

Ironhorse Analysis Area

Vegetation Management Strategy



**Uncompahgre Plateau, Colorado
August 4, 2006**

USDA Forest Service, Grand Mesa Uncompahgre and Gunnison National Forest
Norwood Ranger District

In cooperation with:
Colorado Division of Wildlife
Uncompahgre Plateau Project
Public Lands Partnership
Western Area Power Administration

Recommendations for the Ironhorse Analysis Area

The Ironhorse Vegetation Management Strategy was prepared by staff from the Grand Mesa, Uncompahgre, and Gunnison National Forest with assistance from staff of the Bureau of Land Management, Uncompahgre Field Office.

The line officers from the Norwood Ranger District and the Grand Mesa, Uncompahgre, and Gunnison National Forest recommend implementing this strategy. The Strategy is in conformance with the Grand Mesa, Uncompahgre, and Gunnison National Forest Plan (Plan) and the current draft revision of that Plan. Active management is necessary to modify forest and woodland cover conditions to address the wildland-urban interface and power utility wildfire risk, modify hazardous fuels, improve wildlife habitat for key species, and manage the ponderosa pine community toward a closer approximation of the historic range of variation. NEPA analysis must be completed on specific projects identified in this report.

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Landscape Assessment

This is the second in a series of landscape analysis efforts undertaken by the Uncompahgre Plateau (UP) Project partnership on the Uncompahgre Plateau landscape. The goal of the partnership is to develop a collaborative approach to restoring and maintaining the ecosystem health of the Uncompahgre Plateau using the best available science and public input.

The UP Project is a partnership effort for landscape restoration. Partners include: the Grand Mesa, Uncompahgre, Gunnison National Forest; the Colorado Bureau of Land Management; Colorado Division of Wildlife; the Public Lands Partnership of Delta, Montrose, Ouray, and San Miguel counties; Western Area Power Administration; and Tri-State Generation and Transmission Association. These stakeholders are collaborating to identify and implement priority restoration work on the 1.5 million acre Uncompahgre Plateau.

This has been an unprecedented undertaking within the State of Colorado in ecological assessment and resource improvement. The project has entailed working with all participants to compile complex spatial and tabular databases for cross-boundary assessments, interpreting and applying findings for watershed prioritization, developing and incorporating sophisticated ecological models for comprehensive treatment proposals, and working with a diverse array of partners to get projects implemented through agency and private sector mechanisms. Thousands of acres within the UP Project area have been treated for fuels reduction, vegetation enhancement, and wildlife habitat improvement. The UP Project has been foundational to building collaborative relationships and creating project formulation, analysis, and implementation frameworks that are transferable to other geographic areas in Colorado and beyond. An important offshoot of the project is the development of a major interagency and interregional program for native seed propagation and plant rearing for revegetation. The UP Project has received regional and national recognition from both the Departments of Agriculture and Interior, as well as from nongovernmental organizations, for its example of collaborative work and National Fire Plan success.

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I. Introduction

Abstract

The Ironhorse Analysis Area (IAA) is located at the southern tip of the Uncompahgre Plateau in southwestern Colorado. The IAA has experienced significant changes in forest and rangeland plant communities over the past century. Anthropogenic factors such as homesteading, overgrazing, fire suppression, and past management practices have contributed to departures from the natural ecology of the landscape and an increased risk of severe fire events. Due to concerns over the current conditions, the Partners (USFS, BLM, CDOW, UP Project, Public Lands Partnership, WAPA, grazing permittees and private landowners) have come together in a collaborative effort of fuels reductions, vegetation enhancement and wildlife habitat improvement. The Partners have engaged in a collaborative process to identify priorities, evaluate current conditions, set desired condition objectives, and recommend and design projects to help meet those objectives.

Background

In September 2003, the UP Project sponsored a Vegetation Management Strategy (VMS) effort in the southeast quadrant of the Uncompahgre Plateau in the Spring Creek and Dry Creek watersheds located near Montrose, Colorado. The Spring Creek and Dry Creek VMS effort predates the completion of the Vegetation Dynamics of the Uncompahgre Plateau Landscape, Southwestern Colorado and RMLANDS reports (Romme et.al) used in the Ironhorse VMS.

The Uncompahgre Plateau Landscape Assessment (Foster Wheeler, 2002) and the Spring Creek and Dry Creek (VMS) (BLM, Forest Service, 2003) can be viewed as an evolutionary process of moving toward ecosystem and landscape management through the understanding and quantifying of landscape dynamics on the Uncompahgre Plateau. In the Spring Creek and Dry Creek VMS, the UP Partners utilized a “Mosaic Driver” process (Clements et al.) to estimate the historic range of variability (HRV), document departures and recommend treatments to move the landscape toward more sustainable conditions. The Spring Creek and Dry Creek VMS Mosaic Driver sessions coincided with and informed the parameterization of the RMLANDS and GMUG NF Fire Regime and Condition Class (FRCC) modeling efforts. The Ironhorse VMS relies on the more contemporary efforts in documentation of the current condition and departure analysis contained in the GMUG Forest Plan Revision (Draft) and the Vegetation Dynamics of the Uncompahgre Plateau Landscape, Southwestern Colorado and RMLANDS report. However, the Ironhorse Vegetation Analysis also contains an appendix with the Southwest Quadrant Mosaic Drivers for application in that landscape should interest and resources become available. The Southwest Quadrant Mosaic Drivers were the product of a series of collaborative workshops sponsored by UP Project in early 2005.

