Environmental Assessment

Forest Health and Vegetation Management for the Judith and Moccasin Mountains

EA # MT-060-02-01

June 2006

BLM

Montana Department of Natural Resources and Conservation

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The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based on the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation; rangelands; timber; minerals; watershed; fish and wildlife; wilderness; air; and scenic, scientific, and cultural values.

The mission of the Montana Department of Natural Resources and Conservation is to ensure Montana's land and water resources provide benefits for present and future generations. The DNRC is responsible for the management of state school trust lands and the promotion of healthy forests.

BLM/MT/PL-06/007+2824

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List of Acronyms Used

ACEC	Area of Critical Environmental Concern
ARM	Administrative Rules of Montana
ATV	All Terrain Vehicle
AUM	Animal Unit Month
BI	Burning Index
BLM	Bureau of Land Management
BMP	Best Management Practices
CFS	Cubic Feet per Second
CWPP	Community Wildfire Protection Plan
DNRC	Montana Department of Natural Resources and Conservation
EA	Environmental Assessment
EPA	Environmental Protection Agency
FAR	Functioning At Risk
FOFEM	First Order Fire Effects Model
FRCC	Fire Regime Condition Class
FWP	Montana Fish Wildlife and Parks
HFRA	Healthy Forests Restoration Act
JVP RMP	Judith-Valley-Phillips Resource Management Plan
LWM	Large Woody Material
MBF	Thousand Board Feet
MDEQ	Montana Department of Environmental Quality
MEPA	Montana Environmental Protection Act
MMBF	Million Board Feet
MPIF	Montana Partners In Flight
MSU	Montana State University
MT NRIS	Montana Natural Resource Information Service
NEPA	National Environmental Policy Act
NF	Non-functioning
NRHP	National Register of Historic Places
NWCG	National Wildfire Coordinating Group

List of Acronyms Used (cont'd)

ORV	Off-Road Vehicle
PFC	Proper Functioning Condition
PM	Particulate Matter
SFLMP	State Forest Land Management Plan
SHPO	State Historic Preservation Office
SMZ	Streamside Management Zone
T&E	Threatened and Endangered (Species)
USGS	United States Geological Survey
WCT	Westslope Cutthroat Trout
VCR	Visual Contrast Rating
VRM	Visual Resource Management

1.0 Background, Location, and Purpose

1.1 Background

The National Fire Plan (Appendix A) and The Healthy Forests Restoration Act of 2003 (HFRA) (Appendix B) direct the Bureau of Land Management (BLM) to reduce the risk of large-scale wildland fires, protect human developments intermixed within or adjacent to wildlands, and to protect and improve the health of forests, rangelands, and watersheds.

In response to this direction, the Lewistown Field Office of the Bureau of Land Management is proposing a variety of activities in the Judith-Moccasin Landscape Analysis area.

The Montana Department of Natural Resources and Conservation (DNRC), Northeastern Land Office, is responsible for the management of school trust land within the Judith Moccasin Landscape analysis area. DNRC is also proposing a variety of activities in concert with BLM in the project area. All DNRC lands proposed for forest treatment are dedicated to the Common School Trust beneficiary.

The BLM and DNRC decided that a joint environmental assessment (EA), including the analysis of both agencies' proposed actions, would provide better information for decision makers and the public. This approach allows for a more consistent analysis of the driving issues and the potential effects of the proposed action at a landscape level. This joint document was prepared in accordance with the Montana Environmental Policy Act (MEPA) procedural rules (ARM 36.2.521 through 36.2.543). In addition, for the federal lands this project qualifies as an authorized and covered project under HFRA. See Appendix B for documentation. Guidance for compliance with the National Environmental Policy Act (NEPA) follows the Healthy Forests Restoration Act interim guidance (BLM 2004).

The BLM and DNRC will issue separate decisions on their respective proposed actions. **Goals, objectives, and proposed actions apply to both BLM and DNRC lands, unless specifically stated otherwise.**

1.2 Project Area Location and Description

The analysis area encompasses the Judith, North Moccasin, and South Moccasin Mountains, located north and northeast of Lewistown in Fergus County, Montana. The area includes approximately 224,957 acres of federal, state and private lands, of which 32,439 acres are managed by the BLM and 8,459 acres are managed by the DNRC. Private land encompasses 184,059 acres. Private, state, and federal lands are highly interspersed. Patented mining claims make up inclusions of private land within even the larger parcels of public ownership. The proposed action applies only to federal and state lands within the analysis area. See Figure 1.1 (located at back of document).

The North and South Moccasin Mountains extend 12 miles south to north from Lewistown and are divided east to west by Warm Spring Creek. The Judith Mountains extend northeast from Lewistown approximately 25 miles. Elevations range from 3,693 ft. in Lewistown to 6,427 ft. in the Judiths, 5,402 ft. in the North Moccasin Mountains, and 5,798 ft. in the South Moccasin Mountains. Topography in the region ranges from flat to rolling foothills and prairies to steep mountain slopes greater than 60%. Dense conifer forests cover much of the mountains, with occasional openings of meadows or rock cliffs. All streams in the area eventually drain into the Missouri River.

1.3 Purpose and Need for Proposed Action

The proposed action and analysis are based on the following purpose and needs. Needs are expressed as problems under specific resource headings, and the purpose for the proposed action is to meet the desired outcomes.

Information regarding current conditions is based on extensive forest, range, wildlife, riparian and water quality inventories completed during 2002 by personnel from North Wind Environmental under a contract with BLM. All data and reports resulting from these inventories are on file at the Lewistown Field Office. Data from the inventories was also used as input to the SIMPPLLE model (Appendix G) to determine the risk of disturbance from fire, insect and disease, and the range of natural vegetation. Model input data for non-federal land was derived from aerial photo interpretation. Forest inventory data for deriving forest prescriptions for DNRC land was derived from existent information on file at DNRC.

1.3.1 Forest Health

Past timber harvesting, fire suppression, and natural succession have promoted the development of dense forest stands throughout most of these mountains. Currently, Douglas-fir and ponderosa pine forests are unnaturally dense and dominated by a single canopy layer of mid-aged trees (approximately 80-100 years old). Consequently, competition between trees for water, light, and nutrients is pronounced. Stressed trees have poor resistance to drought and disease and are vulnerable to attack by insects such as mountain pine beetle, pine engraver beetle, and Douglas-fir beetle. Some areas that are capable of supporting Douglas-fir contain dense stands of small-diameter lodgepole pine. Many such lodgepole stands are reaching the limit of their natural lifespan and are subject to high mortality.

These stand conditions are the result of natural seeding after disturbances such as logging, mining, or wildfire combined with a change from the natural regime of relatively frequent, low to mixed severity fires (North Wind Environmental 2003, Fire History Report). In many areas forest productivity is relatively low and tree mortality abnormally high. These stands are at increased risk for large, stand-replacing fires, as opposed to smaller, low to mixed severity fires expected under a natural fire regime. The potential exists for epidemic insect infestations resulting in widespread mortality across the landscape. In some places, such infestations have already begun. Deciduous trees

such as aspen, shrubs, grasses, and forbs have decreased in abundance as the forest canopy has closed, blocking out sunlight and decreasing forest openings.

Desired Outcome: A healthy forest that is biologically and structurally diverse, relatively fire tolerant, and dominated by vigorous individual trees. Encourage establishment of long-lived, fire-resistant tree species as appropriate to the site habitat type with a stand structure and density that supports large tree development, dominance and vigor (Fiedler 2002).

Objective: Maintain or encourage the development of multi-layered stands and complex forest structure. Retain a mix of conifer species, size- and age-classes and large standing dead trees. Retain the large, healthy, genetically superior trees, and thin out smaller or diseased trees. Reduce tree stress by decreasing the number of trees per acre where the canopy cover and density is too high. Enhance or establish forest openings. Increase the structural and species diversity within forest stands, including deciduous trees, shrubs, and herbaceous understory. Limit new road construction. Endeavor to utilize the material that is removed through the sale of saw logs, pulpwood, biomass, and other products to reduce the overall costs of treatment. These objectives are consistent with DNRC's objectives for the management of School Trust Lands (section 1.3.8).

1.3.2 Fire Management

General Fire Hazard Dense thickets of sapling and pole-size trees have established beneath the upper forest canopy layers. Dense forest canopies can easily carry a crown fire. These conditions make the existing forest extremely vulnerable to a high intensity, stand-replacing wildfire. Controlling such fires in conditions of high to extreme wildfire danger will be costly, and the risk to firefighters is potentially great. The potential for large, high-intensity wildfires poses a threat to soil productivity and watershed integrity, as well as to the forest stands. Especially threatened by the existing fire hazard are remnant large, old Douglas-fir and ponderosa pine trees exceeding 200 years of age. Historically, large-scale, stand replacing fires rarely occurred in Douglas-fir and ponderosa pine forest types. Instead, more frequent low and mixed severity fires were the natural regimen before European settlement (North Wind Environmental 2003, Fire History Report).

Desired Outcome: Reduce the likelihood of large, stand-replacing wildfires and increase the likelihood of low or mixed severity wildfires. Increase the probability of controlling wildfires during initial attack. Reduce the expected cost of controlling escaped fires. Improve firefighter and public safety.

Objective: Reduce surface and ladder fuels, increase tree crown spacing and reduce forest density in areas at moderate to high fire risk. Retain the largest healthy, fire resistant trees and thin out smaller or diseased trees. Endeavor to utilize the material that is removed through the sale of saw logs, pulpwood and other products to reduce the overall costs of treatment. Reintroduce fire to the landscape, mimicking a more natural fire regime that will promote an open, multi-aged forest structure with good understory species diversity.

Wildland-Rural Interface Fire Hazard Under current forest conditions, expected wildfire behavior poses a great risk to life, safety, and property for the many private residences in the Judith and Moccasin Mountains. Hazardous fuels and other risks from wildfire on private and public land threaten homes and communities where rural development is intermixed with wildlands. Dense forests adjacent to some major roads could result in the roads being blocked by fire, thus preventing safe evacuations.

Desired Outcome: Homes, communities, recreational sites and access routes are relatively safe from wildfire, and can generally be defended directly with hand or engine crews. Major roads are safe for evacuations and can serve as defensible fire breaks for indirect fire suppression operations (e.g., burn out or back burn).

Objective: Thin forest stands and reduce ladder and surface fuels within the defined wildland-rural interface boundary so that expected fire behavior under extreme fire weather conditions (95th percentile Burning Index) produces flame lengths of 4 feet or less, based on fire behavior models.

1.3.3 Wildlife Species and Habitat

Vegetative diversity across the landscape and within stands has decreased as a result of a) conifer encroachment into meadows, aspen stands, and other non-conifer types; and b) increased tree density within stands which shades out understory species. Both of these changes have greatly diminished forage for deer and elk, nesting habitat for migratory songbirds, and general habitat conditions for species dependent on forest-meadow edges and open woodland stands. DNRC is not proposing any specific treatment areas for the specific purpose of vegetative diversity and wildlife habitat enhancement. However, the wildlife objectives are consistent with the management of School Trust Lands, and DNRC will consider effects on wildlife in making a decision on the proposed action.

Desired Outcome: Improve vegetative diversity, both within stands and across the landscape. Open up the forest canopy to create more forage and improve habitat for a variety of game and non-game species and to increase the distribution of deer and elk on public lands. Increase the abundance of deciduous trees, shrubs and herbaceous understory plants over current conditions. Reintroduce the natural role of fire.

Objective: Use prescribed fire to maintain and enhance historical meadows and forest openings. Where trees are currently too dense to safely use prescribed fire as a first entry, use manual thinning, followed by prescribed fire. Remove competing conifers from aspen groves. In forest or woodland areas retain the largest healthy trees.

1.3.4 Riparian and Aquatic Habitat/Collar Gulch ACEC

General Riparian and Aquatic Habitat Aquatic habitat restoration projects are needed to improve existing conditions, based on proximity to fish habitat and the information found in riparian assessments and stream surveys completed in 2002.

Desired Outcome: Protect aquatic habitat by reducing the risk of high intensity, stand-replacing wildfires. Improve instream aquatic habitat and existing conditions

for headwater streams that impact downstream fisheries. In areas where riparian health assessments are rated as non-functioning or functioning at risk, make progress toward proper functioning condition. Maintain riparian health in areas currently rated as properly functioning.

Objective: Improve vegetative species diversity and riparian forest stand structure, simultaneously reducing potential direct wildfire impacts to riparian areas. Improve instream habitat structure through riparian plantings and placement of large woody material. Reduce impacts to riparian areas by removal or reconstruction of selected riparian area roads and construction of livestock exclosures.

Collar Gulch ACEC Collar Gulch supports an isolated population of westslope cutthroat trout, a sensitive species. The area has been designated as an Area of Critical Environmental Concern (ACEC) in order to protect this special status species. Forests in the Collar Gulch drainage are over-stocked and at risk of large-scale crown fires. In the event of wildfire, the population of westslope cutthroat would be severely impacted by ash and sediment, high stream temperatures, and could potentially be extirpated. In addition, vegetation diversity within the riparian area has decreased as a result of conifer encroachment into birch stands and increased tree density within stands which shades out understory species. Instream fish habitat is lacking deep pools, and a dam from historic mining operations partially limits fish passage.

Desired Outcome: Reduce the risk of extirpation of westslope cutthroat in the Judith Mountains by minimizing the risk of catastrophic fire and improving available habitat in Collar Gulch, and by expanding the range of westslope cutthroat to another drainage within the Judiths.

Objective: Thin forest stands in Collar and Chicago Gulch drainages to reduce the risk of high intensity, stand-replacing wildfires. Remove encroaching conifers from riparian forests in these drainages. Improve instream fisheries habitat and genetic crossing of currently isolated subpopulations. Cooperate with Montana Fish, Wildlife and Parks to expand the westslope cutthroat population into Chicago Gulch.

1.3.5 Range

Upland and Riparian Health Standards Grazing management for allotments in the Judith and Moccasin Mountains has changed little over the past 20 years. Some allotments are not meeting the Standards for Rangeland Health (see Appendices C and E). Livestock grazing is a significant factor for three of those allotments that are not meeting the standards.

Desired Outcome: Grazing management is appropriate to current conditions, meeting or making progress toward upland and riparian health standards.

Objective: Reissue term grazing permits, incorporating management changes where appropriate. Add the Guidelines for Livestock Grazing Management (Appendix D) as well as allotment specific conditions to each grazing permit, to ensure that standards for rangeland health are met.

DNRC will not be making any decisions regarding grazing management from this analysis, and therefore, for the purposes of the decision to be made, does not share the objectives outlined here for range.

1.3.6 Noxious Weeds

Noxious weeds are present in the Judiths and Moccasins, both within active grazing allotments (see Appendix E) and in non-active allotments or unallocated areas.

Desired Outcome: Native plant populations are not threatened by noxious weeds.

Objective: Reduce or contain known populations of noxious weeds and prevent establishment of new populations.

1.3.7 Visual Resources

The outstanding scenic quality of the Judith and Moccasin Mountains is known throughout Central Montana. In recognition of this fact, BLM designated the Judith Scenic Area at the southwest end of the range. Increasingly, tourism has become an economic benefit for Lewistown and the smaller communities around the Judith/Moccasin Mountains. Scenic quality is an important contributor to tourism.

Desired Outcome: Maintain or improve the visual quality of the Judith and Moccasin Mountain ranges.

Objective: Ensure forest health is improved, but scenic quality is not compromised by vegetative management practices.

1.3.8 Management of School Trust Lands

The 8,459 acres managed by the DNRC in the Judith-Moccasin area are held by the State of Montana in trust for the support of specific beneficiary institutions such as public schools, state colleges and universities, and other specific state institutions such as the school for the deaf and blind (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11).

The Board of Land Commissioners and the DNRC are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). These lands are managed under the programmatic guidance of DNRC's State Forest Land Management Plan (DNRC 1996) and the 2003 Administrative Rules for Forest Management (ARM 36.11.401 through 36.11.450, DNRC 2003).

Desired Outcome: A long-term sustainable forest system to provide income for the Trust.

Objectives:

1) To promote a diversity of stand structures and patterns for a long-term sustainable forest system.

2) To produce revenue for the Trust by harvesting up to 6 million board feet (MMBF) of timber.

1.4 Conformance with Applicable Land Use Plans

Management actions in the Lewistown Field Office area must conform to the Record of Decision for the Judith-Valley-Phillips Resource Management Plan decision (JVP RMP), signed in 1994. This land use plan has since been amended by the following decisions: Standards for Rangeland Health in 1997, which established national and local standards for rangeland health and guidelines for grazing management (Appendices C and D); Montana/Dakotas Fire and Fuels Management Plan in 2003, which incorporated direction from the National Fire Plan. Full references to each of these documents can be found in Chapter 5, listed under Bureau of Land Management.

DNRC's State Forest Land Management Plan (SFLMP) provides the overall philosophy for management of forested school trust lands: Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream.

In the foreseeable future, timber management will continue to be DNRC's primary source of revenue and our primary tool for achieving biodiversity objectives (DNRC, 1996). The 2003 Administrative Rules for Forest Management (ARM 36.11.401 through 36.11.450, DNRC 2003) provide specific policy and direction for the implementation of forest management activities under the philosophy of the SFLMP. Timber harvest and associated activities proposed by the DNRC will be planned and completed in accordance with these Administrative Rules.

2.0 Alternatives

2.1 Proposed Action

For maps of the Proposed Action, refer to Figures 2.1 and 2.2 directly following the appendices at the back of the document.

2.1.1 Forest Health

The overall goal for forest health treatment areas of the Judith and Moccasin Mountains (see Figure 2.1) is to develop a mosaic of stands with varying ages and densities, to increase overall vegetative diversity, to modify fire behavior, and to limit the expected size of escaped wildfires. Forest health issues of insects and disease, stand density and structure, fuel loading, and stage of succession will be addressed by treatments in forested areas. The intent is to retain large trees of fire resistant species and reduce stand densities across much of the landscape.

Treatments will occur within the identified forest stands (polygons), but will often not cover the entire polygon based on limitations of topography, slope, streamside management zones, cultural resources, and the desire to retain some patches of denser forest. All treatments are intended to avoid homogeneity on the landscape. Within a given stand, tree density and grouping will vary within the parameters specified for the appropriate habitat type. Also, in some cases, more than one habitat type is present within a polygon. Environmental site factors (slope, exposure, soils, etc.) will determine the prescription applied at any given point in a stand.

Eight areas under BLM management and five areas under DNRC management were identified for forest health and thinning treatment. The analysis for identifying treatment areas was based on the following factors:

- canopy density;
- current and predicted insect and disease occurrence;
- current and predicted fire risk;
- access, adjacency and topographic continuity.

The designated treatment areas are listed in Table 2.1 with acreage given by treatment area and habitat type, along with the priority for treatment. See Figure 2.1 for locations of treatment areas.

Harvesting will occur in the designated forest health treatment areas over approximately 10 years to reduce tree density and remove diseased or insect-infested trees, followed later by underburning. Harvesting operations will include both overstory and understory material to achieve the desired stand structure, target species mix, stocking level, canopy density and fuel profile. The actual schedule for implementing treatments will depend on available budget, access, and market conditions. In some cases treatment

Table 2.1 Forest health and thinning treatment areas: acres by habitat type.

Agency/ Priority	Treatment Area	Douglas-fir Habitat			Lodgepole Habitat	Total Acres
		Warm-Dry	Moderate	Cool-Moist		
BLM - 1	Camp Maiden	198	512	46		756
BLM - 2	Limekiln	228	1134			1362
BLM - 3	Chicago Gulch	293	472		100	865
BLM - 4	Collar Gulch	102	322		56	480
BLM - 5	North End	257	828	180	88	1354
BLM - 6	Pyramid Peak	791	1187		24	2003
BLM - 7	Southeast	69	766	83		918
BLM - 8	North Moccasin	269	165			434
DNRC - 1	Maiden Peak	89	96	80		266
DNRC - 2	Iron Gulch		260			260
DNRC - 3	Burnett Peak		255			255
DNRC - 4	East Armells	34	82			116
DNRC - 5	Log Tree Gulch		153			153
	Grand Total	2331	6200	389	268	9221

will depend on negotiating access through private land. Insofar as possible, the cost of forest health and fuel reduction treatments will be offset by the commercial sale of wood products, including saw logs, posts and poles, firewood, pulp, biomass, and any other product which may be economically viable at the time of treatment. Treatments on BLM lands may be accomplished under Stewardship Contracting authorities, which allow the value of material removed to be used to offset the cost of non-income generating treatments, such as construction of recreational trails, wildlife habitat improvement projects, and removal of non-merchantable or net cost woody material.

DNRC has no authorization for Stewardship Contracting and is tasked with providing revenue for schools. Therefore, DNRC would maximize long-term revenue through treatments that consider the forest health issues described above and are consistent with the State Forest Land Management Plan and administrative rules.

Prescriptions were designed for each forest habitat type (Pfister et al 1977) encountered, and are generally based on desired stand structure, species composition and stocking level as measured by basal area. Basal area is the sum of the area of individual tree boles measured at breast height (4.5 feet). Specific descriptions are given below.

Douglas-fir represents the broadest forest type within the analysis area. These forests occupy a range of sites from warm-dry to cool-moist. A wide range of silvicultural prescriptions is thus necessary to fit the variable environment. Target conditions for this forest type are a canopy cover of 40-60% with a basal area of 40-140 square feet per acre, depending on site productivity. Stand structure will ideally be multi-storied with Douglas-fir composition ranging from 25 to 75 percent. Treatment methods include a combination of overstory density management and thinning from below. Small patch

cuts (up to several acres) within stands will occur, and small uncut patches of dense trees will be interspersed within stands. Recruitment of future upper canopy layer trees will come from mid-sized and small trees retained during thinning. Establishment of new trees will come from natural seeding, and, insofar as possible, excess density of regeneration will be controlled with prescribed fire.

Where stands are currently a dense single layer of mature trees, heavier cuts will be employed to move towards an open multi-layered stand. In such cases stocking may need to be reduced below the target basal area during the initial treatment entry in order to achieve the desired diverse, multi-layer stand in the future. Recently disturbed areas, such as bark beetle infestation or heavy wind damage will be salvaged to limit infestation mortality and to reduce fire danger.

