not Meeting
Meeting with Problems
Landscape boundary
N
W
E
S


Eagle River South Land Health Assessment
Standard 1: Soils
Std 1 - Soils
Meeting
Meeting with Problem Areas
Not Meeting
Roads
Allotments
Landscape boundary
Red Canyon 2
Bellyache
Wolcott Iso Tract
Eagle River
N Bellyache
Bellyache Ridge
Salt Ck/Bellyache
Squaw Ck
Brush Ck
Horse Mtn
Salt Ck/Forest
Red Hill Common
West Hardscrabble
East Hardscrabble
Falk


LEGEND
FAR Downward Trend
FAR Not Apparent Trend
Non Riparian
PFC
Bellyache Ridge
Bellyache
Second Gulch
Gulch
The Seven Hermits
Third
Hardscrabble
Hardscrabble Gulch
Hacker Gulch
Skillman Gulch
Eagle
Gypsum
DENVER
Eagle County Airport
Red Mountain
Lady Bug Mtn
Horse Mountain
Colorado
Wolcott
Campo
Creek
Spring
Alkali
Aho
Fork
Fluvial
Warren
Trail
Brush
Castle
Lake
Dry
Gypsum
Aurora
WHITE
RIVER
NATIONAL
T4S
T5S
R84W
R85W
R86W
R87W


Eagle River South Land Health Assessment
Standard 3: Healthy Plant & Animal Communities
Allotment Results
Allotments
Meeting
Not Meeting
Meeting with Problems
Landscape boundary
N
W
E
S


Eagle River South Land Health Assessment
Standard 3: Plant/Animal Communities
Std 3 - Plant & Animal Communities
Meeting
Meeting with Problem Areas
Not Meeting
Allotments
Landscape boundary
Red Canyon 2
Bellyache
Wolcott Iso Tract
Eagle River
N Bellyache
Bellyache Ridge
Salt Ck/Bellyache
Squaw Ck
Brush Ck
Horse Mtn
Salt Ck/Forest
Red Hill Common
West Hardscrabble
East Hardscrabble
Falk


Eagle River South Land Health Assessment
Standard 4: T&E Species
Allotment Results
Allotments
Meeting
Not Meeting
Meeting with Problems
Landscape boundary
Streams
Not Meeting
Meeting
N
W
E
S