Executive Summary

The Ironhorse Analysis Area (IAA) is a 65,000 acre landscape of ponderosa pine, pine-oak, aspen, pinyon-juniper woodland, and sagebrush rangeland located at the southern tip of the Uncompahgre Plateau approximately six miles east of Norwood, Colorado. The IAA was extensively modified during the settlement and homesteading era of the late 19th century and received heavy commercial use well into the middle of the 20th century before being acquired by the National Forest System.

The fundamental changes in the forest and rangeland plant communities associated with this land use history resulted in the current legacy of vegetative conditions on the Ironhorse landscape. The primary effects of this land use were related to roads, homesteading, dryland agriculture, extensive livestock grazing, exploitive timber harvest and fire exclusion. While this situation describes the general condition and land use history of many low elevation ponderosa pine and dry forest types in the western United States, the extent of the impacts on the Ironhorse landscape are of a scope and scale that represents the more highly altered end of the disturbance scale. Vegetation structure, age, condition and spatial patterns within the IAA appear to be inconsistent with the estimated historic range of variability (Romme et al). This is in part due to the fact that many of the land use practices persisted on this landscape long past being discontinued on other areas primarily because of the easy access to its grazing and valuable ponderosa pine resource.

The ponderosa pine community in the IAA both defines and makes it a fairly unique resource on the Grand Mesa, Uncompahgre and Gunnison National Forest (GMUG). Ponderosa pine communities represent a relatively small component (3.5 %) of the forested type on the nearly three million-acre GMUG NF. In comparison, ponderosa pine makes up 42.8% of the forested type within the IAA. The IAA contains 24% of the total ponderosa pine for the entire GMUG Forest. Ponderosa pine provides important habitat diversity for several of the forest management indicator species (MIS) and is highly desired for big game and livestock grazing, recreation, timber and aesthetic values. Therefore, the ponderosa pine communities within the IAA are an integral resource for the entire GMUG NF.

A majority of the Ironhorse landscape (>50%) was in private ownership through the 1950s. The subsequent acquisition of the private lands into the National Forest System lead to some of the first efforts in large scale vegetation restoration on the GMUG NF. These restoration efforts were perhaps simplistic by contemporary standards, but did represent a successful operational effort to restore forest and rangeland cover through reforestation and rangeland seeding. There are, however, some unintended consequences related to the previous land uses and successional trajectories associated with past and current management direction, which suggest a need for timely management intervention.

In addition to the legacy of past land use, the previous landowners and the GMUG NF have, for the most part, successfully implemented a fire suppression program that has resulted in fire exclusion in a landscape that was adapted to a relatively frequent, low intensity fire regime. It is estimated that 78% of the Uncompahgre Plateau is moderately to significantly altered from its characteristic fire regime (Romme). The cumulative vegetative and fuel conditions resulting from this collective history are the underlying challenge for current and future management of the IAA.

The trends and implications of current vegetative and fuel conditions in the IAA can now be considered in the context of contemporary disturbance and landscape ecology and recent improvements in modeling such as RMLANDs (Romme et.al.) and MTT (Finney). RMLANDS is a spatially explicit Landscape Dynamics (vegetation growth and disturbance) model parameterized to the specific landscape. MTT (Minimum Travel Time) is a spatially explicit wildland fire behavior model capable of predicting pathways of large fire growth. Managers can use these technologies to evaluate the current conditions, landscape departures, and potential risks of the Ironhorse landscape.

Findings suggest a need to intervene or explore opportunities to move the landscape in the direction of pre-settlement (1870) structural and spatial restoration in the pine ecosystem. The application of a combination of active and passive restoration approaches are recommended to restore ecosystem function and resiliency, reduce the potential for unnaturally severe wildfires, and reduce susceptibility to abnormal levels of insect and disease mortality to this unique area. Current landscape conditions are predisposed for uncharacteristic disturbances that could disrupt societal expectations from this landscape.