Prescriptions applied will vary by the environment on each site according to the following:

Warm-Dry Douglas-fir Habitat Types:

- Thin to 40-100 square feet of basal area per acre;
- Leave the largest, healthy, fire resistant trees;
- Insofar as possible, the residual stand will have a mix of size and age classes to achieve a multi-layered, multi-aged stand with high structural diversity;
- Spacing between trees will be clumped and uneven, leaving small forest openings, as well as groups of more tightly spaced trees for wildlife hiding and thermal cover;
- Target species mix is 65-75% ponderosa pine, 25-35% Douglas-fir;
- Depending on slash tonnage resulting from thinning operations, slash may be piled and burned or may be utilized for biomass products;
- Underburn roughly two seasons after initial thinning to stimulate understory shrubs and herbaceous vegetation;
- Maintain with prescribed fire every 10-20 years after the initial underburn.

Moderate Douglas-fir Habitat Types:

- Thin to 60-120 square feet of basal area per acre;
- Leave the largest, healthy, fire resistant trees;
- Insofar as possible, the residual stand will have a mix of size and age classes to achieve an open multi-layered, multi-aged stand with high structural diversity;
- Spacing between trees will be clumped and uneven, leaving small forest openings, as well as groups of more tightly spaced trees for wildlife hiding and thermal cover;
- Target species mix is 50-70% ponderosa pine, 30-40% Douglas-fir, 5-10% lodgepole pine;
- Depending on slash tonnage resulting from thinning operations, slash may be piled and burned or may be utilized for biomass products;

- Underburn roughly two seasons after initial thinning to stimulate understory shrubs and herbaceous vegetation;
- Maintain with prescribed fire every 15-25 years after the initial underburn.

Cool-Moist Douglas-fir Habitat types:

- Thin to 80-140 square feet of basal area per acre;
- Leave the largest, healthy, fire resistant trees;
- Insofar as possible, the residual stand will have a mix of size and age classes to achieve a multi-layered, multi-aged stand with high structural diversity;
- Spacing between trees will be clumped and uneven, leaving small forest openings, as well as groups of more tightly spaced trees for wildlife hiding and thermal cover;
- Target species mix is 50-70% Douglas-fir, 25-35% ponderosa pine, 10-15% lodgepole pine;
- Depending on slash tonnage resulting from thinning operations, slash may be piled and burned or may be utilized for biomass products;
- Underburn roughly two seasons after initial thinning to stimulate understory shrubs and herbaceous vegetation;
- Maintain with prescribed fire every 20-30 years after the initial underburn.

Douglas-fir Habitat Currently Dominated by Lodgepole Pine:

- Target basal areas and species mix follow the same prescriptions as above, according to habitat type of the site;
- Remove overstory lodgepole to open the stand for Douglas-fir and ponderosa pine and to approach the target species mix. Retain only lodgepole that are healthy and robust, or that may serve as future snags for wildlife;
- Retain all mature Douglas-fir and ponderosa pines that are healthy or that may serve as future snags for wildlife;
- Retain immature and understory Douglas-fir and ponderosa pines that have the potential for robust growth resulting from the thinning, up to the limits of the desired understory density;
- Depending on slash tonnage resulting from thinning operations, slash may be piled and burned or may be utilized for biomass products if market conditions are favorable;
- Underburn roughly two seasons after initial thinning to stimulate understory shrubs and herbaceous vegetation;
- Maintain with prescribed fire according to the specifications for the habitat type of the site;
- Replant harvested areas with the desired mix of Douglas-fir and ponderosa pine if an insufficient number of Douglas-fir and ponderosa pine are present on the site to achieve the desired stand regeneration.

Lodgepole Pine will be managed as a patchwork of even-aged groups within the overall stand. The resulting landscape will be a mosaic of even-aged stands of different

age classes. The most common silvicultural prescription to meet the stand target will be small, scattered, patch clearcuts that vary in size and shape to mimic natural openings. The size of individual clearcuts will not exceed the limitations specified below.

Productive Lodgepole Pine Habitat Type:

- Clearcut in irregular shapes that follow natural topography;
- Cut no more than 50 percent of the lodgepole habitat in designated treatment areas over a ten-year period;
- Limit the size of clearcuts according to the Judith-Valley-Phillips RMP (currently 10 acres) for BLM land and to 15 acres for DNRC land;
- Arrange clearcuts to increase patchiness and diversity in age between adjacent stands on the landscape;
- Depending on slash tonnage resulting from harvesting operations, slash may be piled and burned or may be utilized for biomass products;
- Broadcast burn roughly two seasons after initial harvest to stimulate lodgepole regeneration, understory shrubs and herbaceous vegetation;;
- Allow harvested areas to be restocked through natural regeneration from residual seed.
- Use prescribed fire as needed after stand reestablishment to control tree density.

Marginal Lodgepole Pine Habitat Type:

- No harvesting will occur, with the exception of the defined wildland-rural interface area (see below);
- Use prescribed fire to break up extensive stands and increase patchiness on the landscape where it can be accomplished within prescription as part of larger planned burns.

Road Construction will occur in several of the forest health treatment areas to provide access for harvest and treatment activities. Miles of road permanent planned in each treatment area are given in Table 2.2. In addition to the road segments listed, temporary spurs will be created to access areas for harvest and treatment. All temporary spurs will be reclaimed by reshaping (breaking down the cutwall and pulling in the outside berm), ripping and seeding after treatment activities are completed. For locations of the proposed roads see Figure 2.1 directly following the appendices at the back of the document.

New roads on BLM may be closed to motorized access, pending results from the Judith-Moccasin Travel Plan, currently in progress. All new roads on DNRC treatment areas will be closed to motorized access. To prevent unauthorized access, DNRC will obliterate the first 500 to 1000 feet of treatment roads adjacent to other public access roads and place slash or other debris to act as a barrier and reduce road visibility after harvest activities are completed.

Table 2.2 Miles of proposed new road construction by treatment area.

BLM	North Moccasin	2.4
	Pyramid Pk - Lower	1.3
	Pyramid Pk - Upper	1.9
DNRC	Burnett Peak	1.7
	East Armells	0.7
	Iron Gulch	1.5
	Log Tree Gulch	0.9
	Maiden Peak	2.8
	Total	13.2

Mitigations Applied to All Harvest Areas:

- Implement applicable Best Management Practices, as recommended by Montana Department of Natural Resources and Conservation (MSU Extension Service 2001).
- Establish Streamside Management Zones according to Montana state law (Montana Department of Natural Resources 2002). Maintain enough forest cover to provide hiding and thermal cover for wildlife around drainages, wetlands and riparian areas.
- Tractor logging will not occur where the average slope is greater than 40 percent. In such areas limit operations to helicopter, cable logging, other systems that minimize ground disturbance, or use manual thinning to prevent erosion on steep slopes.
- No machine operations will occur during wet periods when excessive soil compaction is likely to occur. Machine operations will only occur when soils are dry, frozen, or snow-covered so that rutting is generally limited to less than 4 inches in depth.
- As a preventative weed control measure, require harvesting contractors to pressure wash or otherwise thoroughly clean all equipment and vehicles at an approved wash station prior to entering public land.
- To limit weed infestations seed all log landings, skid roads and temporary spurs with a mixture of native grasses and forbs upon the completion of harvest activities. Seed all burn pile areas upon completion of burning.
- Retain a minimum average of one large snag (> 10 inches DBH) per acre; if an adequate number of snags do not currently exist then retain the best snag "recruits" (i.e., nearly dead trees). Recently killed snags which still actively harbor mountain pine beetles or other insects that pose a risk of infection to healthy trees will be removed.
- To encourage the regeneration and expansion of aspen, remove all conifers from within aspen stands and from a 50-foot buffer around the stands. An exception will be any "old growth" Douglas-fir and ponderosa pine and any large conifer snags that occur within aspen stands. For the purpose of this assessment "old growth" trees are considered to be those trees that are at

least 15" in diameter with thick bark and crowns that are generally flat (when not broken). Mature aspen trees will be cut only when the clone appears decadent, and cutting large trees is needed to induce sprouting.

- Survey for northern goshawk nest sites before harvest begins in any stand. Nest trees will be left undisturbed. During brooding and fledgling use (roughly April 15th to August 15th) maintain a buffer of ½ mile radius around active nest sites (less if topographic breaks are present). Seasonal buffers will also apply to prescribed fire activities.
- On the ground cultural surveys will be completed prior to the layout of harvest units. Layouts will be designed and modified, based on consultation with an archeologist. Impacts to all cultural sites with potential for listing on the National Register of Historic Places will be avoided.
- A VRM contrast rating (BLM Form 8431-1) analysis will be conducted for each area to be thinned, and visual contrasts will be minimized, consistent with achievement of the forest health and wildfire objectives.

2.1.2 Fire Management

General Fire Management The objectives of fire management in the Judith and Moccasin Mountains are:

1) reducing the fire risk posed by the excessive buildup of hazardous fuels;
2) improving the ecological health of forests and meadows by restoring a more natural fire function.

Historically, wildfires in the analysis area burned primarily with low or mixed severity (North Wind Environmental 2003, Fire History Report), and acted to mitigate the effects of insect and disease infestations, maintain soil productivity, improve watershed integrity, and create a mosaic of wildlife habitats.

These objectives for general fire management have been incorporated into the prescriptions for the forest health treatment areas and the vegetative diversity treatment areas. Thinning of the understory trees will occur in the forest health areas to reduce ladder fuels and the probability that crown fires will develop under extreme weather conditions. Forest health areas also emphasize density management of the overstory to reduce the potential to support a crown fire and to allow the safe and effective use of prescribed fire for ecological function and hazardous fuel reduction. Vegetative diversity areas have more emphasis on restoring meadows, forest openings, aspen stands and deciduous shrubs (see below under Wildlife). Prescribed fire will be used as a first entry in vegetative diversity areas where it can be carried out safely and effectively. Where this is not possible, thick stands of small conifers will be manually removed, followed by broadcast burning.

Wildland-Rural Interface Fire Management The wildland-rural interface definition was based on GIS analysis to include defined units around residences or other structures and the roads that provide ingress and egress for those structures (See Figure 1.1). In general, these areas are delimited by topographic barriers, such as a ridgeline or rock

face that may function as a natural fire break or control line. Thus the lines are irregular and the width around developed areas varies with topography. The wildland-rural interface along the major access roads was defined as a buffer occupying 100 feet on each side of the road. Much of the area thus defined as wildland-rural interface on federal land is already covered in the forest health treatment areas. Net additional interface treatment area totals 1,165 acres on federal land. See Figure 2.1 for federal interface treatments.

The objective of treatments in this zone is to create and maintain fuel conditions that will result in predicted flame lengths of no more than four feet under extreme fire weather (95th percentile Burning Index). Burning Index (BI) is a measure of the difficulty of controlling a fire, and is a combination of how fast the fire will spread and how much heat is being produced. When flame lengths are no greater than four feet, such conditions allow direct attack on the flaming front during wildfire suppression and greater probability of control at initial attack.

Overstory thinning, understory thinning, and pruning using manual and mechanical methods will reduce surface and ladder fuels and will increase tree crown spacing. Fuel loads will be reduced to less than 10 tons per acre.

Slash disposal at a first entry in the wildland-rural interface will be accomplished as pile or underburning. Where pile or underburning cannot be safely implemented, slash may be disposed of by grinding or chipping. Chips may be sold or given away, depending on markets, for use as biomass fuels. Insofar as market conditions are such that disposal as biomass fuels is no more expensive than pile or underburning, the preference will be to dispose of slash as biomass material.

Underburning without thinning will be employed as a first entry in those areas where surface and ladder fuel loads are currently low enough to insure a scorch height of not more than 10 feet. Underburning will be used as a second or third entry after mechanical thinning to achieve final objectives or to maintain the desired fuel conditions.

In general, interface treatments will fit within the lower end of the basal area specifications given for Douglas-fir in the forest health treatments. Where marginal site lodgepole pine occupies the wildland-rural interface, patch clearcutting will be used, followed by slash disposal and fuels treatments as specified for the productive lodgepole pine habitat, to create a discontinuous fuel bed.

2.1.3 Wildlife Species and Habitat

Vegetative diversity treatments will be implemented outside forest health compartments to increase and maintain meadows and forest openings, and to increase deciduous trees and shrubs across the landscape for the purpose of improving wildlife habitat and distribution on the public lands. This treatment category includes areas with key deciduous or herbaceous species with the potential for increasing after prescribed fire

and for improving wildlife habitat and overall vegetative diversity throughout the mountain ranges.

All vegetative diversity treatment areas fall outside forest health treatment areas (see Figure 2.1). Total acreage to be treated for vegetative diversity is 4,943.

Objectives include:
1) restoring aspen stands and increasing their extent;
2) restoring meadows by removing conifer encroachment;
3) rejuvenating and expanding decadent stands of deciduous shrubs;
4) encouraging growth of herbaceous species.

Prescribed fire will be the primary treatment method. Manual thinning, followed by prescribed fire, will be employed where conifer density is so great as to make an initial entry with prescribed fire either unsafe or ineffective, and within aspen stands where the conifers cannot be adequately controlled by prescribed fire alone.

Vegetative diversity and forest health treatments are likely to open up new areas to livestock grazing and provide more and improved herbaceous forage. Alteration of current grazing management may be necessary in order to meet the vegetative and wildlife objectives on the treatment areas. Vegetative response to mechanical and prescribed fire treatments is best when the area is rested from livestock grazing for up to two growing seasons. Rest will be accomplished through installation of temporary or permanent fencing, alteration of the grazing rotation, or voluntary non use on the treatment area.

DNRC is proposing no specific wildlife treatments.

2.1.4 Riparian and Aquatic Habitat/Collar Gulch ACEC

General Riparian and Aquatic Habitat Major streams and draws in the analysis area were surveyed for riparian health assessments (North Wind Environmental 2002, Riparian Health Assessment Report). Results of the surveys are summarized in Appendix F. Deficiencies in riparian health and opportunities for improvement are specified by stream reach in the report.

The objectives for restoration are to:
1) protect the area's fish and other aquatic species habitat by minimizing the risk of catastrophic fire in the watersheds;
2) improve available aquatic species habitat;
3) improve existing conditions for headwater streams and downstream fisheries.

Habitat restoration projects and associated priorities are proposed for specific reaches based on these objectives, existing conditions documented in the above surveys, and proximity to fish habitat (see Table 2.3 and Figure 2.2). These projects involve various combinations of riparian planting, placement of large woody material (LWM), riparian

Table 2.3 Proposed riparian and aquatic habitat restoration projects.

Stream Name	Polygon Number	Miles of Stream	Prescription	Priority
Alpine Gulch	8-1	.63	LWM placement; riparian planting	High
	8-2	.68	LWM placement	High
Armells Creek	15-1, 15-2, 15-3	.17, .13, .18	Riparian thinning; LWM placement	Low
	15-4	.70	LWM placement to reduce livestock pressure	High
	15-5	.20	LWM placement	High
Plum Creek	1-1	.10	Riparian thinning; LWM placement	Low
	1-2	.55	Remove old dam; LWM placement	High
Black Butte	33-1	.30	Construct exclosure on spring	Moderate
Box Elder Trib	28-1	.28	Riparian thinning; LWM placement	Low
Brickyard Creek	29-1	.33	Riparian thinning; LWM placement	Moderate
Chicago Gulch	17-1, 17-2, 17-3, 18-1, 18-2, 20-1	2.63	Riparian thinning; LWM placement	High
Collar Gulch	16-1, 16-2, 16-3, 16-4, 24-1, 24-2	2.30	Riparian thinning; LWM placement; fish passage	High
East Fork (Chicago Gulch – Fords Creek)	19-1	.31	Riparian planting; LWM placement	High
Dexter Gulch	9-1	.10	Riparian thinning; LWM placement	Low
Lincoln Gulch	7-1, 21-1, 22-1, 22-2, 22-3, 23-1, 23-2, 23-3	.42, .23, .09, .09 .20, .11, .12, .10	Riparian thinning; LWM placement	Moderate
	7-2, 21-2	.10, .28	Riparian thinning; LWM placement	High
Limekiln Canyon	13-1, 14-1	.35, .25	Riparian thinning; LWM placement	High
Maiden Canyon	26-1, 26-2	.48, .77	Machine placement of LWM	High
	2a-1, 2b-1	.62, .52	Riparian thinning; LWM placement	Low
	3-1	.12	Riparian thinning; LWM placement	High
North Moccasin	3-2	.30	Riparian thinning; LWM placement	Moderate
	2a-2	.25	Remove old dam and culvert; Riparian thinning; LWM placement	High
Pyramid Gulch	10-1, 11-1	.42, .16	Riparian thinning; LWM placement	Low
	10-2, 11-2	.29, .16	Riparian thinning; LWM placement	Moderate
Ruby Gulch	12-1	.28	Riparian thinning; LWM placement	Low
	12-2	.12	Riparian thinning; LWM placement	High
South Moccasin	4-1, 4-2	.38, .25	Riparian thinning only	Low
	5-1	.20	Riparian thinning; LWM placement	Low
	6-1, 6-2	.30, .28	Riparian thinning; LWM placement	Moderate
Whiskey Gulch	7-1	.25	Riparian thinning; LWM placement	Moderate

thinning, dam removal and livestock exclosure construction. Projects may be completed by Stewardship Contracts, or as appropriated funds become available. Implementation will be based on priority, combined with logistical efficiencies that may result from other projects being scheduled in an area. Thus, some lower priority projects may be completed before all high priority projects. All stream and riparian work will be conducted under the supervision of a fisheries biologist or hydrologist.

For riparian thinning projects, conifers of varying size will be thinned within 100 to 150 feet of the high water mark (slope distance) on both sides of the stream segments listed in Table 2.3. All activities will be in accordance with the Streamside Management Zone, (SMZ) law and the "Water Quality BMP's (Best Management Practices) for Montana Forests." Specific treatment areas will be broken up by non-treatment areas within the reach. If suitable markets exist cut material may be hauled off-site for utilization. Deciduous trees and shrubs may be removed only where individuals are extremely decadent and cutting is expected to stimulate resprouting. Some of the largest, fire-resistant conifers may be retained in the riparian treatment areas, as long as they do not pose an intense fire threat. Prescribed burning within these areas will be limited to pile burning or a cool backing fire.

A summary of the cumulative stream miles of each type of habitat restoration by priority level is given in Table 2.4. The table displays all proposed riparian and stream restoration activities, including those on Collar and Chicago Gulch (see below).

Table 2.4 Cumulative stream miles of proposed stream restoration.

Restoration Activity	Priority	Cumulative Stream Miles
Riparian planting	High	0.94
LWM – manual placement	High Moderate Low	9.47 3.27 3.16
LWM – machine placement	High	1.25
Riparian thinning	High Moderate Low	6.40 3.27 3.79
Dam removal or fish passage	High	3 sites
Exclosure construction	Moderate	0.30

DNRC is proposing no specific stream restoration activities.

Collar Gulch ACEC The primary management objective is to protect the area's westslope cutthroat trout habitat by minimizing the risk of high intensity, stand-replacing

fire, to improve available habitat, and to expand the range of westslope cutthroat habitat. This objective will be met by the following:

Conifers of varying size will be thinned within 100 to 150 feet of the high water mark (slope distance) on both sides of Collar Gulch for 2.3 miles of stream and Chicago Gulch plus associated tributaries for 2.63 miles. All activities will be in accordance with the Streamside Management Zone, (SMZ) law and the "Water Quality BMP's (Best Management Practices) for Montana Forests." Specific treatment areas will be broken up by non-treatment areas within each reach. If suitable markets exist cut material may be hauled off-site for utilization. Deciduous trees and shrubs may be removed only where individuals are extremely decadent and cutting is expected to stimulate resprouting. Some of the largest, fire-resistant conifers may be retained in the riparian treatment areas, as long as they do not pose an intense fire threat. Prescribed burning within these areas will be limited to pile burning or a cool backing fire.

The historic mining dam in Collar Gulch serves as a partial fish barrier, even though the stream has cut around the side of the dam. Because of the barrier, the lower westslope cutthroat trout population cannot interbreed with the upper population in most years. This is a problem, given the small amount of habitat available for westslope cutthroat in Collar Gulch (1.5 to 2 miles). In addition, there are erosion concerns with the dam. To provide passage and reduce potential erosion concerns, the BLM proposes either to:

1) Remove the dam and construct log or boulder low-stage check dams within the channel, or
2) Leave the dam in place and construct log/boulder, low-stage check dams around the historic dam.

The low-stage check dams are rated as excellent structures for B4 Rosgen channel types (Rosgen 1996). Collar Gulch is most likely a B4a Rosgen channel type (BLM preliminary survey data 2005).

The low stage check dams will require the use of a small tracked excavator with a thumb. Some excavation in the stream channel and bank will occur to secure the structures and create passable structures. It is estimated that little riparian vegetation will be removed, due to the presence of an old trail adjacent to the stream. The project will take proper precautions to avoid riparian damage. Three series of certified weed-free straw bales will be placed with rebar directly downstream of the site to catch sediment produced from construction. Prior to straw bale removal, the fine sediment caught behind the structures will be removed and placed out of the flood plain.

Cultural resource clearance of the dam and the nearby mill foundation will be completed, and the site recorded before any ground-disturbing activity takes place in Collar Gulch. If cultural investigations indicate a need, the design for the fish passage will be modified to insure that the integrity of the historic structures is maintained or enhanced.

Large woody material will be placed in Collar Gulch (2.3 miles) and Chicago Gulch (2.63 miles) to create deep pools and increase invertebrate populations that provide forage

for fish. This work will be accomplished in accordance with the SMZ law and under the supervision of a fisheries biologist or hydrologist. Treatment areas within each reach will be interspersed by non-treatment areas in a mosaic pattern.

Hazardous fuels in the upper slopes of Collar Gulch will be reduced through vegetative diversity and forest health treatments (see Figure 2.1). Crown spacing in Douglas-fir forests will be increased and breaks in continuous stands of lodgepole will be created in the upper reaches of Collar Gulch. Prescribed fire will be used to stimulate growth of birch and aspen, other deciduous trees and shrubs, and herbaceous understory plants. The objective will be to obtain a mosaic of burned and unburned areas in the overall treatment area.