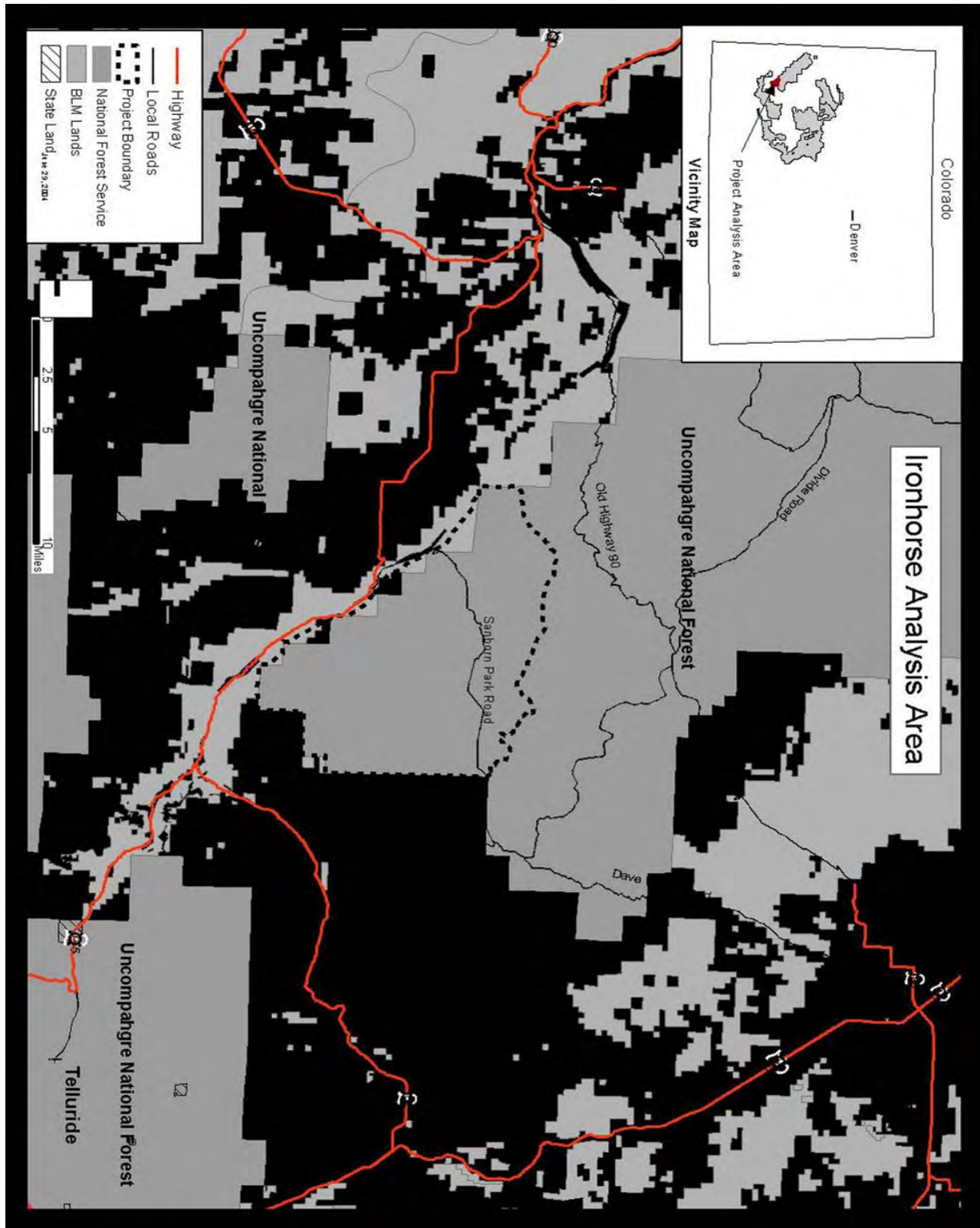


Figure 1: Ironhorse Analysis Area Boundary Map

Findings

Wildfire Risks

- Seventy-eight percent (78%) of the Uncompahgre Plateau is moderately to significantly altered from its characteristic fire regime. (Romme)
- The IAA represents the area within the GMUG with the clearest trend in the increase of lightning caused wildfire events resulting in the majority of the large wildfires on the GMUG NF over the last thirty years of recorded data.
- The current conditions, caused by drought and pinyon decline, predispose and heighten the potential for high severity, high mortality wildfire in the pinyon juniper woodland that could propagate into the ponderosa pine.
- There is a need to reduce potential wildfire hazard to the Sanborn Park Wildland Urban Interface (WUI) area and San Miguel 7.5 kV powerline that serves the area.
- There is a need to reduce potential wildfire hazard to the Western Area Power Administration (WAPA) 345 kV and 230 kV powerlines that transit the IAA.
- Minimal Travel Time data have identified key areas of high management concern that influence travel pathways for large fire growth near:
 - Sanborn Park community
 - Western Area Power Administration 345 kV and 230 kV powerlines
 - Extensive ponderosa pine plantations
 - Cartwheel dwarf mistletoe area
 - Gunnison sage grouse and Abert's squirrel habitat
 - Key big game winter range areas
- A large quantity of residences and ranchettes are currently proposed and under construction adjacent to the National Forest System boundary on the eastern side of the IAA. This residential growth has the potential to complicate risk for fires that start on the National Forest and move off the public land and into the rural intermix.

Vegetative Conditions

- Vegetation structure, age, condition and spatial patterns within the IAA appear to be inconsistent with the estimated historic range of variability (HRV) (Romme et al).
- There are approximately 113,247 acres of ponderosa pine on the GMUG NF. The majority, 76.4% or 86,395 acres, of the ponderosa pine type on

the GMUG NF is located on the Uncompahgre Plateau. The IAA represents 30% or 27,245 acres of the ponderosa pine plant community on the Uncompahgre Plateau. The IAA, therefore, contains 24% of all the ponderosa pine cover type for the entire GMUG Forest.

- The current stand conditions in the ponderosa pine are characterized by, as well as not well adapted to, even-aged, single storied stands that are susceptible to mixed severity and stand replacing crown fire events.
- Homogeneity –a distinct lack of age class and structural diversity –of the ponderosa pine stand structure, patch size and configuration reduces the quality of wildlife habitat and makes the area vulnerable to insects, particularly mountain pine beetle (MPB).
- There are several specific age and structural conditions of ponderosa pine that are completely absent on the IAA landscape.
 - Seedling/sapling and pole size age classes. This gap in regeneration and younger age cohorts increases with each passing year, moving the landscape further away from desired conditions in terms of pine regeneration and establishment.
 - Old growth stands
 - Stands in the Fire Maintained Opening (FMO) condition.
- The IAA is deficient of high quality snags. Snags offer important habitat for cavity nesters and perches for birds of prey.
- The Cartwheel area of the IAA has the highest dwarf mistletoe (DMT) infestation on the Uncompahgre Plateau and increases the risk of infestation and fire to other stands.
- There are over 3,600 acres of ponderosa pine plantations within the IAA. These plantations represent a sizable reforestation investment. The current condition of the pine plantations represents a significant risk of loss to potential wildfire and continuing decline in growth potential.
- Past treatments such as chaining and seeding have matured to the point where additional treatments are needed to restore species diversity of the plant communities and improve forage production and carrying capacity.
- There are 9,064 inventoried acres of noxious weeds on public lands within the IAA. There are 5,079 inventoried acres of cheatgrass within the IAA.
- The long-term commitment of budgetary resources for landscape restoration and for sustaining more resilient ecological conditions makes the IAA a good candidate for designation as a Stewardship Contracting area.

Wildlife Habitat Conditions

- The IAA has a high potential for featuring and improving Abert's squirrel populations in the ponderosa pine type of the Uncompahgre Plateau and GMUG NF.
- There is an active Gunnison sage-grouse lek on private land adjacent to the eastern border of the IAA. The sage grouse at this lek site are very likely to utilize the National Forest for brood rearing. The IAA has sage grouse habitat that can be enhanced by habitat improvement efforts.
- The current condition and use of big game winter range is a primary management concern within the Ironhorse area.
 - The IAA provides important habitat for the Rocky Mountain elk, an MIS species on the Forest.
 - Ponderosa pine forest habitat within the Ironhorse area provides winter range for elk and mule deer, especially the lower elevation, south-facing slopes above the San Miguel River.
- The larger canyons of the San Miguel River, Clay Creek, McKenzie Creek, and Horsefly Creek are suitable habitat for the threatened Mexican spotted owl. Repeated surveys since 1993 have not documented the presence of this species in the IAA. However, management should protect these canyon habitats from large-scale stand-replacement fires or other activities that would impact suitable habitat for this species.

Travel Management

- Roads in the IAA are continuing to contribute to the growth of WUI, loss of big game habitat effectiveness, spread of noxious weeds and soil erosion and sedimentation.
- The Sanborn Park Road is the primary access to the Sanborn Park community and IAA. The Sanborn Park Road also provides a seasonal access for the public transiting between Norwood and Montrose, CO. Use of this road is increasing with the growth in southwest Colorado; Montrose and San Miguel Counties. It is reasonably foreseeable that there will be demands for converting this road to a year-round, all-weather road. This will logically place additional market pressure for increased residential development on private land in-holdings in the IAA, further complicating fire risk and hazard.

Riparian Conditions

- Proper Functioning Condition Surveys indicate that two stream reaches are rated as functioning "at risk". These streams are low gradient alluvial reaches associated with meadow and open park areas. Bank erosion, increase in fine sediment, change in stream morphology, and reduction in riparian vegetation cover, composition, and vigor are consistent problems associated with each impacted reach. The causative factor associated with these impacts appears to be the presence of stock water developments and the associated concentrated livestock grazing use of the site.

Recommended Actions

Wildfire Risks

- Treat 1,238 acres of hazardous fuels in the Wildland Urban Interface adjacent to the community of Sanborn Park.
- Treat 2,140 acres of hazardous fuels in the Wildland Urban Interface adjacent to the WAPA 345 kV and 230 kV powerlines.
- Begin the systematic pre-commercial thinning of 1,195 acres of high priority and 699 acres of medium priority ponderosa pine plantations.