Montana Fish Wildlife and Parks (FWP) has proposed expanding the current westslope cutthroat population into Chicago Gulch to reduce the likelihood of extirpation. In order to accomplish this objective, all of the brook trout that currently inhabit Chicago Gulch would first need to be removed. The stream would then be restocked with native westslope cutthroat trout. FWP will conduct the environmental analysis and complete the documentation. If their decision is to proceed with the project, BLM will cooperate and is committed to maintaining high quality westslope cutthroat habitat in Chicago Gulch. The owner of the private land in Chicago Gulch has already expressed support for the project and a willingness to cooperate with FWP.

2.1.5 Range

Ongoing Grazing Management Maintain or make significant progress towards meeting Standards for Rangeland Health (Appendix C) by implementing Guidelines for Livestock Grazing (Appendix D) or other allotment specific terms and conditions. A variety of management techniques will be used, including water developments, prescribed fire, riding, salt and mineral placement, implementation of a rotational grazing system and/or adjusting season of use. Issue grazing permits for all allotments with terms matching the status of base property control (i.e., deeded lands will be issued ten year permits, and leased lands will be issued permits with terms coinciding with the expiration of the lease). Permittees will be responsible for ensuring that livestock are managed according to the guidelines beginning with the 2007 grazing season.

Monitor for increased livestock impacts following vegetation treatments of thinning and/or prescribed burning. Implement adaptive management if monitoring indicates gains in forage and wildlife habitat are being negatively affected by livestock. Management methods that may be implemented to mitigate potential livestock impacts may include up to two growing seasons of rest following prescribed burning, deferral of grazing, implementation of a rotational grazing system, installation of temporary or permanent fences, changes in season of use, and/or other methods designed to limit the impact of livestock on wildlife habitat and distribution.

No changes in grazing management on DNRC lands are proposed.

Unallocated Allotments The allotments listed in Table 2.5 are not currently allotted due to changes in ownership of base property and the lack of a qualifying grazing application, as required by 43 CFR 4130.1. These allotments will remain unallotted unless a qualifying grazing application and proof of control of base property is received by the BLM.

Table 2.5 Allotments not currently allotted.

Allotment Name	Allotment Number	Acres
Limekiln	20076	600
Pekay Peak	02600	635
Sheep Mountain	02617	1729

Any land acquired in the area by the BLM in the future will initially be unallocated for grazing. An environmental assessment will be completed before grazing is authorized on any newly acquired land.

Qualified applicants could apply for permits to graze these allotments. In addition, unallocated or non-use allotments could be grazed by livestock through a temporary, non-renewable permit if grazing would improve resource conditions, or they could serve as grass banks when temporary livestock displacement occurs on other allotments within the analysis area due to the implementation of proposed vegetation management actions. Permittees would be required to apply for this use in accordance with 43 CFR 4130.2(g) and 4130.2(h).

Allotments Not Meeting Rangeland Health Standards Grazing allotments that are not meeting the standards for rangeland health due to livestock grazing are listed in Table 2.6. Alpine Gulch JR and Judith Peak allotments are not meeting the riparian health standard in part due to utilization and damage (trampling, mechanical breakage) of desired woody vegetation and stream bank damage (hummocking and plugging).

Shelternook allotment has changed ownership since the inventory in 2002 due to the sale of the base property. The current permittee has made several management changes that will be incorporated into the permit that will be offered upon approval of this document.

Table 2.6 Allotments not meeting Rangeland Health Standards due to livestock.

Allotment Number	Allotment Name	Grazing Authorization	Type Use	BLM Acres	BLM AUMs	Standard Not Met
02525	Alpine Gulch JR	5C 5/1 – 9/1	Custodial	440	28	Riparian
02627	Judith Peak	4C 3/1 – 2/28	Custodial	1016	49	Riparian
02667	Shelternook	2C 3/1 – 2/28	Custodial	180	16	Upland
		4C 3/1 – 2/28	Custodial	1020	51	

The grazing permits for the above allotments will be offered incorporating the following management changes:

Alpine Gulch:

- Large woody material (LWM) will be placed along 1.31 miles of the Alpine Gulch stream channel to reduce impacts of livestock trailing and allow these areas to become revegetated;
- One or more photo points will be established and read every three years;
- The Proper Functioning Condition checklist will be completed every three years to determine if the allotment is moving towards meeting the riparian standard;
- Adaptive management will be implemented if monitoring indicates that the allotment is not progressing towards meeting the riparian health standard.

Judith Peak:

- Large woody material (LWM) will be placed along 0.7 miles of the Armells Creek stream channel to reduce impacts of livestock trailing and allow these areas to become revegetated;
- One or more photo points will be established and read every three years;
- The Proper Functioning Condition checklist will be completed every three years to determine if the allotment is moving towards meeting the riparian standard;
- Adaptive management will be implemented if monitoring indicates that the allotment is not progressing towards meeting the riparian health standard.

Shelternook:

- Salt, mineral and protein supplements must be placed at higher elevations to improve livestock distribution and reduce utilization levels at lower elevations of the allotment;
- Herding will be used to improve livestock distribution;
- Seasons of use will vary to minimize repeated impacts to plants;
- Compliance checks and/or utilization mapping will be conducted to monitor impacts on the lower portion of the allotment;
- Adaptive management will be implemented if monitoring indicates that the allotment is not progressing towards meeting the upland health standard.

2.1.6 Noxious Weeds

Noxious weeds were identified in numerous grazing allotments and in areas of unallocated public land. Guideline #11 (see Appendix D) makes weed control a condition of the grazing permit through a signed cooperative weed control agreement. Houndstongue, Canada thistle, spotted knapweed, and Dalmatian toadflax are weeds that should be controlled on a site-by-site basis. BLM will provide guidance and control agents (chemical or biological), and the permittee will provide labor and application equipment.

Noxious weeds on all unallocated areas of federal and state land will continue to be treated by the BLM and DNRC, respectively, using various methods included in an Integrated Weed Management approach.

2.1.7 Visual Resources

Vegetative thinning creates the potential for altering the viewshed. Visual Resource Management (VRM) provides a process to mitigate the impacts of thinning on the viewshed. The degree to which a management activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape.

A VRM contrast rating (BLM Form 8431-1) analysis will be conducted for each thinning project identified under the proposed action, and visual contrasts minimized, consistent with achievement of the forest health objectives.

2.1.8 Management of School Trust Lands

On School Trust Lands within the project area, the proposed action includes timber harvest on approximately 1050 acres and 7.5 miles of road construction. Specific prescriptions and mitigation measures fall within those described under 2.2.1, Forest Health. Table 2.1, Forest Health Treatment Areas, includes acreage treated on school trust lands. All activities proposed by the DNRC will be planned and completed in accordance with the Administrative Rules (DNRC 2003).

2.2 Continuation of Current Management

Continuation of current management represents the “no action” alternative for both BLM and DNRC.

2.2.1 Forest Health

Current management of forest resources will continue as specified by the 1992 JVP RMP and amended by the 2003 Montana/Dakotas Fire and Fuels Management Plan.

The BLM will continue to allow the harvest of forest products to meet the demand for minor forest products as feasible. No coordinated effort to address forest health on a landscape basis will occur. No density management or removal of ladder fuels to reduce the risk of catastrophic wildfire will occur.

Forest products will be sold at fair market value, and harvesting operations will be coordinated with adjacent landowners when possible. Timber sales will generally be opportunistic and designed with wildlife habitat objectives in mind.

No harvest activity will occur on DNRC land.

2.2.2 Fire Management

The BLM will continue to use fire suppression tactics as specified in the 1992 JVP RMP and amended by the 2003 Montana/Dakotas Fire and Fuels Management Plan.

Prescribed fire will be used on a site-by-site basis in grassland, sagebrush, and/or conifer types only to improve wildlife habitat and vegetation production. No mechanical thinning or fuels treatments will be applied in the wildland-rural interface areas.

2.2.3 Wildlife Species and Habitat

No specific actions to improve wildlife habitat, such as manual thinning or prescribed burning, will be implemented. Natural succession in wildlife habitat will be allowed to continue.

2.2.4 Riparian and Aquatic Habitat/Collar Gulch ACEC

Management in Collar and Chicago Gulches and other streams and draws in the project area will continue unchanged. No specific actions to improve fish and aquatic species habitat and populations will occur.

Vegetation diversity within the riparian area will continue to undergo changes due to ecological succession. No hazardous fuel reduction will occur in the upper slopes of Collar Gulch.

2.2.5 Range

The management of rangeland resources and its associated impacts will proceed as specified by the 1992 JVP RMP. All grazing will remain consistent with existing permits.

Guidelines for Grazing Management will not be incorporated into the grazing permits.

2.2.6 Noxious Weeds

The BLM will continue to contain or reduce the populations of noxious weeds on BLM land in the Judith-Moccasin analysis area; however cooperative weed control agreements will not be incorporated into grazing permits.

2.2.7 Visual Resources

Visual resource management objectives will continue as specified in the JVP RMP.

2.2.8 Management of School Trust Lands

The continuation of current management on DNRC lands will defer treatment on these sections within the Judith-Moccasin Landscape. No timber harvest or roadwork will occur on these parcels at this time.

2.3 Alternatives Considered But Not Analyzed in Detail

A “No Grazing” alternative was considered and found not to be a viable option. Precluding grazing is logistically and economically unfeasible. Most of the allotments occur in a patchwork with private rangeland, small private holdings, and old mining claims. In most cases public land is not fenced off from private land. To eliminate grazing, public lands would need to be fenced off from any private lands grazed by livestock. The rugged terrain and extensive boundary perimeters associated with patchwork ownership make such a prospect logistically unfeasible, economically unviable, and ecologically and aesthetically undesirable.

Currently, many grazing allotments are not utilized to their full permitted capacity. Nonetheless, the existence of the grazing permits authorizes the occasional livestock use which occurs on public land. A continual problem of livestock trespass would result if grazing was precluded and fences were not built.

The “No Grazing” alternative was analyzed in detail in the national Rangeland Reform Environmental Impact Statement (BLM 1994). Implementation of a no grazing alternative is considered unfeasible or unnecessary except in specific, localized situations where livestock use may be incompatible with attainment of proposed standards, or with other management objectives. The conditions within the Judith-Moccasin analysis area do not meet these criteria.

3.0 Affected Environment and Environmental Consequences

General information about the planning area can be found within the JVP RMP which is available for review at the Lewistown Field Office.

The following critical elements of the human environment were considered and found not to be affected by any of the alternatives. These elements will not be discussed further:

Farmlands (Prime/Unique)
Floodplains
Native American Religious Concerns
Wastes (Hazardous/Solid)
Wild and Scenic Rivers
Wilderness

No environmental justice issues were identified.

This chapter describes the environmental consequences of implementing each of the alternatives. For each resource, the affected environment is described, followed by the consequences for each alternative. Aspects of the environment with little to no affect are not covered, so as to focus the discussion on the most pertinent information.

3.1 Forest Health

3.1.1 Affected Environment

In 2002, the BLM Lewistown Field Office conducted an extensive forest inventory in the Judith and Moccasin Mountains. The purpose of this assessment was to collect data on forest stand composition and structure, fuel loadings, and insect and disease infestation (North Wind Environmental 2002, Forestry Report). The complete report and data sheets are on file at the Lewistown Field Office. DNRC forest inventories are on file at DNRC Forest Management Bureau in Missoula.

Douglas-fir is the dominant tree species on BLM and State land in the Judith and Moccasin Mountains, with lesser amounts of ponderosa pine, lodgepole pine, and engelmann spruce. Ponderosa pine is dominant on private land at lower elevations. Lodgepole pine is found at mid to high elevations, and small amounts of limber pine are found on shallow soils of high, exposed ridge tops. Engelmann spruce is confined to drainages and a few moist areas at mid and upper elevations in both mountain ranges. Aspen and birch trees can be found where soils retain surface moisture in meadows, seeps, and in the drainages. Horizontal juniper is common in the understory; common deciduous shrubs are chokecherry, snowberry, rose, oregon grape, hawthorn and buffaloberry. Forest structure data for BLM land is presented in table 3.1 below.

Table 3.1 Forest structure attributes on BLM land.*

Age Structure	Acres	Percent	Canopy Cover	Acres	Percent
Grass/shrub	765	3.1	0-39%	3369	14.3
Seedling/sapling	648	2.7	40-59%	13089	55.6
Young forest	2239	9.2	60% +	7068	30.0
Mid-aged forest	14783	60.9			
Mature forest	5810	23.9	Single Layer	6886	30.1
Old growth forest	46	0.2	Multi Layer	15992	69.9

* Specific inventory data of this nature is not available for DNRC lands in the study area; however professional opinion indicates these data reflect conditions on DNRC land, as well (Buck 2005).

Many areas show signs of decadence and mortality due to overstocking, the absence of fire and/or forest management, and insects and disease. New stands of ponderosa pine, Douglas-fir, and juniper are encroaching into areas which historically were natural openings and meadows. Resulting fuel loads far exceed the normal range of variability (Keane et al. 2002).

Table 3.2 Total insect and disease infestation levels on forested BLM land.*

Infestation Level	Score	Acres	Percent
None		20319	74.3
Light	<2	0	0.0
Moderate	2-5	4696	17.2
High	6+	2349	8.6

* Specific inventory data of this nature is not available for DNRC lands in the study area; however professional opinion indicates these data reflect conditions on DNRC land, as well (Buck 2005).

The results of this inventory suggest that insect and disease agents are widespread throughout the Judith and Moccasin Mountains. The analysis area contains a variety of insects which can be classified under the following categories: bark beetles, defoliators, chewing insects, sucking insects, mining insects, boring insects, and seed and cone insects. Common disease pathogens include root diseases, dwarf mistletoe, decays, stem diseases, and foliage diseases. Bark beetles, comandra blister rust, dwarf mistletoe, needle miners, pine engraver beetles, various root diseases, stalactiform blister rust, stem cankers, stem rusts, and western gall rust have the highest level of occurrence (North Wind Environmental 2002, Forestry Report). Common physiological effects caused by these agents include stem decays, cankers, and tree mortality. Other tree deformities caused by physical factors such as fire, animals such as porcupine and beaver, wind, and lightning include general bole deformities, bark damage, broken and missing tops, forks, crooks, and sweeps.

3.1.2 Proposed Action – Environmental Consequences for Forest Health

Direct Effects

All treatments in forested areas will address forest health issues such as fuel loading, stand density, stand structure, stage of succession, insects and disease, etc. The focus will be on improving forest health through a variety of silvicultural options designed to open up stands while still maintaining forest canopies, reducing competition between trees and increasing understory grasses, forbs and deciduous shrubs. Logging activities may cause damage to unharvested trees of all species, though contract specifications and sale administration activities should limit such damage, especially to larger trees which are most critical for retention.

Effects for specific forest types are presented below.

Douglas-fir Direct effects of harvest activities involved in thinning operations are expected to include a strong reduction in the number of trees per acre in treatment areas and an increase in the average tree size due to the retention of larger trees and removal of dense understory trees. The resulting degree of openness in treated areas varies with the habitat type (see Table 3.3). Forests on warm-dry sites will be most open while those on cool-moist sites will have the highest amount of cover after treatment. All habitat types will have much more open understories and a reduction in ladder fuels. In areas where the upper canopy layer is currently dominated by Douglas-fir and ponderosa pine, the upper canopy will remain largely intact, with an increase in openings. Douglas-fir habitat that is currently dominated by lodgepole pine will have much greater density reductions and increased openings that will resemble a shelterwood harvest.

Thinning activities will change the species mix in many forest stands. Depending on the target composition (see Table 3.3) more ponderosa pine will be retained and more Douglas-fir removed, except on cool-moist sites, where more Douglas-fir will be retained. The actual canopy species composition will correspond more or less to the target composition depending on the existing species mix. For instance, some warm-dry sites currently lack enough ponderosa pine to fully meet species targets while retaining the prescribed basal area of trees per acre. In such cases basal area targets take precedence over species composition targets, and immediately after treatment

Table 3.3 Target percent canopy composition and basal area by tree species for habitat types in the treatment area.

Target	Warm-Dry	Moderate	Cool-Moist	Lodgepole
Ponderosa Pine %	65-75	50-70	25-35	0
Douglas-fir %	25-35	30-40	50-70	0
Lodgepole Pine %	0	5-10	10-15	100
Basal Area	60-100 ft^2	80-120 ft^2	100-140 ft^2	N/A

these stands will have excess composition of Douglas-fir. Such stands may also have basal areas below target level to allow and encourage recruitment of less shade tolerant species, such as ponderosa pine. More than one treatment entry may be needed to eventually reach the target species composition on these stands, but additional entries are anticipated to occur 15 or more years out and are not analyzed in this document.

Lodgepole Pine Small, irregularly-shaped clearcuts will occur on productive lodgepole pine sites, resulting in forest canopy openings of up to 10 acres in size directly after treatment. Such openings will disrupt areas of continuous lodgepole cover and their potential to support a running crown fire. Of the total 268 acres of lodgepole pine habitat that are designated for treatment, only 50 percent, or up to 134 acres will actually be harvested. The remaining acres will constitute patches of older age-class stands on the landscape, spread among the designated treatment polygons.

Aspen Wherever feasible, all conifers will be removed from within aspen stands that occur in any treatment area, plus a 50-foot buffer around the stands. Harvest activities will disturb the soil surface and surface roots prompting aspen clones to send up new sprouts within stands and extending the area occupied by the clone, thus resulting in an overall increase in aspen in treatment areas. Prescribed fire occurring approximately two seasons after harvest will further stimulate sprouting of aspen clones.

Road Construction Skid trails and temporary roads associated with thinning and harvest activities will result in temporary soil compaction and baring of mineral soil. All skid trails and temporary roads will be reclaimed by reshaping (breaking down the cutwall and pulling in the outside berm), ripping and seeding after treatment activities are completed.

New permanent roads on BLM land may or may not have continued public access, depending on decisions made in the Judith-Moccasin Transportation Plan EA that is currently underway. However, irrespective of BLM decisions, new roads in the Pyramid Peak area will be accessible to the public only if the private landowner who controls adjacent land allows public access across his property. All new roads on DNRC land will be closed to public access.

Harvesting Methods A maximum of 9,221 acres will be available for forest health treatments. Steep areas (defined as extended slopes greater than 40 percent or small areas greater than 49 percent) occur on 2,236 of these acres (24%). An additional 1,165 acres will be treated for interface treatments, and steep slopes occupy 24% of these acres as well (280 acres). On these steep acres ground-based machine harvesting is prohibited. Only aerial operations, such as helicopter or cable logging systems, or manual thinning will be used. Thus the area of forest health and interface treatments that will be subjected to impacts from logging machinery is a maximum of 7,870 acres. Actual acreage will, in fact, be less, as streamside management zones and locally inaccessible or otherwise infeasible acres are included in the total treatment area “footprint,” but will not be harvested.

Indirect Effects

Forest Health In treated areas retained trees will experience reduced competition for water, nutrients and light (Fiedler 2002). Relieving such competition will make trees less vulnerable to the effects of drought, insects and disease and will increase tree growth rates (Sala et al 2005). With increased resistance, insects such as mountain pine beetle will be more likely to maintain endemic levels and less likely to increase to epidemic populations.

Fire Hazard The presence of slash in treated areas, whether piled or scattered, will temporarily increase the hazard for intense fires, should a wildfire occur before the slash is treated. The effects of such a wildfire would be generally greater surface fire intensities and greater soil heating than either before treatment or after slash disposal. During this period, crown fires will be less likely than prior to treatment, as treatment will remove ladder fuels and increase spacing between canopy trees. Insofar as markets for pulp or biomass fuel are available at the time of treatment, this hazard will not be as great, as slash treatment will occur at the same time as harvest.

Once treatments have been completed through slash disposal and underburning, both fire intensity and the likelihood of developing a crown fire will be greatly reduced. The ability to control any wildfires that start will increase in treated areas, and these areas are more likely to serve as control points from which back burns or burnouts can be successfully executed. Maintenance of treated areas with prescribed fire at 10 to 30 year intervals, depending on the site, will be important to maintaining these benefits.

In lodgepole sites, where patch clearcuts are interspersed with older stands, crown fires may still occur in the untreated areas. However, breaking up the stand will reduce the chance that such fires will develop enough heat and energy to become a running crown fire, burning across many stands, independently of surface fuel conditions.

Vegetative Diversity Opening forest canopies and removing dense conifer undergrowth is expected to stimulate deciduous shrubs, grasses and forbs in the understory of treated stands. Currently many stands have little to no understory in terms of both species diversity and abundance. Removing conifers from aspen stands, opening forest canopies in adjacent stands, and stimulating sprouting of aspen through controlled root disturbance and prescribed fire will result in rejuvenation of existing stands and the expansion of those stands into the surrounding forest. Thus, forest treatments will increase the overall vegetative diversity in the Judith and Moccasin Mountains.

Socio-economics Forest treatment activities will result in increased traffic on some county roads in the area. Trucks carrying loads of logs or chips will result in additional wear and tear on county roads above background levels. The BLM and DNRC will work with Fergus County Commissioners and the County Road Department to minimize impacts to county roads and to offset maintenance costs as allowed by administrative policies and procedures.

Cumulative Effects

Forest Health and Fire Hazard Cumulative forest health will improve as a result of proposed vegetation management. Because of reduced competition, remaining trees will grow faster and thus more quickly attain a large size. The oldest and largest trees will persist longer in the landscape as a result of decreased competition, improved water and nutrient balance (Sala et al 2005) and increased resistance to insects and disease, as well as a reduced likelihood of fire mortality. Overall these factors will increase the resiliency of stands to disturbance, and by treating areas connected over the landscape, the range as a whole will be less susceptible to large-scale disturbance.

This same concept applies to fire hazard. In general, the ranges will be more resilient to wildfire, even under extreme weather conditions, and fire effects are expected to be less severe, showing less tree mortality and erosion than would be expected from a wildfire under current conditions.

Vegetative Diversity By thinning smaller trees and ladder fuels, retaining large trees and opening forest canopies to more light, structural diversity in forest areas will increase in the long term. This effect will be most pronounced when looking at larger, landscape scales, though an increase in structural diversity is also expected at smaller scales within stands.

By removing conifers from aspen stands and stimulating aspen root sprouting, the total acreage of pure aspen stands is expected to increase several fold over the current level. Over the long term, aspen will persist in the landscape.

Watershed Impacts The combined cumulative effects for forest health, interface treatments and vegetative diversity treatments that occur in currently forested areas are displayed in this section. Combining these treatment categories allows cumulative effects analysis of all areas that will be subject to tree removal.

Reduction in the density of the tree canopy increases the amount of precipitation (both rain and snow) that reaches the ground. Trees intercept rain and snow in their branches where it may evaporate or sublimate before reaching the ground. These effects are most common for storms of short duration which do not last long enough for canopy saturation to occur. Reduction of tree canopy thus tends to increase both runoff and water percolation into the soil. Runoff increases when precipitation hits ground that is frozen, highly compacted, or exposed to bare mineral soil. The presence of rooted herbaceous vegetation, organic duff and large woody debris decreases water runoff and increases soil moisture recharge. Removal of the entire tree canopy by clearcutting results in the greatest increases in runoff and erosion, while thinning the canopy greatly lessens these impacts.

The acres of conifer treatments, along with the percent of conifers and percent of the total area by fifth order watershed divisions are presented in Table 3.4. The percentage of conifer acres to be treated within each watershed ranges between 5 and 27 percent.

Of the 14,552 conifer acres scheduled for treatment, 268 acres are lodgepole that will be treated with patch clearcuts. Harvested patches will not exceed 10 acres in size and are limited to no more than fifty percent of this area, or 134 acres. Therefore, less than one percent of the treated area will be subject to clearcut harvesting. The cumulative effect of these treatments is therefore expected to result in some increase in runoff and soil water recharge, with minimal increase overall in erosion.

Table 3.4 Acres of conifer treatments, total conifers, total acres and percents by fifth order watersheds within the analysis area.

Fourth Order Watershed Name	5th Order Number	Conifer Trtmts	Total Conifers	% Conifers Treated	Total Acres	% of Total Treated
BOX ELDER	01	934	8,274	11	16,036	6
	02	280	5,468	5	34,818	1
	03	3,630	14,230	26	31,128	12
BULLWHACKER-DOG	05	171	1,656	10	6,974	2
FORT PECK RESERVOIR	06	1,767	8,044	22	12,781	14
JUDITH	05	2,792	16,415	17	29,467	9
	06	126	2,029	6	10,393	1
	09	4,291	25,559	17	75,047	6
	13	561	2,063	27	8,142	7
Grand Total		14,552	83,737	17	224,787	6

Machine harvest will be used on forest health and interface treatments where slopes average less than 41 percent. Aerial systems will be used where slopes are steeper and manual harvest will be used in the vegetative diversity area. Machine harvest generally has more potential for soil disturbance and compaction than aerial or manual methods. Table 3.5 displays the maximum total acres that will be subject to machine harvest within each fifth order watershed. The maximum acreage in any one watershed is 2,948. The maximum percentage of watershed area within the analysis area subject to machine harvest is just over 6 percent.

No reliable estimate of timber harvest activities that may occur on private land within the analysis area is available as they tend to vary with the market price of timber. Thinning to create defensible space around structures or to reduce ladder fuels is expected to occur on some private lands through a program with the Fergus County Conservation District. Since 2001 this program has provided technical and cost-share assistance for such thinning on just over 600 acres spread throughout Fergus County on parcels ranging in size from 1.5 to 39 acres (Fergus County Conservation District 2005). Approximately 25 percent of those acres have been located within the analysis area.

Table 3.5 Acres of machine harvest treatment and percent of total fifth order watershed acres within the analysis area.

Fourth Order Watershed Name	5th Order Number	Machine Acres	Total Acres	Machine % of Total
BOX ELDER	01	677	16,036	4.2
	02	0	34,818	0
	03	1,781	31,128	5.7
BULLWHACKER-DOG	05	30	6,974	0.4
FORT PECK RESERVOIR	06	619	12,781	4.8
JUDITH	05	1,792	29,467	6.1
	06	0	10,393	0
	09	2,948	75,047	3.9
	13	96	8,142	1.2
Grand Total		7,850	224,787	3.5

Major past events that may contribute to the cumulative effects of the proposed action in the analysis area include heavy logging on 1250 acres in the Lincoln Gulch area west of Maiden Peak in 2000. Much of this area was clearcut with trees left only in steep areas and streamside management zones. The extensive denudation may have contributed to an increase in runoff for this small sub-drainage, which resulted in severe damage to the road and culverts on the private access road during spring storms in 2006.

Approximately 670 acres of BLM land within the Lincoln Gulch sub-drainage is proposed for forest health and interface treatments, with an additional 70 acres of vegetatitive diversity treatments. Approximately 80 acres of DNRC land within the sub-drainage is proposed for forest health treatments. All the proposed forest treatments are in the moderate to cool Douglas-fir habitat type. Thinning to the lower end of the target basal area prescriptions could put additional stress on this area, as could stand-replacing wildfire in the upper reaches. Thinning at the upper end of the target basal area prescriptions is expected to reduce fire hazard without creating excess runoff.

3.1.3 Current Management – Environmental Consequences for Forest Health

Direct Effects

Current management on BLM lands will continue as specified by the 1992 JVP RMP. The BLM will continue to allow the incidental harvest of forest products on a limited basis under existing RMP forestry guidelines. Under the current program, harvest activities over the next decade will likely be less than 500 acres on BLM land in the Judith and Moccasin Mountains.

Douglas-fir No density management of forest stands will occur, and ladder fuels will remain in place and continue to grow. The mix of dominant tree species in existing stands will not be changed, thus leaving more of the forest dominated by less fire-

resistant species. In stands where decadent lodgepole is a significant part of the canopy, mortality in lodgepole will accelerate over the next decade, leaving increasing numbers of standing snags and contributing to increasing dead fuel on the forest floor as dead trees fall over.

Lodgepole Pine No patch clearcuts will occur, and the continuous even-aged canopy that currently exists will be retained.

Aspen Conifers currently present in aspen stands will not be removed, and will increasingly compete with aspen for light, water and nutrients. No stimulation of root sprouting will occur as the result of harvest activities and prescribed fire. The extent of existing stands will not increase, and is expected to continue to slowly decrease. A direct result of the continuation of current management will be the continued decline in the health of aspen stands.

Road Construction No skid trails, temporary roads or permanent new roads will be constructed under current management.

Indirect Effects

Forest Health Forests will continue to grow unnaturally dense, resulting in increasing competition for water and nutrients. As a result of this competition, trees will become increasingly susceptible to insect infestations and disease, and increasing mortality from such agents is expected to occur. The older, larger trees that are targeted for retention under the proposed action are the ones most likely to succumb as competition increases. Bark beetles, in particular, preferentially attack larger trees, and especially in drought conditions, larger trees show greater increases in water stress, resulting in decreased capacity to repel bark beetles and thus increased mortality over younger, smaller trees.

Under current management, project design and assessment will be limited to single stands associated with incidental harvest. Thus, treatments will not be designed with the intent of reducing the risk of wide-spread insect and disease or large-scale stand replacing fires, and no treatments will be designed with overall landscape patterns in mind.

Fire Hazard Under current management, little slash will be generated, and so no temporary increased risk for a more intense surface fire will occur. Because ladder fuels will not be removed and forest canopies will remain dense, stand-replacing wildfire will be much more likely to occur. Conditions to support a running crown fire will persist and escaped wildfires will be harder to control under current management. Thus, chances are great that an escaped wildfire will be much larger, more intense, and with more severe fire effects than would occur with the proposed treatments.

Vegetative Diversity Given that forest canopies will remain dense and will slowly increase over time, vegetative diversity and abundance of deciduous shrubs, grasses and forbs in the understory will continue to decline.

Cumulative Effects

Forest Health and Fire Hazard Under current management, forest health will continue to decline. The rate of decline will be dependent on weather and climate factors. If the current drought persists, increasing mortality from bark beetle infestations is expected and could reach epidemic proportions. The oldest cohort of lodgepole pine (those approximately 100 years old) will show accelerated mortality rates and will begin to fall over, greatly increasing large dead fuel loading in affected stands.

These conditions will contribute to an increasing probability of a large, stand-replacing wildfire. In the long term the only question about such a fire is not if it will occur, but when. Weather patterns and the availability of initial attack resources are the greatest influences from a timing standpoint, given sustained and increasing forest densities and tree mortality. Prediction of the timeframe for such an event is not possible: it might occur next year, or not for several decades.

Vegetative Diversity on a large scale across the ranges will continue to decline under current management. In particular, the loss of meadows and aspen stands will continue unimpeded from increasing encroachment and over-topping by conifers. Eventually, aspen, deciduous shrubs and herbaceous species will be eliminated from affected stands, making their recovery in the event of harvest or fire much delayed. Elimination of remnants and propagules of native understory and meadow species also increases the likelihood of weed infestation after a disturbance occurs.

Watershed Impacts Under current management no increases in erosion and soil compaction will occur as a result of management activities, and no new roads will be constructed. However, in the event of a large, stand-replacing wildfire, soil erosion and stream sedimentation is likely to increase dramatically.

Increases in runoff, soil water recharge and water yield will not occur. As the forests continue to develop and mature, increasing amounts of precipitation will be intercepted by tree canopies and evaporate before reaching the soil. Thus water yield is expected to decline from its present level.

3.2 Fire Management

3.2.1 Affected Environment

Fire History and Fire Regime Condition Class From 1980 to 2005 the record shows 86 fires on BLM land within the Judith-Moccasin analysis area. (A geospatial record of fires on state and private land is not currently available.) These fires burned a total of 6,754 acres (NWCG 2006). Average fire size was 79 acres, however this average is

made up of numerous small fires under 100 acres, one fire of 150 acres, and one fire over 5,000 acres (see Table 3.6). Thus, the fire record shows that ignitions are common and initial attack is generally successful at keeping fires small, but that fuel and weather conditions exist to generate large fires when initial attack is unsuccessful.

Table 3.6 Fire record for federal lands in the analysis area, 1980-2005.

Size Class		# of Fires	Average Acres	Total Acres
A	.1-.25	39	0.1	3.1
B	.26-9.9	35	1.5	52.3
C	10-99	10	24.9	249.0
D	100-299	1	150.0	150.0
E	300-999	0		
F	1,000-4,999	0		
G	5,000+	1	6,300.0	6,300.0
Total		**86**	**79**	**6,754.4**

Fire scars collected from the Judith and Moccasin Mountains suggest that these forests are representative of ecosystems historically characterized by mixed severity fires (North Wind Environmental 2003, Fire History Report). At middle elevations, evidence of mixed-severity fire regimes exists, in which relatively small patches may burn as a crown fire, killing all trees, while nearby the fire only consumes surface vegetation, leaving the canopy fairly intact. Many of the “doghair,” even-aged lodgepole pine forests in the Judith Mountains likely resulted from stand-replacing fires approximately 100 years ago. In other areas lodgepole came in after a fire under very open canopies of remnant Douglas-fir and ponderosa pine.

The current Fire Regime Condition Class (FRCC) is presented in Figure 3.1 (directly following the appendices at the back of the document) showing divisions between the fifth order watersheds. This parameter is an assessment of how much the existing vegetation differs from the vegetation that would be expected under the natural, pre-European settlement fire regime. FRCC 1 areas are within the expected natural vegetation, FRCC 2 areas show moderate divergence, and FRCC 3 areas diverge strongly from expected natural vegetation. Percentage of forest in the analysis area in each of these classes is FRCC 1: 26.3%; FRCC 2: 13.6; FRCC 3: 60.1%.

The vegetation composition that would result from the absence of fire suppression was modeled using SIMPPLLE (see Appendix G). This predicted vegetation is derived by applying an ignition rate based on documented recent fire history to the current vegetation and removing the effect of initial attack and fire suppression. The model is then run for a period simulating 500 years. After several hundred years, the resulting vegetation reaches equilibrium with the natural fire occurrence in terms of the number of acres in each vegetation type. Because the model is based on random probability, the prediction encompasses a range of acres resulting from 30 simulations (see Table 3.7).

Table 3.7 Acres of predicted natural vegetation modeled by SIMPPLLE with minimum and maximum vs. acres of current vegetation types.

Vegetation Type*	Predicted Natural				Current	
	acres	percent	minimum	maximum	acres	percent
Aspen	1,772	0.80	123	1,923	85	0.04
Aspen-Mixed Conifer	0	0.00	0	121	518	0.23
Conifers	6,356	2.87	791	7,034	90,622	40.87
Native Forbs	4,721	2.13	5,261	27,554	0	0.00
Grasslands	90,041	40.60	80,676	115,387	67,299	30.35
Riparian Shrubs	14,341	6.47	12,367	16,678	14,165	6.39
Upland Shrubs	86,956	39.21	40,127	86,956	31,498	14.20
Grand Total	204,187	100.00			204,187	100.00

* Acres of agriculture, rock and scree are not reported, as they are not modeled for succession and disturbance and thus do not vary.

Current vegetation in the analysis area is displayed in Figure 3.2, and predicted natural vegetation, as modeled by SIMPPLLE is presented in Figure 3.3. The figures are directly following the appendices at the back of the document. The predicted natural vegetation resulting from such modeling is designed to approximate pre-settlement conditions; the maps present a graphic contrast between current and pre-settlement vegetation.

Another graphic example of the difference between current and pre-European settlement vegetation can be seen from comparing current with historical photographs. The back cover shows comparisons of the Judith Mountains paired to 2002 photographs of the same area. The front cover shows an 1886 photograph of the area around Fort McGinnis on the east side of the Judith Mountains (no paired retake).

Both historic photographs and vegetation modeling based on the known fire occurrence, current vegetation types and prevailing weather pattern confirm that “natural” (i.e., pre-settlement) vegetation in the Judith and Moccasin Mountains had substantially less area of continuous forest cover than currently exists. A number of Plains Indians tribes were known to frequent Central Montana (Howard 1943) and used fire in hunting, warfare, and other activities (Williams 2002). Lack of modern fire suppression technology in response to spring and summer lightning fires when combined with Indian burning would be expected to greatly increase both the extent of fires and the frequency of ignition, as fires set in the grasslands and foothills could move upslope into forested areas.

The historical fire regime of the Judith and Moccasin Mountains created shifting, heterogeneous mosaics of habitats, cover classes, and tree densities. These attributes have become more homogenous as fire frequency was diminished, first by removing Indians from the land who used fire extensively and, second, by deliberate fire suppression. Pre-settlement fire regimes likely produced highly diverse forest

communities that contained abundant fire-dependent species, including multi-aged stands with old, large fire-resistant trees.

Interface Treatments The analysis area contains many small communities and ranches that are built adjacent to BLM lands containing timber and steep slopes. The potential exists for future fire-related incidents. In the Judith Mountains, communities susceptible to fire include Maiden and Gilt Edge and scattered homes in Limekiln Canyon, New Years, Alpine, Lincoln, Ruby, and Whiskey Gulch. In the Moccasin Mountains, the Kendall community and various ranches on all sides of the mountains are interspersed with heavily forested BLM land.

The defined wildland-rural interface area within the analysis area is identified in Figure 1.1. This definition varies from the wildland-urban interface delineated on a county-wide basis in the Fergus County Wildfire Mitigation Plan (Schlosser 2004). In the county-wide plan the entire area of the Judith and Moccasin Mountains is included in the defined wildland-urban interface. At the scale of a county-wide assessment (over 3 million acres), this definition is appropriate. However, when looking at the smaller scale of the analysis area (225,000 acres) for specific project implementation purposes, it is appropriate to identify areas which are most critical for treatment and will result in the greatest protective benefit. Treating the entire area with one blanket prescription based on wildland interface concerns would be ecologically undesirable, financially prohibitive and inefficient.

Air Quality and airshed characteristics are based on climate, prevailing winds, inversions, and local weather patterns influenced by topography and air pollution sources. All of the JMLA analysis area is designated as a Class II airshed. Air quality in this airshed has not been monitored and therefore threshold measurements or current conditions are not available. Visibility is generally good.

The general airflow in the Judith and Moccasin Mountain Ranges are from the west to the east, although local winds are altered by topography and can come from any direction. The town of Lewistown, Montana lies 15 miles (all distances are approximate and Judith Peak was used as a location to measure distance from) to the southwest of the project area. The town of Roy is located 15 miles to the northeast, Winnett is 45 miles to the southeast, Grass Range is located 25 miles to the southeast and Winifred lies 25 miles to the north. The Judith and Moccasin Mountains are known for their winds, which allows for good smoke dispersion.

Air pollution sources in the analysis area includes wildfires, timber harvest activities, prescribed burning, mining, dust transported from fallow fields, and vehicle travel on unpaved roads during dry periods. Air quality can also be affected by wildfires and prescribed burning activities and from dust transported from fallow fields outside of the immediate area.

The Environmental Protection Agency (EPA) through the document, *Interim Air Quality Policy on Wildland and Prescribed Fires* (EPA 1998), supports increasing the

reintroduction of fire into Federal land management programs to allow fire to play its natural role and provide resource benefits, consistent with public health and environmental quality considerations. All prescribed burning planned in this project area will be in line with the certified Smoke Management Program (i.e., Montana/Idaho Airshed Group).

3.2.2 Proposed Action – Environmental Consequences for Fire Management

The environmental effects of all uses of prescribed fire in the proposed action will be displayed in this section. Vegetative effects of harvest for forest health, interface protection and vegetative diversity will generally be displayed in those respective sections.

Direct and Indirect Effects

Interface Treatments A total of 1,165 acres scattered across the Judith and North Moccasin Mountains are proposed for treatment with the sole purpose of improving life-safety and property protection in the event of wildfire. Additional areas were classified as interface, but are included in forest health treatment areas. The acreage figure presented here is the net additional acres, above that which is covered in forest health treatments. See Figure 2.1.

Forests adjacent to existing structures and key travel ways will be thinned to limit expected fire behavior in these areas to 4-foot flames lengths. This level of fire intensity allows for direct attack by hand and engine crews and the safe passage for vehicles evacuating from a burning area. These actions will result in substantially greater likelihood that residents will be able to evacuate safely during a wildfire, even if the fire is burning adjacent to evacuation routes. Fuel reduction adjacent to roads will also provide the opportunity to use roads as fuel breaks from which back burn or burn out operations could be initiated when indirect attack is indicated during wildfire suppression operations. These conditions will greatly increase firefighter safety and reduce the risk of property and resource damage during wildfire.

Forests will be thinned for 100 feet on each side of a key road or to a topographic break, whichever is less. Areas adjacent to structures will be thinned to the nearest identified topographic break. Thinning prescriptions given for the different habitat types in the forest health treatments will be used according to the habitat type of a given site. For the interface treatment areas, the lower end of the target basal area will be used in thinnings adjacent to roads and within 150 feet of private land. For interface treatment areas that extend further than 150 feet from private land, the target basal area may gradually increase as distance from the private land increases, to the maximum given in the prescription.

Environmental effects for specific forest types, general forest health, and vegetation diversity from the interface treatments are identical to those identified for forest health

treatments, except that effects are marginally increased because thinning will be relatively heavier in the interface treatment areas.

Air Quality Prescribed fires are ignited under fuel moisture conditions that reduce total fuel consumption and when mixing height and winds are favorable for dispersion of smoke away from populated areas. They are not conducted during inversions or when smoke would be expected to pool in populated areas. Weather forecasts, smoke management forecasts, atmospheric stability, fuel loadings, fuel moisture, amounts of fuel consumed, and local and upper winds will be evaluated prior to ignition to mitigate effects of smoke from any planned prescribed fire under this project.

The closest Class I airshed is the U.L. Bend Wilderness Area on the Charles M. Russell National Wildlife Refuge. This area should not be affected due to direction and/or distance from the project.

This analysis used the First Order Fire Effects Model (FOFEM), a computer model that predicts the amount of particulate matter produced by prescribed burning. PM2.5 is particulate matter 2.5 microns in diameter or smaller, and PM10 is particulate matter 10

Table 3.8 Distances and directions of areas of potential concern for air quality.

Area of Potential Concern	Airshed Class	Distance in Miles from Judith Peak	Direction from Project Area
U.L. Bend Wilderness Area	I	65 miles	Northeast
Roy, MT	II	15 miles	Northeast
Winnett, MT	II	45 miles	Southeast
Grass Range, MT	II	25 miles	Southeast
Winifred, MT	II	25 miles	North
Lewistown, MT	II	15 miles	Southwest

microns in diameter or smaller. Particulate matter emission from fires has a great potential for causing air pollution because of: 1) the amount of particulate matter produced, 2) the effect on visibility due to the amounts of sub-micrometer sized particles, and 3) the high organic content. Particulate matter less than or equal to 10 micrometers in diameter (PM10) is the size of material which can penetrate the inner recesses of the human lung potentially causing health problems.

Currently five primary air toxins are being assessed relative to the exposure of humans to smoke from both prescribed fire and wildfires. These toxins are: acrolein, formaldehyde, carbon monoxide, particulates, and benzene. Currently, little is known of the long-term health factors these toxins have on humans as they are found in smoke from vegetation, and modeling to predict concentrations of air toxins downwind from a prescribed burn or wildfire does not exist. Due to dilution of these toxins with fresh air, exposure is less harmful the further away an individual is from the source of the smoke.

The people that will be impacted the most by the effects of prescribed burning will be those personnel directly involved with the project.

The areas surrounding the project area (especially areas downwind) may be impacted when some of these burns are implemented. These impacts will likely occur mainly from evening through the next morning, due to the tendency that as the sun sets cooler air usually flows downhill into drainages. These smoke impacts will be relatively short term; normally as the next day heats up the local winds become uphill and these lower areas clear out. This cycle may continue for a few days with the biggest impact being the day and evening of ignition.

Particulate matter emissions (both PM2.5 and PM10) have been calculated for each prescribed burning activity under the proposed action (see Table 3.9). These figures include all proposed treatments, and will occur over a period of 10 years or more. Thus, the average yearly acres and emissions will be one tenth of the figures cited. The actual acres, and thus the particulate emissions, will likely be less than presented in the table, as not every acre within identified treatment polygons will actually be treated. The figures presented are thus a worst-case scenario.