Vegetative Conditions

- Begin the systematic pre-commercial and commercial thinning and prescribed burning of the ponderosa pine type in the IAA.
- Identify candidate areas for development of old growth and fire maintained openings (FMO) in the ponderosa pine type.
- The Cartwheel area contains an extensive infestation of dwarf-mistletoe. Treat 1,000 acres through commercial timber harvest, post harvest timber stand improvement cutting, and hand-planting to develop stand conditions more favorable to long-term forest health and a reduction in fuel loading.
- Treat noxious weeds in the IAA using Integrated Weed Management strategies and the priorities for weed management that are addressed in the Horsefly Coordinated Weed Management Area Plan.

Wildlife Habitat Conditions

- Treat 428 acres of big game winter range habitat in the Deadhorse Point area.
- Treat 181 acres of potential Gunnison sage-grouse habitat in the Iron Springs area.
- Implement Abert's squirrel habitat enhancement in the ponderosa pine habitat in the Iron Springs area.
- Recommend complimentary big game habitat treatments to be applied on adjacent BLM managed lands along the San Miguel Canyon rim.

Travel Management

- Implementation of the 2002 Uncompahgre NF Travel Management Plan should be accelerated with consideration for access needs for current and future restoration efforts.
- At present there is the potential to develop several locations on the Sanborn Park and Goodenough Gulch Road that can serve as seasonal road closures for access to the IAA to control timing of use on roads and in big game and Gunnison sage-grouse habitat. The gated road closures would allow for graduated opening of access as seasonal access objectives are met while reducing unauthorized roads and road maintenance costs.

Riparian Conditions

- Implement improved grazing practices and/or structural improvements to improve riparian conditions where the PFC ratings are Functioning ‘at risk’.

Location and Characteristics of the Uncompahgre Plateau

The Uncompahgre Plateau is a prominent landform located south of Grand Junction in southwestern Colorado. The Uncompahgre Plateau is a long fault block with a surface layer of erosion-resistant Dakota sandstone and a few remnant caps of Mancos shale. The northwest to southeast oriented Plateau is characterized by a steep escarpment on the west side and a long gentle slope on the east. The southwest corner of the Plateau falls off rapidly along steep cliffs and drains into the San Miguel River Canyon. The east side of the Plateau is a more gradual slope, heading toward the northeast and the Uncompahgre River Valley. The northeast side of the Plateau is dissected by steep, northeast trending canyons with narrow drainages separated by sloping mesas. There are areas of extensive rock outcrop and canyon rims. The Plateau watersheds drain into the San Miguel, Dolores, Uncompahgre and Gunnison rivers –all major drainages of the Colorado River.

The climate is semi-arid and is reflected in the plant communities in the area. The vegetative plant communities follow an elevational gradient from the low elevation, semi-arid salt desert shrub and semi-desert grasslands to the more mesic high elevation mixed conifer and spruce-fir forests. The average annual precipitation across the Uncompahgre Plateau ranges from 9.5 inches in the lower areas to 25 inches in the higher elevations. Precipitation is bimodal and falls predominantly in late summer (July and August) and winter (January through March). Plant effective moisture is highly dependent on soils, slope, aspect, and topographic position—resulting in a heterogeneous vegetation mosaic across the landscape. Elevation on the Plateau ranges from 4,000 feet in the surrounding valleys to 10,350 feet on Horsefly Peak.

Project Area

The Ironhorse Analysis Area (IAA) name is a composite of two locally prominent terrain features in the area: Horsefly Creek at the north end of the area and Iron Springs Mesa located on the south end of the area. The IAA partially lies within two large watersheds of Horsefly and Beaver-McKenzie Creek (5th level hydrologic unit). Each of these watersheds contain 6th level hydrologic units, which include the Upper Horsefly Creek, Horsefly Creek, and Albin Draw drainages within the Horsefly Creek watershed and the McKenzie Creek, Clay Creek, and Beaver McKenzie drainages within the Beaver-McKenzie Creek watershed. The project area watersheds drain into the San Miguel River and in turn, the Dolores River, and eventually the Colorado River.

The IAA consists of approximately 64,173 acres on the southern end of the Uncompahgre Plateau primarily on National Forest System land. Other landowners include 7,747 acres of private land and 3,191 acres of BLM. The private land is centered in Sanborn Park and along the forest boundary on the east side of the IAA. The small community of Sanborn Park is the largest concentration of year-round residences within the National Forest System lands on the Plateau. There are also other scattered private land in-holdings in the IAA. The BLM land is located along the eastern canyon edge above the San Miguel River, and the river corridor is designated as an Area of Critical Environmental Concern (ACEC). The northern boundary of the IAA is Horsefly Canyon, the west and southwest sides are bounded by the San Miguel River, and the Uncompahgre National Forest boundary forms the eastern edge of the IAA. The area is administered by the Norwood Ranger District of the GMUG NF. BLM lands are administered by the Uncompahgre Field Office located in Montrose, Colorado. The area is bisected by the San Miguel County and Montrose County line.