Table 3.9 Estimated particulate matter emissions by acres for proposed vegetation management actions.

	BLM Forest Treatments	DNRC Forest Treatments	Interface Treatments	Vegetative Diversity Treatments	Average per Year	Total (10 years)
Acres of Prescribed Fire	8,176 ac.	1,050 ac.	1,165 ac.	4,943 ac.	153 ac.	15,333 ac.
Tons of PM2.5	3,860 tons	476 tons	534 tons	1,591 tons	646 tons	6,461 tons
Tons of PM10	4,556 tons	562 tons	631 tons	1,878 tons	763 tons	7,627 tons

Prescribed fires will be conducted at times when there is both good predicted ventilation and mixing height (the height above the surface through which relatively strong vertical mixing occurs). During these times, smoke and smoke particles will be dispersed in a manner that would be tolerable to healthy people living downwind. The general airflow in the Judith and Moccasin Mountains should carry smoke from the southwest to the northeast. The smoke may be quite noticeable by local inhabitants for a few days following ignition, but by the time it reaches an incorporated town located downwind it should not be noticeable. There are a few valleys which may trap smoke.

Prescribed burning operations are conducted within the Central Montana Fire Zone under a Montana Air Quality Open Burning permit issued from the Montana Department of Environmental Quality with support of the Montana/Idaho Airshed Group. The meteorologist for the Montana/Idaho Airshed Group monitors National Weather Service

weather forecasts, predicts daily smoke dispersion conditions and issues daily advisories. These advisories are issued 24 hours in advance when conditions are not favorable for good smoke dispersion.

Prescribed Fire managers will also utilize local techniques for limiting the amount of smoke production, such as:

- scheduling burning when weather conditions are favorable;
- limiting the amount of burning in adjacent areas;
- using higher fuel moisture and/or relative humidity levels to limit the amount of duff and fine fuel consumption, and thus limiting smoldering.

The smoldering phase of a prescribed fire can contribute greatly to the duration and amount of smoke produced.

Burning could start in the fall of 2008 and continue for approximately 10 years. Although difficult to quantify, a temporary degradation of downwind air quality may occur as an irretrievable and unavoidable adverse effect. Substantial deterioration should be avoided by following established guidelines and procedures.

Cumulative Effects

Fire Regime Condition Class Thinning and vegetative diversity treatments are designed to move the vegetation closer to reference (i.e., pre-European settlement) conditions. Over the long-term these actions will result in moving the Fire Regime Condition Class from 2 or 3 closer to Condition Class 1. For each fifth order watershed Table 3.10 shows the forested acres that will be converted to Condition Class 1, the percent converted, percent existing and the percent of the watershed in Condition Class 1 resulting after all treatments are completed.

Table 3.10 Acres and percent converted to Condition Class 1 by fifth order watershed.

Watersheds		Fire Regime Condition Class One			
Fourth Order Name	**Fifth Order Number**	**Acres Converted to CC1**	**Percent Converted to CC1**	**Percent Existing**	**Percent Resulting**
BOX ELDER	01	638	7.7	36.1	43.8
	02	111	2.0	45.1	47.1
	03	2,071	14.6	41.8	56.4
BULLWHACKER-DOG	05	224	13.5	1.9	15.4
FORT PECK RESERVOIR	06	1,344	16.7	0.5	17.2
JUDITH	05	2,236	13.6	21.7	35.3
	06	134	6.6	2.0	8.6
	09	2,912	11.4	0.0	11.4
	13	407	19.7	26.7	46.4
Grand Total		10,078	12.0	26.3	38.3

Overall, the percentage of Condition Class 1 increases by 12 percent for the entire analysis area. Individual watersheds range from just under 10 to over 50 percent after treatment. The greatest improvement comes in Fort Peck Reservoir 06, which moves from less than 1 percent to over 17 percent Condition Class 1. Additionally, 4,474 acres that are currently in Condition Class 1 will be treated with thinning and prescribed fire to maintain their current state.

The Burnett Peak Fire burned over 6000 acres in the Judith Mountains in 1991. Given that the fire occurred 15 years ago, any increased erosion hazard from the fire is no longer anticipated, due to natural revegetation. The burned area does not currently present an increased fire hazard because snags killed by the fire are, for the most part, still standing. Within the next 20 years standing snags are expected to fall and will posed an increased hazard for a hot fire that could damage soils. Treating areas adjacent to this burned area presents the only viable strategy for reducing the impacts of subsequent wildfire for this sub-drainage.

The Forest Vegetation Simulator (FVS) was used to model a representative forest health treatment area and compare the effects of a wildfire to the stand 30 years after treatment versus the same stand with no thinning treatment. Weather conditions for the fire were modeled as an average August day and were identical for both the treatment and control simulations. The visual representation of the results is presented in Figures 3.4 and 3.5. With no treatment the wildfire burns through the tree crowns, and all trees are killed by wildfire. With thinning treatment, the fire generally remains on the surface and few canopy trees are killed. Thus the thinning treatments result in fire behavior which more closely mimics the pre-settlement fire regime.

Interface Areas Safety for residents, members of the public and firefighters will increase as a result of interface treatments. The probability of property damage will decrease. Escaped wildland fires will likely be smaller in size and less damaging to natural resources than if no treatments occurred. In the event of an escaped wildfire, negative impacts to private property values would likely be reduced over the existing condition.

The aesthetic value of private properties is likely to improve from the increase in wildlife use expected from treatments, especially big game animals. Wildlife will also be somewhat more easily viewed in thinned areas. Restoration and maintenance of meadows and aspen stands will also contribute to a higher aesthetic value for the area as a whole. Such changes may contribute to increased economic property values.

Air Quality The air quality cumulative effects analysis area included the entire JMLA project area and other locations downwind of the project area. In addition to the particulate emissions presented in Table 3.9, vehicle traffic, agricultural dust, wildfires, and prescribed burning not related to the proposed vegetation management could temporarily reduce air quality in the area. All prescribed burns will be scheduled so that no one area or drainage will exceed Air Quality Standards or be impacted by smoke for a prolonged period of time.

3.2.3 Current Management– Environmental Consequences for Fire Management

The BLM will continue to use fire suppression tactics as specified in the 1992 JVP RMP and amended by the 2003 Montana/Dakotas Fire and Fuels Management Plan.

Direct and Indirect Effects

Interface Areas No thinning treatments will occur adjacent to existing structures and key roads. In the event of an escaped wildfire, evacuation routes could easily be blocked by high intensity flaming fronts adjacent to roads and entrapment could easily occur. Firefighter response for protecting houses will be limited by safety concerns: if safe egress cannot be guaranteed, crews and engines will not be sent in to protect structures from an approaching wildfire.

Unplanned fires, especially those ignited during hot, dry conditions or during high winds, will be more difficult to control without any thinning treatments, because there will be few areas to function as defensible fuel breaks.

Air Quality Continuation of current management will result in no increase in particulate matter (PM) emissions resulting from management activities. However, under current management there is an increased chance of large, stand-replacing wildland fires. Such fires would result in much larger inputs of particulate matter than those modeled for prescribed fire. In addition to the health effects, visibility, especially during the summer months, would be expected to be severely impacted by these potential fires, as well.

Cumulative Effects

Interface Areas In the long-term, continuation of current management is expected to result in marginally increasing conflicts with social and economic private property values until such time as a stand-replacing fire occurs. Once a large stand-replacing fire occurs that involves private residences, or even undeveloped private property, tort claims and lawsuits would likely result.

In the event of a large, stand-replacing fire private property values within the fire perimeter will decline drastically, and values in the general area may also be negatively affected.

Air Quality The long-term effects of continued current management will result in an eventual increase in PM emissions resulting from wildland fire events. Wildfires typically produce more PM than do prescribed burns on those same acres because wildfires typically consume more fuel per acre. Escaped wildfires usually consume more fuel per acre because they burn when fuel moistures are low and winds are sometimes strong. Prescribed fires are generally conducted during the spring and/or fall, or in the case of slash pile burning, during the winter when escape is highly unlikely.

In addition to the difference between fire behavior parameters in prescribed vs. wildfire, the absence of thinning treatments and ladder fuel reduction will leave more fuel available to burn, thus further contributing to PM emissions and impacts to visibility.

3.3 Wildlife Species and Habitat

3.3.1 Affected Environment

Northern Goshawk The northern goshawk is a forest-dwelling raptor preferring habitat with dense canopy cover and mature trees (MPIF 2000). Within the Judith-Moccasin analysis area, all forested landscapes may contain potentially suitable habitat for some portion of the northern goshawk's life cycle.

In 2002, five goshawk sightings and seven goshawk habitat locations were recorded by the BLM. All sightings and habitats were in mid-aged to mature forests. Canopy cover varied from open to closed. Sightings and habitat observations occurred in stands dominated by Douglas fir, ponderosa pine, and lodgepole pine.

Townsend's Big-Eared Bat Townsend's big-eared bat is a USFWS species of concern. It is also a BLM Special Status species in Montana. From 1997 to 1999, Hendricks (2000) surveyed several areas on BLM lands in the Judith Mountains. He documented one cave inhabited by Townsend's big-eared bat within the current analysis area.

An additional survey was conducted in 2002 to identify additional sites used by bats and supplement the previously gathered information. The following four sites were visited in 2002: Unnamed Maiden Canyon Adit, Unnamed Mason Canyon Adit, Abby Mine, and cliff sites in the South Moccasin Mountains. At the Abby Mine a bat of unidentified species was seen flying in the riparian area below the mine entrance. No Townsend's bat activity or evidence of occupation was confirmed at any of the above sites.

Rocky Mountain Elk Rocky Mountain elk habitat covers the vast majority of the Judith-Moccasin Analysis Area. Elk occupy most range with suitable forage, from prairie to montane forest, migrating with the seasonal availability of food. Elk summer range occupies most of the forested and higher elevation grassland and sagebrush areas of the North and South Moccasins, the Judiths, and the Black Butte areas (Lackey 1999). The Rocky Mountain Elk Foundation defines summer range as the area in which 90 percent of individuals are historically located between the appearance of spring greens and the first heavy snowfall (Lackey 1999). The crucial elk summer range is concentrated in the North Moccasins. Crucial summer range is the area supporting the heaviest elk densities between mid-June and mid-August. In these areas that provide high quality forage and habitat for rearing of new calves, the elk density may reach 200 percent of that in surrounding areas (Lackey 1999).

In the Moccasin Mountains, elk summer, crucial elk summer, and elk winter ranges overlap significantly. In the Judiths, elk winter range is concentrated between the north

Judiths and Black Butte in the Lewis Peak area, also overlapping summer range. Elk crucial winter range is concentrated in the Lewis Peak area (Lackey 1999). Elk also require migratory corridors to travel between their summer and winter ranges. In the Judith-Moccasin analysis area, these regions are in between the North and South Moccasins, north of the North Moccasins and north of Porphyry Peak in the North Judiths (Lackey 1999).

Due to the potentially vast area containing suitable calving habitat and the dispersed distribution of cow elk, the BLM conducted fixed-wing aerial surveys during the peak calving period, on June 5 and 13, 2002. Sixty-nine cow elk and six calves were spotted on the June 5 survey. The elk were concentrated in the north and northeast sections of the Judith Mountains. Five bull elk were spotted along the eastern side of the mountain range. No elk were observed in the southern portion of the Judith Mountains. During the June 13 survey, twelve cow elk and no calves were spotted in the North Moccasin Mountains. All elk were located on the eastern side of the mountain range at low elevations. One bull was spotted with a herd of three cows. Eleven bulls and no cows were observed in the South Moccasin Mountains. Four cow elk and one calf were spotted in the western-central area of the Judith range (North Wind Environmental 2002, Wildlife Report).

Winter surveys were also conducted for elk in February 2002 (North Wind Environmental 2002, Wildlife Report). A total of 457 elk were observed, of which 123 were bulls. The vast majority of elk (291) were concentrated around Black Butte. Other parts of the Judiths held 85 elk. Sixty-six animals were spotted in the North Moccasins and 15 in the South Moccasins. The target elk population for the Judith and Moccasin Mountains (Hunting District 412) is 300 animals total with 45 bulls (FWP 2004).

Big Game Winter Range Mule deer and whitetail deer habitat covers the majority of the Judith-Moccasin analysis area. During aerial surveys in February 2002, mule deer and whitetail deer populations were abundant within the entire analysis area, and so numerous that an accurate count could not be made. A large number of antelope (746) occured in the sagebrush-grasslands around Black Butte, and a few individuals (12) were seen in the South Moccasin Mountains (North Wind Environmental 2002, Wildlife Report).

Bald Eagle The bald eagle is the only endangered species that routinely uses lands within the analysis area. No breeding pairs nest in the planning area. Bald eagles migrate through the region more or less concurrently with the waterfowl spring and fall migrations.

Peregrine Falcon Peregrine falcons were surveyed in the Judith-Moccasin analysis area in 2002. The scope of the survey was based on historical falcon nesting and release records and information from local biologists. Since 1991 more than 60 peregrine falcons have been released on or within 100 air miles of the analysis area. No evidence of nesting peregrine falcons was discovered, and it is clear that either prairie falcons or golden eagles occupy virtually all appropriate nesting habitat within the

landscape area. Nine active eyries from those two species were discovered during the 2002 survey. Four cliffs were occupied by golden eagles and five were occupied by prairie falcons. The occupation of such a large percentage of the appropriate habitat by these competing species may delay the re-establishment of peregrine falcons in this region.

Ferruginous Hawk Six active ferruginous hawk nests were discovered during a 2002 helicopter survey of the Judith-Moccasin analysis area. The survey concentrated on areas with high forage value: short, uncultivated native prairie, hayland, and pastureland in association with shrub steppe vegetation; and likely nesting sites: rock outcrops, steep low cliffs, ledges on hills, isolated trees, or artificial nesting platforms. Sites with known or observed high rodent densities were also surveyed (Rogers and Rogers 1995).

3.3.2 Proposed Action – Environmental Consequences for Wildlife

Direct Effects

There will be several direct effects to wildlife and their habitat through the implementation of the proposed action. Big game species will benefit from the renewed source of herbaceous and deciduous forage plants that the forest treatments will promote. The vegetation treatments will impact the wildlife if they are accomplished during parturition or winter concentration. The treatments are designed to avoid crucial periods and locations and possibly expand the area of these important habitats.

Managing livestock to meet standards for rangeland health will have direct effects on many wildlife species. Herbaceous vegetation will become more abundant and vigorous. Grazing wildlife, such as elk, will benefit immediately just by having more available forage. Neotropical birds and other wildlife that inhabit riparian communities will benefit from an increase in structural diversity in the riparian vegetation.

Migratory birds, small game and other small mammals and birds will be temporarily displaced during treatment periods. The disturbance to these species will be minimal and the spring parturition period will be avoided whenever possible. The new openings created by the treatments will provide additional foraging areas for many of the species that inhabit the area.

There will be virtually no direct effects to any threatened and endangered or special status species that inhabit this area. There are no known special status species that nest in or inhabit the immediate area of any proposed forest treatment areas. An inventory will be made for Northern Goshawk nests and other area raptors during the nesting season before the treatment is to occur. Direct effects to nesting raptors will be kept to a minimum by avoiding the nest site and nesting period of the particular species.

Indirect Effects

The proposed treatments will minimize the chance for stand-replacing fires and subsequently maintain a more stable environment for all of the wildlife in the area. Treatments done in various locations across the landscape area will encourage elk and deer to expand their distribution and more thoroughly utilize the available habitat. These treatments will also encourage elk and deer to spend more time on the public land and make them more accessible to the public land hunter and wildlife enthusiast. Species, such as Merriam's turkey, that prefer meadows and open forest floors will likely increase in distribution and numbers.

Harvest activities may reduce wildlife cover, and may cause wildlife to temporarily relocate to other areas.

The proposed action will have no negative affects on any threatened or endangered (T&E) species or their associated habitat.

Cumulative Effects

Under the proposed action, forested and non-forested polygons containing BLM sensitive species or having the potential to provide critical habitat for sensitive species, will be managed to maximize wildlife habitat. Forest health treatments in these areas will consider the needs of key wildlife species or features that provide or have the potential to provide wildlife habitat. Thinning operations will be designed to protect northern goshawk, peregrine falcon, migratory birds, and Townsend's big-eared bat habitat.

Rangeland management actions will allow all allotments to meet standards for rangeland health. During implementation of forest health treatments, impacts to wildlife may occur resulting in short-term displacement. However, the long-term improvements to wildlife habitat will be compensatory as a result of these projects.

The proposed action will have no negative affects on any threatened or endangered (T&E) species or their associated habitat.

3.3.3 Current Management – Environmental Consequences for Wildlife

Direct Effects

The BLM will continue to manage wildlife resources according to the 1992 JVP RMP as amended by the 2003 Montana/Dakotas Fire and Fuels Management Plan. The BLM will maintain wildlife habitat within the Judith and Moccasin Mountains. None of the forest health and vegetative diversity treatments will be accomplished, so forest health will remain generally poor and declining. Most wildlife populations will generally remain static while some populations may even decline with increased tree mortality, and the dead trees accumulate on the forest floor.

Indirect Effects

The long term benefits of improved and expanded habitats will not occur. No changes to big game distribution will occur, and hunting opportunities will not improve. Continued conifer encroachment will lead to reduced amounts of available forage and the open forest habitats preferred by many wildlife species.

Current management will have no negative effects on any threatened or endangered (T&E) species or their associated habitat.

Cumulative Effects

Forests will continue to grow unnaturally dense as a result of continued wildfire suppression. The growth of forage species will be suppressed and vegetation diversity will be reduced. Aspen habitat will decline as a result of fire suppression. Conifers will continue to encroach into open rangeland and deciduous stands thereby reducing meadow and deciduous habitat.

The risk of a stand-replacing fire will increase, which once it has occurred, would directly impact wildlife habitat. An intense fire will remove cover and foraging habitat for all wildlife species.

Current management will have no negative effects on any threatened or endangered (T&E) species or their associated habitat.

3.4 Riparian and Aquatic Habitat/Collar Gulch ACEC

3.4.1 Affected Environment

Aquatic Species Westslope cutthroat trout and sauger are the only fish species in the Judith-Moccasin analysis area listed as sensitive by the BLM. The westslope cutthroat trout requires clean, cold water conditions for survival, adequate habitat connectivity (tributaries and main stems), protection from introduced non-native fish, and is sensitive to over-harvesting. The sauger are located within the lower 29.7 miles of Warm Springs Creek, which is located in the analysis area. However, its habitat ranges from approximately 3 to 20 miles downstream of treatment and project areas.

In addition to westslope cutthroat trout and sauger, other fish species present in the Judith-Moccasin analysis area include rainbow trout, brown trout, brook trout, brook stickleback, mottled sculpin, northern redbelly dace, white sucker, channel catfish, common carp, fathead minnow, goldeye, longnose dace, longnose sucker, mountain sucker, northern pike, sauger, shorthead redhorse, smallmouth bass, stonecat, and yellow perch. Most of the non-salmonid fish species occupy the lower portions of the analysis area in the larger streams.

Aquatic macro-invertebrates were surveyed on Chicago, Lincoln, Armells and Alpine Gulches by North Wind Environmental (2002). The surveys found several species of

aquatic insects (stoneflies, mayflies, etc.) and mollusks, worms, etc. The complete report for macro-invertebrate surveys (North Wind Environmental 2002, Water Quality Sampling Report) is available in the project file located at the BLM Lewistown Field Office.

The following amphibians and aquatic-dependent reptiles may exist in the area: boreal/chorus frog, tiger salamander, woodhouse toad, painted turtle, Great Plains toad, Northern leopard frog, and Plains spadefoot. The Great Plains toad, Northern leopard frog, and Plains spade foot are BLM sensitive species.

Riparian Health A riparian health inventory conducted in 2002 assessed 67 separate polygons, covering a total of 20.48 miles and 55.40 acres. Of these polygons, 34 were rated as Proper Functioning Condition (PFC), 19 were rated as Functioning At Risk (FAR), eight were rated as Non-functioning (NF), and six were determined to be uplands (North Wind Environmental 2002, Riparian Health Assessment Report). See Appendix F for riparian assessment data.

Many of the drainages within the above polygons indicated vegetation diversity has decreased within the riparian areas as a result of conifer encroachment and increased tree density within stands which shades out understory species. Many of these areas are also at risk of large-scale crown fires.

Stream reaches rated as NF were generally found to be impacted by mining, road construction, and/or fire suppression activities. Mining, road construction, and subsequent noxious plant invasions, and historic livestock use were the major factors that resulted in many of the FAR scores. Many of the polygons that had historic disturbance contained many increaser plant species, such as Kentucky bluegrass, dandelion, clover, pussytoes, and invaders, such as houndstongue and thistle. Polygons that had historic mining usually scored low due to bare ground and altered stream bank morphology.

Livestock grazing was not a significant factor preventing riparian areas from achieving the riparian health standard. Only six polygons had livestock use in the current year prior to when the assessments were conducted. The majority of the polygons have not had livestock use for several years as a result of the current drought, ownership changes, and the generally low level of allowable stocking and livestock ownership in the area. Portions of Alpine Gulch JR, Judith Peak and Armells Creek allotments showed livestock impacts to woody utilization and trailing within the riparian zone. Reaches classified as uplands were usually the very dry portions of ephemeral streams and lacked hydric soils, hydrophytic vegetation, and wetland hydrology.

Water Quality Three streams within the analysis area are listed as water quality impaired by the Montana Department of Environmental Quality in the 303(d) list (MDEQ 2004). They include: Armells Creek, Chicago Gulch, and Collar Gulch (Table 3.11).

Table 3.11 Impaired streams and probable sources according to MDEQ.

Stream Segment	Beneficial Use Support Status	Probable Causes	Probable Sources
Armells Creek (headwaters to Deer Creek)	Aquatic Life Support (Partial) Warm Water Fishery (Partial) Primary Contact – Recreation (Not Assessed)	Lead Zinc Metals pH	Resource Extraction Acid Mine Drainage Abandoned Mining
Chicago Gulch (headwaters to mouth (Fords Creek))	Aquatic Life Support (Partial) Warm Water Fishery (Partial) Primary Contact – Recreation (Not Assessed)	Lead Zinc Metals pH	Resource Extraction Acid Mine Drainage Abandoned Mining
Collar Gulch (headwaters to mouth (Fords Creek))	Aquatic Life Support (Partial) Warm Water Fishery (Partial) Primary Contact – Recreation (Not Assessed)	Lead Zinc Metals pH	Resource Extraction Acid Mine Drainage Abandoned Mining

With regard to the elevated heavy metals concentrations and low pH in the above listed streams, the federal Bureau of Mines started a water quality study in Collar Gulch and Armells Creek to find the potential source of the pollutants. The agency was disbanded before the study could be completed. However, the sampling that was conducted suggested that the source of the metals and low pH is natural.

The headwaters of Armells, Chicago, and Collar Gulch are located on a large sulfide deposit. Oxidation of the sulphur associated with arsenopyrite mineralization in the ore body causes a decrease in pH thereby increasing the concentration of heavy metals in solution. The metals and low pH in Armells, Chicago, and Collar Gulch are more than likely associated with acid rock drainage as opposed to acid mine drainage. Land management activities on BLM lands are probably not contributing pollutants to the impaired reaches mentioned above.

The BLM tested the water quality of Armells Creek, Alpine Creek, Collar Gulch, Chicago Gulch, and Lincoln Gulch 2002. Samples were collected during high water and low water conditions. The water quality of the five drainages sampled was relatively good. The complete report for these water quality analyses (North Wind Environmental 2002, Water Quality Sampling Report) is available in the project file located at the BLM Lewistown Field Office.

Hydrology Major drainages in the North Moccasins include Dog Creek, Little Dog Creek, Duck Creek, and Meadow Creek. The South Moccasins contain only minor ephemeral drainages which flow north into Warm Spring Creek or south into Big Spring Creek. Notable watersheds in the Judith Mountains include Alpine Creek, Armells Creek, Boyd Creek, Box Elder Creek, Burnette Creek (Limekiln Canyon), Chippewa

Creek (Whiskey Gulch), Fords Creek (Chicago and Collar Gulch), Muscrat Creek, Pyramid Creek, and Warm Spring Creek (Lincoln Gulch).

The current vegetative condition in the Judith and Moccasin Mountains can be characterized by denser canopy cover and larger patch size of Douglas-fir and lodgepole pine than would have been found historically. The increased canopy cover is affecting the peak, timing, and annual water yield of runoff. Dense forest canopies have resulted in increased evapotranspiration rates, faster snow melting rates, and lower snow accumulation than open forest canopies. Compared to natural conditions, runoff likely occurs earlier and has a higher peak flow. Annual water yield has almost certainly decreased.

Channel modifications and flow diversions associated with historic mining activity or road crossings may also be affecting the timing and peak of runoff. Bare ground near the stream bank related to the aforementioned features increases velocity of overland flow and decreases infiltration rates before water enters the stream channel. Therefore, the peak flows have more than likely increased, and the lag time to the peak flows has decreased.

Collar Gulch supports an isolated population of westslope cutthroat trout, a BLM sensitive species. This population is a pure strain of westlope cutthroat and is in marginal condition due to the persistence of drought conditions which have limited streamflow in several reaches of the creek.

Forests in the Collar Gulch drainage are over-stocked and at risk of large-scale stand-replacing fires. In addition, vegetative within the riparian area has decreased as a result of conifer encroachment into birch stands and increased tree density within stands that shade out understory species. The stream is lacking deep pool fish habitat and has been impacted by mining.

An old check dam is located within the westslope cutthroat habitat of Collar Gulch. It is acting as a partial fish barrier and limits spawning gravels entering the reach of stream downstream of the dam. During base flow conditions (about 1 cfs), Collar Gulch flows go subsurface, providing less than two miles of habitat and Shepard (1996) found the majority of the fish in one mile of stream. To date, no habitat improvements have been implemented to improve the viability of westslope cutthroat trout in Collar Gulch.

A population estimate was completed on September 9, 2004 by Montana Fish, Wildlife and Parks and BLM. Survey results indicated 54 westslope cutthroat trout (WCT) over 4 inches per 1000 feet and 181 WCT over 3 inches per 1000 feet.

Chicago Gulch originates on the east side of the Judith Mountains and flows approximately 2.5 miles to its confluence with Fords Creek. Sampling was conducted along a 300 foot reach in Section 28 (T17N, R20E). Species captured were all brook trout ranging in size from 1.5 inches to 9 inches and averaging just less than 5 inches.

Population numbers were calculated to be 84 fish per 300 feet (North Wind Environmental 2002, Fisheries Report).

The brook trout population in Chicago Gulch was sampled by Montana Fish, Wildlife and Parks (FWP) and BLM on September 10, 2004. The brook trout population was estimated at about 477 fish per 1000 feet for fish exceeding 4 inches (total length) The estimate is almost ten times higher than WCT in nearby Collar Gulch (Tews 2005).

Chicago Gulch has the greatest potential for reintroduction of westslope cutthroat trout. Montana FWP has expressed interest in establishing a second population of westslope cutthroat in the Judith Mountains, and will be conducting an environmental assessment for such reintroduction. BLM has agreed to cooperate with FWP on the project, should FWP's decision be to proceed with it.

Fisheries habitat is similar to Collar Gulch, but appears to have more habitat available. In addition, there are fewer overstocked stands within the riparian area and the risk of stand-replacing wildfire is less. However, deep pool habitat is still lacking and there are areas within the drainage that exhibit overstocked stands with high intensity wildfire concerns.

Fish sampling at Alpine Gulch and Armells Creek failed to produce any fish. Habitat is marginal, but private landowners state that they have seen fish in Alpine Gulch. During high flows, brook trout may move upstream into Alpine Gulch from beaver ponds on Warm Springs Creek. Initial appearance of the aquatic fauna appears normal for a mountain stream. Fish sampling along Lincoln Gulch yielded many brook trout at one location and one sculpin plus several brook trout at another. The complete report for fish sampling surveys (North Wind Environmental 2002, Fisheries Report) is available in the project file located at the BLM Lewistown Field Office.

3.4.2 Proposed Action – Environmental Consequences for Riparian and Aquatics

Direct Effects

Aquatic Species Beneficial direct effects are expected for westslope cutthroat populations, due to the removal of brook trout from Chicago Gulch and the transplant of westslope cutthroat from Collar Gulch if the analysis and decision by MT FWP is to proceed with the transplant. The proposed actions will increase the habitat available, making it possible to expand the range for westslope cutthroat populations.

Direct effects that could cause mortality to aquatic species will be negligible to the populations. Potential direct mortality could be caused by a tree or log felled or placed in the stream, dam removal in Collar Gulch, an oil spill from harvest equipment that drifts downstream into fish habitat, or livestock stepping on fish redds (this will not occur in Collar Gulch). The potential direct mortality associated with these actions will be of such low occurrence that it will have negligible effects on aquatic species populations.

The potential for oil spills will be mitigated by Montana Streamside Management Zone Law and Rules (DNRC 2002).

Riparian Health The LWM placement and riparian planting will benefit riparian health by improving stream function, dissipating energy associated with high flows, and developing diverse channel characteristics that are necessary for aquatic species and wildlife. During LWM placement, care will be used to not disturb any more riparian vegetation than necessary.

LWM will also help mitigate the impacts from livestock on Armells Creek and Alpine Gulch. Trailing within the riparian zone and utilization of woody species will be limited by LWM, and progress will be made toward reaching PFC. Mitigation techniques associated with livestock grazing include the Standards and Guidelines that are integrated into the grazing permit.

The vegetation treatments in the proposed action will provide a direct beneficial effect to riparian health by making the riparian vegetation less vulnerable to high intensity wildfire. In order to minimize riparian disturbance, SMZ laws and Water Quality BMPs will be utilized to protect the riparian zone.

Water Quality The LWM will help improve stream shading, thus decreasing water temperature. It will also dissipate stream energy, stabilizing stream banks against cutting action and reducing sediment delivery. During LWM placement, minor amounts of sediment will enter the stream. In order to minimize sediment delivery, instream work will be performed during low-flow periods.

Water quality impacts associated with livestock grazing will be minimized by the LWM. Livestock will be forced to trail outside the riparian zone and will be limited to watering at specific locations. Sediment related to livestock crossings and bank erosion is expected to decrease. Riparian vegetation will improve, aiding in flood-plain development and sediment retention. Livestock grazing management will be required to follow the Standards and Guidelines in the grazing permit.

SMZ laws and Water Quality BMPs limit direct water quality effects from the vegetation treatments in the proposed action.

Hydrology Placement of LWM will not directly affect quantity or timing of runoff from the Judith and Moccasin Mountains. Livestock grazing may cause localized, site-specific increases in runoff and erosion on cattle trails. However, cumulative hydrologic effects will be minimal.

The vegetation treatments in the proposed action will have a direct effect on hydrology. Decreased canopy density and smaller patch size will decrease the evapotranspiration rate, increase snow accumulation, and decrease melting rates. Annually, marginally larger quantities of water will be available for runoff in the treated areas.

Indirect Effects

Indirect effects involve the following parameters identified within the project area: erosion and sedimentation, temperature, stream and canopy cover, large woody material, pool habitat, streamflows, and bank stability. These parameters are important for westslope cutthroat trout habitat, and other aquatic-dependent species.

Erosion and Sedimentation Potential effects from increased erosion and sedimentation on fish and aquatic habitat and populations within the project area could occur. However, it will only be short-term, and no adverse effects are expected. In the long-term, beneficial effects will result from reducing the risk of high intensity fire to fish and aquatic habitat. The westslope cutthroat population is currently in danger from the negative effects from a high intensity fire, due to overstocked stands that are at risk of large-scale crown fires.

The risk of erosion and sedimentation reaching a stream from this project increases with the amount of bare ground or mineral soil exposed and the degree of soil compaction. This could occur from logging, road construction, prescribed burning, and livestock grazing. However, the following measures reduce the amount of compaction and bare soil associated with the project:

1) Best Management Practices, as espoused by Montana Department of Natural Resources and Conservation will be implemented (MSU Extension Service 2001).

2) Streamside Management Zones following Montana state law (DNRC 2002) will be implemented.

3) Tractor logging will not occur where the average slope is greater than 40 percent. In such areas, operations will be limited to helicopter, cable logging, and other aerial systems that minimize ground disturbance or manual thinning to prevent erosion on steep slopes.

4) No machine operations will occur during wet periods when excessive soil compaction is likely to occur.

5) Within 100 ft. of the high water mark (slope distance) on both sides of Collar and Chicago Gulches, ground-based machinery will be limited and prescribed burning will be limited to hand/jack pot piles.

6) Riparian thinning treatments will occur in a mosaic pattern.

7) Livestock management practices designed to reduce impacts to streams will occur.

8) Upland treatments will occur over a ten-year period of time and will result in a mosaic pattern over the project area.

Temperature, Stream Shade and Canopy Cover Changes in stream temperatures are expected to be negligible from this project, due to the small amount of riparian vegetation removed. Stream shade and canopy cover could be affected in the short-term, however, adverse effects are not expected. In the long-term, this project will have no negative effects, and will reduce the risk of high intensity fire to fish and aquatic habitat.

Thinning of conifers within the riparian area will increase shading from deciduous species, improve vegetative diversity and increase nutrient input to streams. This thinning will not involve the removal of any deciduous shrubs or trees, unless they are extremely decadent and cutting is expected to stimulate sprouting. The thinning will create a mosaic pattern, with the objective of improving fisheries and aquatic habitat. Planting, fencing, and/or other livestock management practices will occur on those streams lacking stream/canopy cover and riparian vegetation. In addition, all stream habitat work will be conducted under the supervision of a fisheries biologist or hydrologist.

Large Woody Material (LWM) and Pool Habitat LWM, ideally sized 9 inches or greater at the butt end, will be added to fish-bearing streams to improve the quantity and quality of pools. Currently, instream fish habitat is typically lacking deep pool habitat. In the nonfishbearing streams, LWM additions will help reduce erosion and facilitate the capture, storage and safe release of water.

The quality of future LWM recruitment should also improve from riparian thinning. Fewer trees will be available for future LWM recruitment due to thinning, but the size of trees available will increase. Larger trees are better able to provide the deep pool habitat needs of fish and the capture, storage and safe release of water. As a result, fish habitat will improve in the short and long term.

Streamflows The potential effects to fish and aquatic habitat from changes in streamflows will be minimal. Accelerated peak flows are typically associated with clearcuts more than basal area thinning. Basal area thinning occurs in 97 percent of the forest health treatment areas, whereas clearcut prescriptions only occur on 3 percent of the treatments. In addition, no clearcuts over ten acres will occur and no more than 50 percent of the areas proposed for this treatment will be cut in a ten year period. These measures will significantly reduce the possibility for accelerated peak flows. Prescribed burning will have similar results as basal thinning.

Road construction on BLM lands will occur in the Pyramid Peak area and the North Moccasin Mountains for a total of 3.20 and 2.4 miles in length, respectively. Road construction on state lands will occur within the Burnett Peak, East Armells, Iron Gulch, Log Tree Gulch, and Maiden Peak areas for a total of 1.7, .7, 1.5, .9 and 2.8 miles in length, respectively. These roads are not located within the watershed associated with westslope cutthroat trout. No known fish habitat exists where road construction activities will occur, although, some aquatic invertebrate and amphibian habitat may exist. These roads will be constructed following the Montana Streamside Management

Zone law (DNRC 2002) and Best Management Practices (MSU Extension Service 2001). These laws and practices are designed to protect water quality and stream functionality by not allowing road construction to occur in perennial streams, except at designated crossings. In areas outside the SMZ, Best Management Practices will require proper road placement and drainage.

Skid trails will be limited to slopes less than 40 percent and will be limited to forest health and interface treatment areas only. Again, adherence to BMPs and SMZ laws will limit the amount of soil compaction and disturbance.

Bank Stability Effects to bank stability are considered to be negligible. Bank stability problems can occur from increased peak flows, when logging and yarding systems are located adjacent to the stream, and heavy grazing within the riparian zone. Accelerated peak flows are expected to be minimal from this project. Use of ground-based equipment will be limited within Collar and Chicago Gulches. In other streamside areas, adherence to the Montana Streamside Management Zone law will mitigate effects. Livestock grazing concerns are limited in this area due to inaccessibility. In those areas where grazing concerns exist, measures will be taken to improve riparian conditions.

Cumulative Effects

Potential cumulative effects could occur from the relevant past, present, and foreseeable future actions. These actions include: mining, logging, fire suppression, livestock grazing, residential areas, recreation, existing roads, agriculture/irrigation, road reconstruction and maintenance, in addition to the activities associated with the proposed action.

The cumulative effects associated with the proposed action are similar to the effects identified in indirect effects. The primary potential effects associated with this project are erosion, sedimentation, and changes in stream flows. The effects will be short-term and not detrimental to westslope cutthroat trout and other aquatic species. Beneficial effects from the proposed action will result from increases in LWM, pools, riparian diversity, and a decrease in the risk of high intensity wildfire.

Riparian Health The placement of LWM and the implementation of grazing Standards and Guidelines will continue to improve the riparian health. LWM will dissipate stream energy and protect riparian vegetation and stream banks from livestock impacts. Riparian vegetation will be enhanced, thereby capturing sediment and improving water quality. Vegetation treatments will protect the riparian area from high intensity wildfire.

Water Quality Cumulatively, the proposed action will lead to a small improvement in water quality. Better stream shading associated with functioning riparian areas and increased volumes of water available for runoff from the vegetation treatment areas will result in cooler water temperatures and improved sediment retention.

Hydrology The placement of LWM will have little cumulative effect on watershed hydrology in the Judith and Moccasin Mountains. Livestock grazing will also alter runoff on a small scale relative to the size of the analysis area. Although the timing and quantity of runoff will trend towards more natural conditions in the vegetation treatment areas, cumulative improvement for the mountain ranges as a whole will be minimal because treatment areas are only a small percentage of the area.

A short-term increase exists in the potential for cumulative effects from this project in combination with past and present activities. However, beneficial effects will occur for other parameters (identified above) and an overall positive effect will occur, due to the habitat improvement projects and the reduction in risk of stand-replacing wildfire.

3.4.3 Current Management – Environmental Effects for Riparian and Aquatics

Management in Collar and Chicago Gulches and other streams and draws in the project area will continue unchanged. No specific actions to improve fish and aquatic species habitat and populations will occur. Vegetative diversity within the riparian area will remain unchanged. No hazardous fuel reduction will occur in the upper slopes of Collar Gulch. Instream habitat improvement projects will not occur.

Direct Effects

In the event of high-intensity wildfire, the population of westslope cutthroat could be severely impacted by ash and sediment, high stream temperatures, and could potentially be extirpated. In addition, direct mortality from high intensity wildfire to other fish and aquatic species could occur.

Riparian Health Riparian areas that are in PFC or FAR in an upward trend will continue to improve under current management. Riparian areas that are NF in a static trend will remain in the degraded condition. The riparian zone will also be vulnerable to high intensity wildfire, which could alter water quantity, water quality, timing and aquatic life.

Water Quality Riparian areas and aquatic habitat will not be improved by LWM or riparian planting. Stream temperature and sediment yield will remain the same. Watersheds in the Judith and Moccasin Mountains will remain vulnerable to high intensity wildfire. The water quality impacts from a stand-replacing wildfire under current forest conditions would be greater than the impacts that would have occurred under historic conditions.

Hydrology The watersheds in the Judith and Moccasin Mountains will continue to yield small runoff volumes relative to historic conditions. Furthermore, the timing and quantity of peak flows will remain altered. High intensity wildfire would affect watershed hydrology by increasing the frequency and magnitude of peak flows.

Indirect Effects

Riparian Health Degraded riparian areas will continue to contribute waters with higher temperatures and sediment to downstream water users.

Water Quality Altered watershed hydrology and erosion following a high intensity wildfire would increase the water temperature and siltation in downstream waterways significantly more than what would have occurred under historic vegetation and fire regimes.

Hydrology A stand-replacing wildfire would change the timing and peak of runoff in the watersheds. Peak flows would occur with greater frequency, have higher peaks, and runoff faster than runoff following a fire under historic conditions. The altered timing and peak of runoff would increase erosion and morphologically adjust stream channels causing water quality problems downstream.

Large woody material levels and deep pool habitat will not be improved. Vegetation diversity, species diversity and stand structure within the riparian areas will not be improved and will continue to decline. The likelihood of high intensity, stand-replacing fires will increase over time. The available fish habitat in Collar and Chicago Gulches and other streams will not be improved. The existing condition of headwater streams and fish habitat in downstream fisheries will not be improved.

Cumulative Effects

The human-caused effects from past and present activities on private and public lands in the analysis area includes mining, logging, fire suppression, livestock grazing, residential areas, recreation, existing roads, agriculture/irrigation, road reconstruction and maintenance. Natural conditions and these actions have shaped the existing condition of aquatic species habitat and populations.

Mining causes many changes to fish habitat. In the past some streams were dammed in the analysis area; harmful minerals and chemicals were deposited in streams; roads and cabins have been built in riparian areas; riparian vegetation has been removed. Cumulative effects are possible.

Logging and Fire Suppression Potential impacts from past/current logging and fire suppression is primarily associated with erosion and the development of unnaturally dense stands. Erosion from these two activities is limited to the amount of marketable timber available and the limited amount of acres and timing associated with fire suppression. However both of these activities have contributed to the development of unnaturally dense stands. Therefore, logging and timber related activities could have potential effects to aquatic habitat and populations. Cumulative effects are possible.

Livestock Grazing Livestock grazing occurs within the analysis area. Potential impacts are increased erosion and higher stream temperatures caused from reduced riparian

vegetation through livestock browse, livestock reservoirs that breach, and livestock trailing and loafing. The degree of effect varies throughout the drainage and depends on the vegetation types, grazing system, topography, fencing, water, forage availability, and natural conditions. Livestock grazing could have potential effects on aquatic habitat or populations. Cumulative effects are possible.

Residential Areas Effects from residential areas include erosion and changes in water quality and streamflows. There are no major residential areas within the analysis area, although Lewistown is in close proximity. The residential areas primarily consist of ranches and ranchettes spread across the analysis area on private land. Generally, the analysis area could be described as sparsely populated, reducing the potential for effects on habitat or populations. However, cumulative effects are possible as residences are concentrated in the areas of Maiden, Gilt Edge and Kendall.

Recreation Recreational activities in the analysis area include hunting, camping, hiking, fishing, ORV use, etc. The main effects from recreational activities are related to ORV use on unauthorized roads and trails. This damage can cause increased erosion, changes in water quality, and direct take of aquatic species. The formation of unauthorized roads and trails is an ongoing problem in the Judith and Moccasin Mountains. Therefore, cumulative effects are possible.

Existing Roads Roads have the potential to increase erosion, block fish passage (where culverts are installed) and remove riparian and upland vegetation. It is likely that past road construction activities and current road locations are having some effect on aquatic life. Therefore, cumulative effects are possible.

Agriculture and Irrigation Potential impacts from agriculture and irrigation are decreased streamflows, changes in water quality and erosion. Agriculture is primarily limited to dry land farming or irrigated farmland adjacent to large perennial streams in the analysis area, potentially affecting fish and aquatic habitat and populations. Cumulative effects are possible.

Road Reconstruction and Maintenance Road reconstruction and maintenance occurs at some level on all of the BLM, state, county roads within the analysis area. The main effects from road (re)construction and maintenance are associated with erosion and, in some cases, decreased vegetation adjacent to the river and streams. However, in many cases road maintenance and reconstruction reduces the risk of erosion by preventing failures during high flood events. Therefore, road (re)construction and maintenance activities have questionable adverse effects on aquatic habitat or populations. Cumulative effects from this activity are expected to be minor and not detrimental.

Determination The degree of cumulative effects from the combination of the above current and past activities within the analysis area depends on a variety of factors, some of which are natural. Drought conditions have affected aquatic habitat and populations

within the drainage for the past several years. Local geology, severe wildfire, and soil composition also influence water quality, streamflows, and erosion.

Of the above activities, mining, logging, fire suppression, livestock grazing, residential areas, recreation, existing roads, and agriculture/irrigation indicate potential cumulative effects to aquatic habitat and populations. The other activity, road reconstruction and maintenance, has a minor potential for cumulative effects and is determined not to be detrimental. Although difficult to quantify in numerical terms, it is reasonable to assume that, with the magnitude of cumulative activities there will be some impacts to most aquatic species residing in the area that cannot be avoided.