The area is relatively flat to gently undulating, characterized by ponderosa pine stands, dry parks, mesas and points overlooking the San Miguel River. The IAA is dissected by several steep sided canyons that drain west into the San Miguel River. The primary drainages are, from north to south: Horsefly Creek, Clay Creek and McKenzie Creek. The area generally lacks water features. The channel and riparian conditions in the canyons are considered stable, with good riparian condition due to the inherent geomorphology, limited access by livestock and the absence of roads and stream crossings. Elevations range from 6,800 feet on Horsefly Point to 8,800 feet on the south and southeast sides of the IAA. The precipitation in the IAA ranges from 16-24 inches annually. The western side of the IAA is drier than the eastern side due to its lower elevation and the orientation of prevailing weather patterns. The predominant vegetative cover types are: ponderosa pine, pine oak, pinyon juniper woodland, mixed mountain shrub, sagebrush, grassland, and to a lesser extent, dry mixed conifer, mixed conifer, aspen and spruce-fir. Mixed conifer, aspen and spruce-fir occur at higher elevations, on north facing slopes and canyons and in more mesic areas of higher effective precipitation.

The area is generally used for timber management, livestock grazing, dispersed recreation, and hunting. The IAA contains five grazing allotments that are grazed from early June through October. The grazing operations are primarily cow/calf with a small yearling component for flexibility. The livestock grazing systems are deferred rotation and rest rotation systems. An Environmental Assessment (EA) for the issuance of grazing permits and development of Allotment Management Plans (AMPs) was completed in 2003. Because of the land ownership pattern and topography, BLM and Forest Service pastures are used in common. The western side of the IAA is important for elk and deer winter range. Big game habitat improvement projects, designed to improve winter range, have been successfully implemented in the pinyon juniper/ ponderosa pine transition zone through roller chopping and seeding of wildlife forage species. Turkeys are also a featured species in the area. Canyons and draws with older ponderosa pine snags for roost trees are desirable components for retention and enhancement of turkey habitat. Gunnison sage-grouse are potentially using the sagebrush parks within the IAA due to the proximity of adjacent private land leks. Abert's squirrel is a featured species for mature ponderosa pine management.

Small settlements, homesteads, family homesite clusters, schools and sawmills were common in the area during the early part of the last century, particularly adjacent to live water, springs and arable land. Many of the existing roads stem from this original pattern of settlement. Most of the sites were heavily disturbed by past management practices such as land clearing, grazing, timber removal, and dryland farming. Outside of the limited riparian areas, water for wildlife and livestock is provided by earthen stock tanks and reservoirs. Large ponderosa pine stumps are evident across the area from prior timber harvest activity. Evidence of past wildfire activity is present across the area. In general, the IAA is deficient in snags and in particular the larger sized snags. The ponderosa pine component generally lacks age and size class diversity and is relatively homogeneous which reflects a significant risk for insects, disease and crown fire events. There are an estimated 3,654 acres of ponderosa pine plantations in the area. The pine plantations in the area were machine planted in the late 1960s through the 1970s. Site preparation for planting involved clearing the existing vegetation and windrowing it into earthen berms which are evident throughout the plantation areas. Tree seedlings from the Mt. Sopris nursery in Carbondale, Colorado were air dropped as para-cargo every three days to provide planting crews with fresh seedlings for planting (Reg Cridler, pers. comm.)

The Western Area Power Administration (WAPA) of the Department of Energy (DOE) operates and maintains 345 kV and 230 kV powerlines that cross the east and south sides of the IAA. The powerlines are key to the power grid in the western U.S. The private land and powerlines, adjacent to Sanborn Park, have been designated as Wildland-Urban Interface (USFS, BLM 2004) for the purposes of prioritization of projects for hazardous fuels reduction projects. This area is prone to some of the highest number of lightning caused wildfires on the GMUG NF and is therefore susceptible to wildfire, particularly wind driven crown fire events.

Purpose and Need of the Strategy

The purpose of the Ironhorse Vegetation Management Strategy (IVMS) is to create a document that can serve as a guide for agency administrators, resource professionals, and the interested public for both short and mid-term planning at the watershed scale and as a management tool to assist with site-specific project planning. The IVMS accomplishes this by organizing and displaying ecosystem information and identifying priorities and needs within the landscape that are related to vegetation in the near term. In other areas of the IVMS, the direction and goals are more aspirational due to the long-term nature of the objectives, the inherent uncertainties and nature of public land management, and the dynamic nature of ecosystems.

This effort is being undertaken on both BLM and National Forest System lands because landscape information is not commonly integrated across agency boundaries, and it is necessary for examining and focusing on the most important areas within the IAA for management activities. The strategy characterizes the important ecosystem elements and provides a tool for decisions regarding the type, location and sequence of appropriate management activities within the IAA. The IVMS is not a decision document. It will be analyzed through subsequent National Environmental Policy Act (NEPA) analysis. At the time of this writing, it is believed that separate NEPA analysis and decision documents will be produced for the BLM and National Forest System lands.