3.5 Range

3.5.1 Affected Environment

Upland range health assessments were conducted in 2002. Current ecological condition was assessed for 46 grazing allotments on public land managed by the BLM. Most of the allotments occur in a patchwork with private rangeland. Many lack fences and rely on the local topography to provide natural barriers. Logging activity and wildfires have occurred in some areas, but most of the sites are densely wooded with undergrowth limiting forage production. The allotments on the upper mountain slopes have steep slopes, scree fields, limestone outcroppings, and limited access to water. These factors have contributed to limited forage use for many of the allotments. Plant communities on BLM allotments reflect conditions influenced by natural factors and other management activities as well as grazing pressure.

Lack of water plays a principal role in the distribution of livestock on certain allotments. Some of the allotments are surrounded by or adjacent to private lands, and the developed water sources on these private lands support grazing on the public lands. Most of the allotments consist of steep, forested land, with some area conducive to livestock grazing. Although maps of the area show creeks or springs, these may be located in areas inaccessible to livestock or only provide water on a seasonal basis.

The plant communities found within the Judith-Moccasin analysis area are indicative of the Northern Great Plains and Rocky Mountain ecosystem types. The herbaceous vegetation is dominated by cool season grass and forb species. Dominant native grass vegetation includes bluebunch wheatgrass, needle and thread, green needlegrass, rough fescue, prairie junegrass and numerous native forbs and shrubs.

Only one special status vascular plant species, little Indian breadroot, is reportedly found in the analysis area (NRIS 2003). The distribution of this species is relatively secure, though it is rare in parts of its range, especially at its periphery. This species does not require special management. To date, no other special status or plant species of special concern are found in the Judith and Moccasin Mountains.

3.5.2 Proposed Action – Environmental Consequences for Range

Direct Effects

Implementation of the proposed action will result in several direct effects to livestock grazing, vegetation and grazing administration. In the short term the prescribed burns will result in decreased amounts of herbaceous forage. Forest thinning may result in a temporary reduction in forage, but by the first growing season after thinning in the foothills of the Snowy Mountains, herbaceous vegetation increased above the untreated condition (Ellingson 2005). Treatments within the Judith and Moccasin mountains are expected to respond in a similar fashion.

Due to this temporary loss of forage and ground cover, portions of several grazing allotments may need to be rested from grazing for up to two full growing seasons to allow for the regrowth and establishment of desired herbaceous vegetation and deciduous shrubs. Table 3.12 lists the total number of acres and AUMs of the allotments to be treated as well as the number of acres and AUMs that will be impacted by the proposed treatments. If monitoring data suggests that affected allotments will support livestock grazing while continuing to meet or make significant progress towards meeting standards for rangeland health, livestock will be authorized to graze the allotments according to the authorized permits. In the long term, herbaceous vegetation should respond favorably to the proposed treatments. Treatments will be spread over a period of approximately ten years, so impacts to the allotments will be staggered over time.

The placement of large woody material in selected riparian areas will have limited impacts to livestock grazing within the allotments affected. Many of the drainages where the material will be placed provide limited access to livestock, and several of the affected allotments are currently unallocated. Potential impacts include reduced access to portions of the streams, and cattle may have to trail higher up the slopes out of the riparian zones.

The manner in which the potential two growing seasons of rest is managed will be based on consultation and coordination with the affected permittees on an individual allotment basis. Adaptive management will be used in order to allow livestock grazing in portions of allotments that are not going to be treated. Management options could include, but are not limited to the following options: temporary electric fence, permanent fence, water and/or mineral placement, changes in authorized season of use, etc.

Indirect Effects

The thinning of the existing timber stands through mechanical means and prescribed fire will allow livestock access to forage that may have previously had limited accessibility. The amount of herbaceous forage production will increase due to decreased competition for light, nutrients and water resulting from conifer removal. This

Table 3.12 Allotments affected by proposed vegetation treatments.

Allotment ID	Allotment Name	Total Acres*	Total AUMs	Treated Acres	Treated AUMs	% of AUMS Affected
02524	Whiskey Gulch G.R.	721	22	294	9	41%
02525	Alpine Gulch J.R.	450	28	211	13	47%
02600	Pekay Peak	635	0	143	unallotted	
02603	Maginnis Mountain	954	48	635	32	67%
02615	Ross Pass	705	62	101	9	14%
02617	Sheep Mountain	1729	0	984	unallotted	
02627	Judith Peak	802	49	702	43	88%
02644	Three Links	904	193	19	4	2%
02649	Lookout Peak	304	24	80	6	26%
02660	Flat Mountain East	40	4	40	4	100%
02661	Alpine Gulch G.R.	590	8	214	4	36%
02667	Shelternook	1387	67	155	8	11%
02674	Box Elder Ranch	955	65	122	9	13%
02681	East Fork Fords Creek	757	10	381	5	50%
10036	North Moccasin	1873	122	1039	67	55%
10042	Judith Mountain Common	790	54	251	18	32%
10053	Deer Creek	280	40	86	13	31%
10058	Spear T Ranch	297	24	12	1	4%
10059	Spear T Common	442	25	366	21	83%
10060	Milburn Place	628	42	540	37	86%
10073	Whiskey Gulch J.R.	838	45	564	31	67%
12610	Elk Peak	202	21	8	1	4%
19741	South Moccasin	1316	27	415	9	32%
20032	Jackson Coulee	235	24	82	9	35%
20056	North Fork Warm Spring	191	24	33	4	17%
20068	Ruby Gulch	272	6	165	4	61%
20069	Mason Canyon	799	88	446	50	56%
20076	Limekiln	597	30	596	unallotted	
20077	Shammel	149	53	90	32	60%
20082	Devils Canyon	545	20	107	4	20%
20083	Pyramid Peak	2278	72	1589	51	70%
	Total:	22665	1297	10470	528	46%

* Acres are derived from GIS spatial analysis.

increased amount of forage may reduce livestock grazing impacts to areas closer to existing water sources and may improve livestock distribution as areas become more accessible through reduced forest densities.

Cumulative Effects

New term grazing permits will incorporate Standards for Rangeland Health and Guidelines for Grazing Management. Specific terms and conditions will be incorporated

for the allotments identified as not meeting the Standards for Rangeland Health due to livestock concerns (see Table 2.6).

The overall impacts of the proposed action to existing vegetation will be positive. Prescribed fire will generally benefit desired woody vegetation that sprouts after burning, and will also result in different age classes of desired deciduous shrubs, which helps to maintain a healthy ecosystem. Herbaceous vegetation will increase as a result of forest thinning and prescribed fire. The areas impacted by the proposed treatments within individual allotments will vary in size, when compared to the entire allotment, which will create a landscape with a diversity of vegetative conditions and age classes.

3.5.3 Current Management – Environmental Consequences for Range

Direct Effects

The management of rangeland resources will proceed as specified by the 1992 JVP RMP and amended by the 2003 Montana/Dakotas Fire and Fuels Management Plan. Grazing of the allotments potentially affected by the proposed action will continue in accordance with their existing grazing permits using current terms and conditions.

Indirect Effects

The encroachment of conifers into areas currently dominated by herbaceous vegetation will continue to occur, leading to reduced amounts of available forage for livestock and wildlife. Poor livestock distribution will cause their use to become concentrated on areas with lower densities of trees. These factors could lead to an increased number of grazing allotments not meeting the standards for rangeland health, which will decrease the resource value of public lands and increase conflicts with other resources.

Cumulative Effects

Continuation of current management within the Judith and Moccasin Mountains analysis area will lead to decreasing forest health and increasing encroachment of conifers into areas that have been historically dominated by herbaceous vegetation. These factors will in turn lead to increased potential for high intensity wildfires and decreased range conditions. The potential for riparian degradation and poor water quality will also increase along with the potential for the loss of wildlife habitat if the current management is continued. These cumulative affects will lead to greater demands on the forage that is available and may lead to more allotments failing to meet the standards for rangeland health.

3.6 Noxious Weeds

3.6.1 Affected Environment

Scattered infestations of leafy spurge, Russian knapweed, spotted knapweed, houndstongue, Canada thistle, dalmatian toadflax, yellow toadflax, and whitetop occur

throughout the analysis area. Noxious weed locations were surveyed concurrent with the 2002 upland range health assessment. Numerous allotments were identified as having weed infestations. Weeds are controlled by both the BLM and grazing permittees on a site by site basis. A combination of weed control techniques have been used in the past, including herbicide, insects, grazing, mechanical treatments and prescribed fire.

3.6.2 Proposed Action – Environmental Consequences for Noxious Weeds

Direct, Indirect and Cumulative Effects

Weed infestations on allotments will be controlled by the permittee as a condition of the grazing permit. All weed infestations on unallocated public land will be treated by the BLM. Weeds will be controlled immediately upon discovery by both the permittee and the BLM. Since weed control will be immediate and site-specific, weeds will be controlled more quickly with fewer resources than under current management. More effective noxious weed control will increase native species composition and improve rangeland health.

3.6.3 Current Management – Environmental Consequences for Noxious Weeds

Direct, Indirect and Cumulative Effects

The control of noxious weeds will proceed as specified by the 1992 JVP RMP and amended by the 2003 Montana/Dakotas Fire and Fuels Management Plan. Known and existing infestations of weeds will continue to be controlled on BLM lands. The potential for spread would exist.

3.7 Visual Resources

3.7.1 Affected Environment

A VRM inventory was completed in the JVP RMP EIS. The Judith and Moccasin Mountains area is identified in the JVP EIS, Map 1, Side A.

A VRM inventory consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. Based on these factors, BLM-administered lands are placed into one of four visual resource inventory classes. These inventory classes represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV has least value (BLM 1992).

In the analysis area there are two classes: Class II and III. For Class II VRM management activities may be seen, but should not attract the attention of the casual observer; changes must conform with the predominant natural features of the landscape. Class III VRM allows for evident contrasts or changes to the basic elements

of the landscape, but recommends the change not dominate the attention of the viewer (BLM 1992).

In the Judith Mountains all BLM lands are designated as Class II VRM. A 3,702 acre Scenic Area of Critical Environment Concern was designated in the JVP RMP (see Figure 1.1). In the South Moccasin Mountains all BLM lands were designated as Class II VRM. Only the North Moccasin Mountains is designated as Class III within the analysis area.

Judith Mountains Scenic Area ACEC The Judith Mountains Scenic Area ACEC was designated in the JVP RMP with the intent of protecting scenic, wildlife, and recreation values located in portions of the Judith Mountains that form the backdrop for the town of Lewistown. The ACEC includes approximately 3,700 acres in the southwest end of the mountain range. Sightseeing, scenic driving, hiking, mountain biking, and hunting are considered as main recreational activities in this area. Some ORV use occurs mainly on unimproved roads and trails in the upper end of Limekiln Canyon.

3.7.2 Proposed Action – Environmental Consequences for Visual Resources

Direct Effects

Thinning operations will cause some visual effects in the analysis area. During thinning operations, people who live or travel to the area will see freshly cut trees, landing piles and fresh slash. Slash piles and scattered slash will persist for one to two years after thinning before it can be burned, except where slash is chipped or ground and possibly utilized for biomass fuels. Temporary logging trails and skid roads will persist until they are reclaimed anywhere from two to five years after being established.

Visual Contrast Rating (VCR) analyses will be required to mitigate visual impacts from all proposed vegetation thinning projects. The contrast ratings will be conducted from at least two and possibly three or more Key Observation Points (KOP) per treatment, due to the scenic visual quality of the area and public sensitivity to changes in the landscape.

The need for visual mitigation measures will be determined through the VCR. Mitigation may include: non-linear or curved alignment of the main proposed access roads to better blend into the contours of the landscape, mosaic thinning patterns that resemble natural land patterns, and avoidance of ridge top timber removal. The existing thinning prescriptions already incorporate many of these measures through the emphasis on uneven grouping and variation within a stand for tree spacing, basal area retention and large tree retention. Visual mitigation measures are generally not expected to be at odds with the fuels and forest health objectives.

Indirect Effects

Thinning operations, once completed, will generally be visible from afar due to the protrusive nature of the island mountain ranges in the plains landscape. Treatments in the Limekiln area will be visible directly from Lewistown and will appear as a more open, rough-textured forest in contrast to the solid forest canopy that now occupies the view.

At a closer scale, large trees that are retained during thinning treatments will be more visible than currently, and they will persist longer in the landscape.

Cumulative Effects

Cumulatively, the forest health and vegetative diversity treatments will add visual diversity to the landscape. Where forest canopies are open and less dense, more herbaceous and deciduous vegetation will grow, and this will be visible through the trees from afar. More snow will accumulate on the ground beneath an open canopy, and this too will be visible through the trees. With the increase in deciduous shrubs and aspen stands the ranges will show more color in the fall.

Fuels treatments will help protect the visual resources of the analysis area by reducing the likelihood of a large, stand-replacing fire and, in the long run, retaining a more constant level of forest cover. Vegetation treatments will also reduce the risk of developing insect epidemics in the mountain ranges, further contributing to the protection of visual resources.

3.7.3 Current Management – Environmental Consequences for Visual Resources

Direct Effects and Indirect Effects

No forest thinning or vegetative diversity treatments will occur, so there will be no temporary landing piles, slash piles, logging trails or skid roads. The direct effect of continuing current management will be to keep the visual resources in their current state. Large old trees will continue to be obscured by dense, younger trees.

Cumulative Effects

No increases in open forest canopies, aspen stands and herbaceous vegetation will occur. Over time, meadows and aspen stands will decrease, and the visual aspect from afar will become more homogenous.

An example of the expected long term effects of current management on visual resources can be seen in the 6300 acre Burnett Peak Fire that burned in 1991. With continuation of current management, increasing portions of the range will suffer stand-replacing fires, the visual and ecological effects of which are expected to persist for decades after the event.

3.8 Recreation

3.8.1 Affected Environment

The analysis area includes the Judith Mountain Special Recreation Management Area (SRMA), which includes most types of dispersed recreation. Some designated hiking trails are maintained in the Judith Mountains, including Collar Peak Trail and Limekiln Trail. The Judith Peak area and the Maiden Canyon area have numerous two-track trails on which people hike and use motorized equipment such as ATV's and mountain bicycles. A small picnic area is located in the lower end of Limekiln Canyon. Recreation access has been limited throughout the analysis area due to large tracts of private land which generally require landowner permission to access BLM lands.

No developed recreational sites are located in the North and South Moccasins although access can be gained to BLM lands in the North Moccasins through roads near Kendall.

3.8.2 Proposed Action – Environmental Consequences for Recreation

Direct Effects

Recreation in the Limekiln Canyon area could be reduced in the short term by the timber and vegetative thinning operations because of conflicts and/or safety concerns. Recreational use is expected to continue on existing BLM trails used by the public, but when operations occur in Limekiln Canyon and Collar Gulch areas, vegetative treatments have the potential to disrupt activities associated with the hiking trails. Careful consideration of when thinning operations occur is needed to minimize these conflicts. However, the potential exists for there to be temporary recreational use restrictions on non-motorized and motorized uses when logging or vegetative treatments are occurring nearby. If public recreational use is allowed when operations are being conducted, noise levels in treatment areas and near to adjacent hiking trails could disrupt or preclude recreational activities in the short term regardless of the decision to allow public use to continue during vegetation treatments.

Use of the trails by work crews could also impact hiker solitude, and perhaps damage the trails if mechanized equipment or transportation of personnel with ATVs is authorized. A wide, hiking-horseback-mountain bike trail has recently been created along the west side of Limekiln Canyon where ATVs can negotiate passage to some of the proposed treatment areas. The use of ATVs during implementation of vegetation treatments would cause damage to the trail that would need to be repaired prior to operations exiting the area.

Temporary closures of hiking or legal ATV routes due to safety concerns for the general public will be posted in the local newspaper and signing placed at appropriate locations prior to beginning any actual work. The public will also be notified as to when slash burning will occur. Smoke has the potential to displace recreational users in the short term independent of safety concerns. Overall, the most appropriate times to conduct

these vegetative treatment operations to reduce conflicts with recreation would be during the week and in the early spring or fall seasons, when use levels are lowest.

Indirect Effects

Vegetative treatments will improve wildlife habitat on public land and are expected to increase the number of wildlife and the time spent on public land. This effect may increase opportunities for hunting and viewing wildlife in treated areas, thus enhancing recreation.

Cumulative Effects

OHV use could expand in treated areas due to the creation of new roads and temporary skid trails. Opening up the forest and reducing dense understories may also result in more illegal OHV use where slopes are gentle.

3.8.3 Current Management – Environmental Consequences for Recreation

Direct and Indirect Effects

Recreation will not be directly affected by continued current management. Indirect effects will result from a continued decline in wildlife habitat and viewing opportunities on public land.

Cumulative Effects

The continued and increasing risk of stand-replacing wildfires will, in the long term, have negative impacts for recreation in the Judith and Moccasin Mountains. In the event of a high intensity fire, recreation values will be greatly reduced.

3.9 Cultural Resources

3.9.1 Affected Environment

Cultural resources are definite locations of past human activity, occupation, or use. Traditional values are the traditional systems of religious belief, cultural practice, or social interaction that are not closely identified with the definite locations (BLM 1992).

The prehistoric period began around 14,000 years ago and ended around 1855, with the signing of the Blackfeet Stevens Treaty. Miners began working the Judith Mountains for gold and silver in 1880, and towns like Maiden and Gilt Edge sprang up near the mines. Joe Anderson and David Jones made the first discovery in May 1880 (Leeson 1885). Somewhat later, the mining spread to the nearby Moccasin Mountains and the town of Kendall was created.

Collar Mine was discovered in August 1880, and the associated 20-stamp mill was constructed in 1880 as well. Even though the Collar Mine was not the first mine

discovered in the district (that happened four months earlier) it was the first mine to be developed.

In 1885 the Fergus County sheriff sold the mine and mill to Eugene Smith for $7,550. The mill equipment ended up at the Spotted Horse Mine, about two miles away. The Spotted Horse Mine did not produce enough water for industrial use, so a pumping plant was placed in Collar Gulch. The dams currently identified in Collar Gulch may be associated with that mining and milling activity at Spotted Gulch.

In the early part of the twentieth century, thousands of homesteaders arrived and the area was quickly settled.

The BLM conducted a search of all documented cultural sites in 2002. The State Historic Preservation Office (SHPO) provided a detailed list of all documented sites to the BLM. A total of 27 sites have been recorded in the project area and 11 cultural resource-specific projects have been conducted within the project area. Seventeen of the sites are classified as historical, one is prehistoric, one is multi-component (containing both a historical and prehistoric component), and the remaining eight have no classification because the data collected was insufficient to ascertain site type. Of the recorded sites, one is recommended as eligible for inclusion on the National Register of Historic Places (NRHP), 15 are recommended as ineligible for inclusion on the NRHP, and 14 have unknown, or undetermined, eligibility recommendations.

3.9.2 Proposed Action – Environmental Consequences for Cultural Resources

Direct, Indirect and Cumulative Effects

Cultural resources will continue to be managed under the guidance of the 1992 JVP RMP. Prior to the implementation of any ground-disturbing activity, cultural resource inventories shall be conducted. Any historic properties that are identified shall be evaluated for eligibility for listing on the National Register of Historic Places.

Fuels reduction treatments may reduce the threat of wildfire to cultural sites, particularly wooden historic properties, within the planning area. Historically much of the area in the mining districts was denuded of timber suitable for use as mine stulls, fuel, and construction. Areas especially hard hit were concentrated around mines, mills, and habitation sites. Therefore fuel treatment projects that remove trees generally return the area to a landscape more compatible with a historic mining setting.

Field Research Services, Inc. completed inventories in 2004 and 2005 for fuels reduction projects proposed in association with this analysis. Inventories are on file at the BLM Lewistown Field Office. Their work identified no eligible historic properties that could be affected by proposed fuels reduction activities.

The dam removal project slated for Collar Gulch has the potential to adversely affect the historic cribbed log dam situated in the stream. The dam is a contributing site within the

historic Cone Butte Mining District, which is a sub-district of the Warm Springs Mining District. The dam and the mining district have yet to be recorded or evaluated to determine their eligibility for listing on the National Register of Historic Places.

As a result of this project we are increasing our surveyed area and knowledge of historic properties within the analysis area.

3.9.3 Current Management – Environmental Consequences for Cultural Resources

Direct, Indirect and Cumulative Effects

Cultural resources will continue to be managed by the 1992 JVP RMP. Possible effects of any planned actions will be considered prior to initiation. Excessive fuel buildup and the resultant risk of wildfire will remain a threat to cultural sites and other resources.

Since the stream in Collar Gulch has already eroded a channel around the cribbed log dam no further effects to the existing structure are anticipated. Without an action driving it, it is unlikely that we would document the historic sites in the Judith Mountains at the same level that we would if there were an action that could affect the integrity of existing historic properties.

3.10 Economics

3.10.1 Affected Environment

The forest products industry in the planning area is relatively small. This industry generates income from outside the area into the local economy with timber processed at sawmills in Roundup, Hobson, Seeley Lake, Livingston and Townsend, plus a pulp mill in Frenchtown (BLM 1992). Most harvested timber comes from private land and is processed outside of Fergus County.

The current gross value for the potential wood products that may come off forest health and interface treatments is $317-456 per thousand board feet for saw logs (Bureau of Business and Economic Research 2005), $45 per ton of pulpwood and $35 per ton of wood biomass fuel (Atwood 2006). These figures represent the delivered price and do not include the cost of harvesting the material and transporting to the mill or other user.

Recreation is valuable to the local economy in that there are a growing number of seasonal homes in the analysis area that bring extra income to the county in the form of property taxes and expenditures at local businesses. As there are no public campgrounds in the analysis area, this form of recreation is not economically valuable. However, many non-residents come to the area during hunting season for the excellent opportunities to hunt elk, deer, antelope, and upland game birds. In addition, Big Spring Creek is a renowned trout stream, drawing anglers to the area.