Vegetation structure, age, condition and spatial patterns within the IAA appear to be inconsistent with the estimated historic range of variability (HRV) (Romme et al). This makes the landscape more prone to uncharacteristic fluctuations in vegetation by the primary natural landscape disturbance mechanisms such as fire and insects and disease. It also reduces the resiliency of this area to recover following severe disturbance events. This disparity in landscape condition affects the habitat needs of many important native wildlife species. The current vegetation pattern, both natural and human induced, heightens the risk of uncontrollable wildfire, the spread of insects and tree disease, and accelerated big game winter range and Gunnison sage-grouse habitat decline.

Ponderosa pine is a primary focus of the IVMS. Ponderosa pine is the dominant plant community and the forest type of special interest in the IAA due to its low relative abundance and high value on the GMUG NF. The mature forest type occurs predominantly as large, even-aged stands of pure ponderosa pine growing in association with a moderate to high density understory of Gambel oak. Patchiness and horizontal diversity between stands and across the landscape is relatively low. Current stand conditions in the ponderosa pine indicate that the area is predisposed to stand replacing fire events across broad portions of the IAA. The normal fire regime in ponderosa pine types in southwest Colorado are surface fire regimes with fairly short return interval, low mortality events with a mean fire interval of 15-25

years (Romme). Fire suppression has resulted in fire exclusion and consequently, in concert with logging, lead to a relatively homogeneous matrix of ponderosa pine across the IAA. These current stand conditions will result in an altered fire regime of more extensive mixed and high mortality fire, to which the area is not well adapted or resilient. Mixed and high mortality crown fire would be incompatible with the current land ownership pattern due to the risk of catastrophic wildfire to citizens and property in the Wildland-Urban Interface (WUI) and to the powerlines on which many communities depend. Altering fuels through mechanical treatment, prescribed burning, or combination of both practices can modify wildland fire behavior (Finney). Well designed and implemented fuel modifications are recommended for reducing the wildland fire risk adjacent to the WUI and powerlines, as well as in habitats and stands that are identified as high risk and high value.

In addition to wildfire, bark beetles (both mountain pine beetle and western pine beetle) are of concern in the IAA because they represent another primary agent of the mortality or potential mortality of the ponderosa pine. As mentioned, due to the past timber harvest history, the majority of the ponderosa pine forest is characterized as mature stands less than 120 years old from 8" up to 22" dbh with low to moderate crown closure. The lack of structural diversity within and across stands predisposes the ponderosa pine forest to attack by insects and disease, primarily bark beetles and to a lesser degree, dwarf mistletoe. Bark beetles typically select dense older, mature, and over-mature trees particularly if they are weakened, stressed or damaged. Homogeneous stands and landscapes containing very similar conditions of host species, age, and structure are at higher risk. Weather and lightning damaged trees, drought, high tree density, fire and logging slash have all been observed to contribute to increased susceptibility of host trees to bark beetles. Generally, healthy diverse individual trees and stands are more resistant to infestation.

Two other factors within southwestern Colorado and the IAA are influencing the increased potential for wildfire risk: drought and pinyon decline. Pinyon decline appears to be easing at the time this document is being prepared; however, the lasting effects of pinyon decline will persist and interact with potential wildfire activity and drought. Pinyon decline is the interactive effect of two agents of pinyon mortality: bark beetles (*Ips confusus* and *Dendroctonus ponderosae*) and black stain root fungus (*Leptographium wageneri*). Pinyon decline has the potential to dramatically alter the pinyon-juniper woodland composition through loss of the pinyon component and the resultant increase in fuel loading. It appears that the pinyon component of some pinyon-juniper woodland types may cycle in and out of pinyon-juniper stands over time in response to climate, pest complexes, plant succession and other environmental factors. The pinyon-juniper community is the most common woodland type on the Plateau, and therefore, the potential area affected by pinyon decline is quite significant. Stand replacing fires are influenced by the strong climactic control of drought and wind events. Wildfires within the pinyon-juniper community influence and affect wildfire activity in the more flammable ponderosa pine communities adjacent to it. The current conditions in the area predispose and heighten the potential for high

severity, high mortality wildfire in the pinyon-juniper woodland that could propagate into the ponderosa pine. This situation also has the potential to set off a cycle of invasion by invasive plant species, particularly cheatgrass (*Bromus tectorum*), that could colonize large areas subsequent to a stand replacing fire event with resultant alterations in fire regimes.

In general, the IAA has ponderosa pine forests that are less structurally diverse across the landscape than would be expected in a natural disturbance regime and the pinyon-juniper woodland and sagebrush communities are producing less variety and abundance of understory vegetation than they have the capability to produce. This situation arises from a combination of natural and man-made factors related to land use. Due to the past timber harvest history, the majority of the ponderosa pine forest is characterized as dominated by mature stands less than 120 years old, with low to moderate crown closure. There is only one site in the IAA that is typed as a mature stand with dense canopy closure. The remainder of the pine type is within the sapling-pole stages. These sapling-pole sites represent the various tree plantations within the IAA. The mature forest type occurs predominantly as large, even-aged stands of pure ponderosa pine growing in association with a moderate to high density understory of Gambel oak. Patchiness and horizontal diversity between stands and across the landscape is relatively low.

The rangeland, woodland, and grazed forestlands in the watershed area have been exposed to sustained livestock grazing for approximately 125 years due to the pattern of settlement and easy accessibility to grazing. To different degrees, livestock grazing has changed the composition and structure of the plant communities due to dietary preference and by altering competitive pressure within the grazed plant communities. In addition, other land management practices such as herbicide spraying, chaining, plowing and seeding introduced non-native species to improve forage for livestock have altered plant communities. Grazing by native ungulates and the introduction of noxious weeds have also contributed to the alteration of plant communities. There are locations within the area where highly palatable native grass species have been replaced by exotics and by low value forbs and annuals. This condition can result in bare soil, reduced litter input, soil erosion, and compaction. Large amounts of bare soil are susceptible to soil detachment, runoff and erosion, reducing soil productivity.

The IVMS is intended to place management on a path to correct the vegetation problems listed above by implementing a vegetation strategy. The IVMS will cover the major vegetation changes needed to reach both ecological health and agency management objectives. Actions will occur over a 1-20+ year time period to achieve the various vegetation objectives within the IAA. In addition, the strategy will include a monitoring and research component, as well as mechanisms to refine or alter planned actions based on new information.

This Vegetation Management Strategy is not a comprehensive watershed restoration plan, but rather applies landscape level approaches to the vegetation of the IAA.

Therefore, comprehensive analysis of all the constituent elements relative to ecosystem properties, such as ecological integrity and processes, or questions regarding fragmentation and diversity are outside of the scope of this assessment and are deferred to a time when data, decision support tools and adequate resources can be brought to bear on those questions. In addition, other than to discuss broad implications and recommendations and suggest additional lines of inquiry, this analysis will not address management or policy issues related to private land use relative to growth, development and wildfire risk. This is most appropriately addressed by state and local governments and the insurance industry. Issues related to travel management, specific transportation systems and roads, recreation management, grazing allotment management or other land uses are addressed under current agency land and resource management plans. One exception to transportation systems and road issues are recommendations for seasonal road closures to prevent rutting of soils.

Rationale

At present there is very little known about actual applied restoration strategies and treatments at the landscape scale in southwestern Colorado and the eastern Colorado Plateau. There are also questions about long-term sustainability of systematic approaches to developing treatments to mimic spatial heterogeneity in southwestern Colorado plant communities at the landscape scale. Further, the duration of treatment effectiveness remains to be determined at the treatment unit and landscape scales. Relatively short-lived plant communities, such as mixed mountain shrub, oak and seral aspen types, are problematic in terms of duration of effectiveness. This is also true of firebreaks specifically constructed and maintained to protect WUI. At present, models and decision support tools are not adequately refined at the operational level to determine exact successional pathways for highly complex landscapes. Empirical data to determine precise successional pathways to support restoration is still lacking, although experience and recent research indicates that certain forest, woodland and shrubland plant communities are outside of their historic range of variability in terms of stand structure, fire frequency, and fire behavior.

There is a reasonable expectation that we can manage for multiple use within the historic range of variability by maintaining the composition, structure, and function of the plant communities in the area. To reduce the risk to the WUI, modification of fuels has proven effective in changing fire behavior. Seeding native plants in disturbed areas or as a part of a suite of restoration practices is recommended to maintain ecological processes. Carefully tailored habitat improvement projects can provide specific benefits to the targeted species while enhancing a broader range of species with similar or nonconflicting habitat requirements. The current science indicates opportunities for reversing trends in forest and woodland cover -- thickening, expansion, and succession -- particularly where opportunities exist in the pinyon-juniper savannah and woodland and other fire adapted ecosystems including ponderosa pine and mountain shrub communities. Facilitating practices in the form of

noxious weeds treatment, native plant seeding, grazing management and prescribed burning of seedling tree regeneration show significant promise to extend the effectiveness of treatments.

For the purposes of developing the Southwest Quadrant Mosaics, an interdisciplinary team of agency resource professionals, academic researchers and knowledgeable community members developed landscape mosaic drivers that are within the reasonable approximations of the landscape historic range of variability. Landscape mosaic drivers were developed based on professional expertise and sound scientific information available at the time of development and were considered in concert with the desired conditions. The Southwest Quadrant Mosaics have been included in this assessment as an appendix to aid managers desiring to implement site specific projects. In addition, general prescriptions for hazardous fuels reduction to alter fire behavior in the WUI and ponderosa pine restoration treatments, for which there is broad agreement and applicability, are also included.