3.10.2 Proposed Action – Environmental Consequences for Economics

Direct Effects

Forest Industry The forest health and interface treatments are expected to yield a combination of saw logs, pulpwood and biomass fuel that may be marketable. Some treatment areas will yield a net positive economic value (when the value of wood products exceeds the cost of removal and disposal) and some areas will result in a net cost.

When considered statewide, the average net value of treatments for fire hazard reduction is $624 per acre (Keegan et al 2004). Because this is a statewide average, the figure for the Judith Moccasin analysis area would be expected to be lower, as trees are smaller and markets farther away, than in the western part of the state. However, this average figure does not attribute any value to pulpwood or biomass products. Currently demand is increasing for pulpwood (Atwood 2006), and the hospital in Lewistown has obtained funding to install a biomass incinerator heating system, which may create a local demand for biomass fuel. Therefore the average net value for treatments in the analysis area could be as high as the average figure for the state.

Using these figures, a rough estimate of the potential net value of the forest health (state and federal) and interface treatments would be over six million dollars. The vegetative diversity treatments are expected to result in a net cost. Depending on the demand for biomass fuels (no pulpwood or saw logs are expected from these acres), the net cost may vary between zero and $500 per acre. Thus the net economic value of the project is expected to vary between four and six million dollars.

Recreation The vegetation treatments are designed to improve wildlife habitat on public land and to draw more game animals to public land. Insofar as the public lands are accessible to hunters and the general public, these actions will improve hunting and wildlife viewing opportunities, and will marginally improve the hunting and recreational economy of the area.

Grazing Permits The reissue of term grazing permits will increase the economic stability of the ranches to which the term permits are tied through continued authorization of livestock grazing.

Indirect and Cumulative Effects

Forest Industry Under the proposed action, an average of approximately 1,500 acres per year will be treated for the next ten years. These activities will undoubtedly generate jobs in the local area, and will also generate revenues for local trucking businesses and local and regional mills. Given an expected steady supply of wood products, the existing timber industry is more likely to invest in capital expenditures for utilizing biomass products (Chandler 2006), which will further contribute to jobs in the area and local business revenue, as well as income and business taxes to the state.

The proposed action will contribute incrementally to the continued viability of the forest products industry in the region and will marginally reduce the likelihood of additional mill closures.

Recreation The vegetation management treatments are designed to maintain the aesthetic character of the landscape, and thus are not expected to reduce recreational or seasonal home values of the area. By reducing the risk of stand-replacing fire and improving firefighter and public safety, the vegetation treatments are expected to marginally increase recreational and seasonal home values of the area.

3.10.3 Current Management – Environmental Consequences for Economics

Direct Effects

Forest Industry No additional wood products will be made available and no additional net revenues would accrue beyond current background levels.

Recreation Hunting and wildlife viewing opportunities will not be enhanced on public lands, and will continue to slowly degrade with tree encroachment and loss of deciduous trees, shrubs, and herbaceous understory.

Grazing Permits Continuation of current management could create negative economic impacts to permittees with allotments not meeting health standards in a downward trend. Continued degradation of public rangelands could eventually lead to lower capacities and reduced livestock numbers. Allotments meeting health standards would not be impacted by this alternative.

Indirect and Cumulative Effects

Forest Industry No additional jobs will be created under continued current management, and on a regional level this “no action” alternative will contribute to further mill closures.

Recreation Continued current management is expected to have no substantial cumulative effect on the recreational economy of the area until another large, stand-replacing wildfire occurs. Then the cumulative effect on economic values for recreation and real estate would be negative.

Fire Suppression Costs Continued current management is expected to eventually result in a large-scale, stand replacing fire in the Judith and Moccasin Mountains. Even if the projected economic value of the proposed vegetation treatments is wrong and the true value is negative, any costs would be expected to be substantially lower than the potential costs of fire suppression and rehabilitation.

The Cave Fire on the Helena National Forest in 2000 serves as a pertinent example of this phenomenon. An environmental assessment was completed for forest health and hazardous fuel reduction treatments in a 90,000 acre watershed. The most expensive

alternative that would best remedy the forest health and fuels problems was projected to cost 10 million dollars. Three days after the assessment was completed and the decision record was signed, a wildfire started in the watershed. Much of the watershed burned at high intensity resulting in extensive tree mortality, consumption of duff layers, and extensive soil heating. The resulting costs for fire suppression and watershed rehabilitation were over 17 million dollars (Larsen 2006).

4.0 Consultation and Coordination

4.1 Public Involvement Process

Information letters were sent to all private landowners within the analysis area on April 25, 2002 and to all grazing permittees on May 27, 2002 to introduce them to the project and advise them of the resource inventory work that would occur during summer of 2002.

A scoping letter was mailed to landowners, grazing permittees, interested agencies and organizations, and local governments on January 17, 2003.

A meeting for the purpose of presenting inventory information and conducting public scoping was held at the Montana Fish, Wildlife and Parks building in Lewistown on January 29, 2003. The meeting was attended by 48 people, mostly private landowners from within the analysis area. The concerns that were expressed during the scoping meeting included a general recognition of the elevated fire danger in the mountain ranges and the concern that fuels reduction projects be pursued; concerns regarding changes in wildlife populations and the effects of birds of prey on game bird populations; ongoing weed management in the mountain ranges; and dangers posed by some abandoned mines in the area.

Team members consulted with Fergus County Commissioners and the Fergus County Fire Warden about this project during the preparation of the Community Wildfire Protection Plan (CWPP) for Fergus County, as well as after the completion of the CWPP. Team members also consulted with staff from the Lewistown Office of Montana Fish, Wildlife, and Parks and made two presentations to the Big Spring Watershed Partnership (January and April 2003).

A predecisional draft of the Environmental Assessment was released to the public on March 30, 2006. The EA was mailed to all grazing permittees in the analysis area, the Fergus County Commissioners, US Fish and Wildlife Service, and Montana Fish, Wildlife, and Parks. Over 400 letters were mailed to landowners within the analysis area, tribal governments, the Central Montana Resource Advisory Council, and various interest groups advising of the availability of the predecisional draft. Tribal governments that were contacted include: Blackfeet, Chippewa Cree, Crow, Fort Belknap, Fort Peck, and the Little Shell Chippewa. The EA was available for downloading off the World Wide Web on the Montana/Dakotas BLM site and the DNRC site. Printed copies of the EA were available by request from the Lewistown BLM and DNRC offices.

A public meeting was held on April 4, 2006 in Lewistown. Notice of the public meeting was given in the availability letter, an article in the Lewistown News-Argus on March 29, 2006, and through announcements on KGLT, the local radio station. The meeting was attended by 27 people, not including BLM and DNRC staff. Questions and concerns presented at the public meeting centered around wear and tear on the Maiden-Gilt Edge Road from anticipated log truck traffic, and the potential for the spread of weeds.

During the 30-day comment period, which ran from March 30 through April 30, 2006, a total of 13 written comments were received, plus requests for meetings from two individuals. Two field visits resulted from these individual meetings. Substantive comments focused primarily on the cumulative effects analysis for past logging and fires in the area. Other comments included concerns about air quality impacts, display of private roads on maps or errors in ownership, assessment methodologies and support of prescribed fire and fuels treatments. Specific comments and responses will be included as an appendix to the BLM's Decision Record.

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APPENDICES

Appendix A: The National Fire Plan

1. ASSURING THAT NECESSARY FIREFIGHTING RESOURCES AND PERSONNEL ARE AVAILABLE TO RESPOND TO WILDLAND FIRES THAT THREATEN LIVES AND PROPERTY: An ongoing priority of the National Fire Plan is ensuring that the agencies of the Departments of Agriculture and Interior maintain a world-class firefighting organization. The Departments will continue to provide all necessary resources to ensure that the fire suppression workforce is at the highest efficiency possible in order to protect life and property in as safe a manner as possible. During the life of the National Fire Plan, major efforts to address the shrinking firefighting workforce have been undertaken, including hiring of additional permanent and seasonal firefighters and permanent fire management staff.

Enhanced training and leadership development opportunities for firefighters and fire managers continue to be delivered through the Wildland Firefighter Apprenticeship Program, the Fire Use Training Academy, and the Prescribed Fire Training Academy. Through these academies, more than 500 people have been trained yearly since the inception of the National Fire Plan.

2. CONDUCTING EMERGENCY STABILIZATION AND REHABILITATION ACTIVITIES ON LANDSCAPES AND COMMUNITIES AFFECTED BY WILDLAND FIRE: In the aftermath of catastrophic wildland fires, emergency stabilization and post-fire rehabilitation work improves lands that are unlikely to recover naturally from the effects of wildfires. Emergency stabilization treatments are essential to protecting lives and properties downstream of burned areas. This work, often implemented over the course of several years following a wildfire, includes reforestation, road and trail rehabilitation, fence replacement, fish and wildlife habitat restoration, invasive plant treatments, and replanting and reseeding with native or other desirable vegetation.

3. REDUCING HAZARDOUS FUELS (DRY BRUSH AND TREES THAT HAVE ACCUMULATED AND INCREASE THE LIKELIHOOD OF UNUSUALLY LARGE FIRES) IN THE COUNTRY'S FORESTS AND RANGELANDS: In response to the risks posed by heavy fuels loads -- the result of decades of fire suppression activities, sustained drought, and increasing insect, disease, and invasive plant infestations -- the National Fire Plan established an intensive, long-term hazardous fuels reduction program. Hazardous fuels reduction treatments are designed to reduce the risks of catastrophic wildland fire to people, communities, and natural resources while restoring forest and rangeland ecosystems to closely match their historical structure, function, diversity, and dynamics. Such treatments accomplish these goals by removing or modifying wildland fuels to reduce the potential for severe wildland fire behavior, lessen the post-fire damage, and limit the spread or proliferation of invasive species and diseases. Treatments are accomplished using prescribed fire, mechanical thinning, herbicides, grazing, or combinations of these and other methods. Treatments are being increasingly focused on the expanding wildland/urban interface areas.

The Healthy Forests Initiative and the Healthy Forests Restoration Act have equipped land managers with additional tools to achieve long-term objectives in reducing hazardous fuels and restoring fire-adapted ecosystems.

4. PROVIDING ASSISTANCE TO COMMUNITIES THAT HAVE BEEN OR MAY BE THREATENED BY WILDLAND FIRE: Communities need many types of assistance, and community participation is at the core of carrying out citizen-driven solutions to reduce the risks of fire in the wildland/urban interface. Agencies provide support for educating citizens on the effects of fire, community fire protection planning, and training and equipping rural and volunteer firefighters. Through a variety of grant programs including Rural, State, and Volunteer Fire Assistance and Economic Action Programs, delivered by the Agencies and the State Foresters, communities can take action to live safely in fire-prone areas.

5. COMMITTING TO THE WILDLAND FIRE LEADERSHIP COUNCIL, AN INTERAGENCY TEAM CREATED TO SET AND MAINTAIN HIGH STANDARDS FOR WILDLAND FIRE MANAGEMENT ON PUBLIC LANDS: Oversight, coordination, program development, integration, and monitoring are critical to successful implementation of the National Fire Plan. Well-articulated, consistent policies and procedures provide for better oversight and review, and lead to greater accountability. To this end, the Wildland Fire Leadership Council is committed to ensuring the highest level of accountability.

Appendix B: The Healthy Forests Restoration Act of 2003

The Healthy Forests Restoration Act of 2003 contains a variety of provisions to expedite hazardous-fuel reduction and forest-restoration projects on specific types of Federal land that are at risk of wildland fire or insect and disease epidemics. The act helps rural communities, States, Tribes, and landowners restore healthy forest and rangeland conditions on State, Tribal, and private lands. It also:

- Encourages biomass removal from public and private lands.
- Provides technical, educational, and financial assistance to improve water quality and address watershed issues on non-Federal lands.
- Authorizes large-scale silvicultural research.
- Authorizes acquisition of Healthy Forest Reserves on private land to promote recovery of threatened and endangered species, and improve biodiversity and carbon sequestration.
- Directs the establishment of monitoring and early warning systems for insect or disease outbreaks.

Title I provides authorities for expedited vegetation treatments on certain types of NFS and BLM lands that are at risk of wildland fire; have experienced wind throw, blowdown, or ice-storm damage; are currently experiencing disease or insect epidemics; or are at imminent risk of such epidemics because of conditions on adjacent land. This title:

- Provides expedited environmental analysis of HFRA projects.
- Provides administrative review before decisions are issued on proposed HFRA projects on NFS lands.
- Contains requirements governing the maintenance and restoration of old-growth forest stands when the USDA Forest Service and DOI BLM carry out HFRA projects in such stands.
- Requires HFRA projects on NFS and BLM land to maximize retention of larger trees in areas other than old-growth stands, consistent with the objective of restoring fire-resilient stands and protecting at-risk communities and Federal lands.
- Requires collaboration between Federal agencies and local communities, particularly when Community Wildfire Protection Plans are prepared.
- Requires using at least 50 percent of the dollars allocated to HFRA projects to protect communities at risk of wildland fire.
- Requires performance to be monitored when agencies conduct hazardous-fuel reduction projects and encourages multiparty monitoring that includes communities and other diverse stakeholders (including interested citizens and Tribes).
- Encourages courts to expedite judicial review of legal challenges to HFRA projects.
- Directs courts that consider a request for an injunction on an HFRA-authorized project to balance the short- and long-term environmental effects of undertaking the project against the effects of taking no action.

HFRA Analysis and Documentation of Authority

Judith and Moccasin Mountains
Forest Health and Vegetation Management

Decision Diagram 1:

Is project outside wilderness areas AND collaboratively developed (based on a CWPP)? → YES

Is the project designed to protect communities, municipal watersheds, T&E species or natural resources by treating hazardous fuels? →YES: communities identified in CWPP and natural resources

Is project consistent with RMP? → YES

Is project less than 1000 acres for mechanical and 4500 for Rx fire? → NO

Is project on BLM land? → YES

RESULT: Go to Diagram 2.

Decision Diagram 2:

WUI Test: Is the project within or adjacent to an at-risk community covered by a CWPP? → YES

RESULT: Qualifies as an authorized and covered project under HFRA. Go to Diagram 3.

Decision Diagram 3:

Does the RMP contain old-growth management direction? → NO

RESULT: Apply large-tree retention requirements (see Sec. 102(f) from HFRA and pages 27-29 of Interim Guidance) and proceed with project.

Appendix C: Standards for Rangeland Health

Standards are statements of physical and biological condition or degree of function required for health sustainable rangelands. Achieving or making significant and measurable progress towards these functions and conditions is required of all uses of public rangelands. Historical data, when available, should be used when assessing progress towards these standards.

Standard #1: Uplands Are In Proper Functioning Condition

This means that soils are stable and provide for capture, storage and safe release of water appropriate to soil type, climate and landform. The amount and distribution of ground cover (i.e., litter, live and standing dead vegetation, microbiotic crusts, and rock/gravel) for identified ecological site(s) or soil-plant associations are appropriate for soil stability.

Evidence of accelerated erosion in the form of rills and/or gullies, erosional pedestals, flow patterns, physical soil crusts/surface scaling and compaction layers below the soil surface is minimal. Ecological processes including hydrologic cycle, nutrient cycle and energy flow are maintained and support healthy biotic populations. Plants are vigorous, biomass production is near potential and there is a diversity of species characteristic of and appropriate to the site. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

Physical Environment

- erosional flow patterns
- surface litter
- soil movement by water and wind
- soil crusting and surface sealing
- compaction layer
- rills
- gullies

Biotic Environment

- cover distribution
- community richness
- community structure
- exotic plants
- plant status
- seed production
- recruitment
- nutrient cycle

Standard #2: Riparian and Wetland Areas Are In Proper Functioning Condition

This means that the functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water and vegetation.

Riparian-wetland areas are functioning properly when adequate vegetation, landform or large woody debris is present to dissipate stream energy associated with high water

flows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood water retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for native fish production, waterfowl breeding, and other uses appropriate for the area that will support greater species richness.

The riparian-wetland vegetation is a mosaic of species richness and community structure serving to control erosion, shade water, provide thermal protection, filter sediment, aid floodplain development, dissipate energy, delay flood water, and increase recharge of groundwater where appropriate to landform.

The stream channels and flood plain dissipate energy of high water flows and transport sediment appropriate for the geomorphology (e.g., gradient, size, shape, roughness, confinement, and sinuosity), climate, and landform.

Soils support appropriate riparian-wetland vegetation, allowing water movement, filtering sediment, and slowing ground water movement for later release. Stream channels are not entrenching beyond natural climatic variations and water levels maintain appropriate riparian-wetland species.

Riparian areas are defined as land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

Hydrologic

- floodplain inundated in relatively frequent events (1-3 years)
- amount of altered streambanks
- sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region); and upland watershed not contributing to riparian degradation.

Erosion/Deposition

- plain and channel characteristics; i.e., rocks, coarse and/or woody debris adequate to dissipate energy
- point bars are being created and older point bars are being vegetated
- lateral stream movement is associated with natural sinuosity
- system is vertically stable
- stream is in balance with water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

- Vegetation
- reproductive and diverse age class of vegetation
- diverse composition of vegetation
- species present indicate maintenance of riparian soil moisture characteristics
- streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events
- utilization of trees and shrubs
- riparian plants exhibit high vigor
- adequate vegetative cover present to protect banks and dissipate energy during high flows
- where appropriate, plant communities in the riparian area are an adequate source of woody debris

Standard #3: Water Quality Meets Montana State Standards

This means that surface and ground water on public lands fully support designated beneficial uses described in the Montana Water Quality Standards. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

- dissolved oxygen concentration
- pH
- turbidity
- temperature
- fecal coliform
- sediment
- color
- toxins
- others: ammonia, barium, boron, chlorides, chromium, cyanide, endosulfan, lindane, nitrates, phenols, phosphorus, sodium, sulfates, etc.

Standard #4: Air Quality Meets Montana State Standards

This means that air quality on public lands helps meet the goals set out in the State of Montana Air Quality Implementation Plan. Efforts will be made to limit unnecessary emissions from existing and new point or non-point sources.

The BLM management actions or use authorizations do not contribute to air pollution that violates the quantitative or narrative Montana Air Quality Standards or contributes to deterioration of air quality in selected class area.

As indicated by:

Section 176(c) Clean Air Act which states that activities of all federal agencies must conform to the intent of the appropriate State Air Quality Implementation Plan and not:

- cause or contribute to any violations of ambient air quality standards
- increase the frequency of any existing violations
- impede the State's progress in meeting their air quality goals

Standard #5: Habitats are provided to maintain healthy, productive and diverse populations of native plant and animal species, including special status species (federally threatened, endangered, candidate or Montana species of special concern as defined in BLM Manual 6840, Special Status Species Management)

This means that native plant and animal communities will be maintained or improved to ensure the proper functioning of ecological processes and continued productivity and diversity of native plant lifeforms. Where native communities exist, the conversion to exotic communities after disturbance will be minimized. Management for indigenous vegetation and animals is a priority. Ecological processes including hydrologic cycle, and energy flow, and plant succession are maintained and support healthy biotic populations. Plants are vigorous, biomass production is near potential, and there is a diversity of plant and animal species characteristic of and appropriate to the site. The environment contains components necessary to support viable populations of a sensitive/threatened and endangered species in a given area relative to site potential. Viable populations are wildlife or plant populations that contain an adequate number of reproductive individuals distributed on the landscape to ensure the long-term existence of the species. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

- plants and animals are diverse, vigorous and reproducing satisfactorily noxious weeds are absent or insignificant in the overall plant community
- spatial distribution of species is suitable to ensure reproductive capability and recovery
- a variety of age classes are present
- connectivity of habitat or presence of corridors prevents habitat fragmentation
- species richness (including plants, animals, insects and microbes) are represented
- plant communities in a variety of successional stages are represented across the landscape.

Appendix D: Guidelines for Livestock Grazing Management

Guideline #1: Salting and supplemental feeding

If salt and/or mineral are provided to livestock, they will be placed a minimum of 1/4 mile from riparian areas (including both reservoirs and creeks) and stock water tanks. Salt and/or mineral placement locations will be rotated periodically (once each grazing season at a minimum). Supplemental feeding will not be allowed except to accomplish resource objectives.

Guideline #2: Riparian stubble height

Adequate vegetative stubble heights will remain on plants identified as having deep binding root mass at the end of the grazing season to provide streambank stability, trap and filter sediment, improve water quality, and to facilitate meeting site-specific objectives. Average vegetative stubble heights will be four inches for grasses and forbs. Utilization of trees and shrubs will not exceed 25% of the 2nd year and older available leaders. Plants with a deep binding root mass include trees (cottonwood, green ash, box elder, and peachleaf willow), shrubs (sandbar and yellow willow, dogwood, chokecherry, buffaloberry, golden and buffalo currents), forbs (cattail and American licorice), and grasses (western wheatgrass, slough grass, cord grasses, sedges and rushes).

Guideline #3: Utilization of upland grasses

Utilization on key grass species in upland areas will not exceed 50% by weight or 4 inch stubble height at the end of the grazing season.

Guideline #4: Grazing systems

When practical, rotational or rest rotation type grazing systems will be used to maximize the amount of rest on the allotment during the growing season and/or break up the cycle of continuous hot season use on riparian areas. At a minimum, portions of an allotment under rotational grazing should receive periodic rest during the growing season and hot season grazing should not occur each year on any given pasture. Season-long or year-round grazing will be discontinued if standards for rangeland health are not met.

Guideline #5: Surface disturbance and seeding

Permittee must notify the BLM prior to conducting any surface disturbing activities on public land. Areas that are disturbed by fire or mechanical means will be rested two growing seasons. Native plant species will be used for reclamation of all disturbed areas. The only time non-native seed should be used is when there is a lack of native seed availability following large scale fires or the use of sterile non-native annual

grasses is necessary to achieve rapid site stability and/or reduce the threat of noxious weeds.

Guideline #6: Pasture moves

Pasture move dates as shown in this watershed plan are an estimate, actual move dates should be based on resource conditions and forage utilization. Any pasture moves exceeding five days past the scheduled move date will be made with concurrence of the BLM. Earlier or later move dates could be required or permitted based on resource or livestock conditions or if the guidelines for upland utilization or riparian stubble heights are exceeded or are yet to be reached.

Guideline #7: Changes in scheduled use

Any deviation from scheduled use must be applied for by the permittee and approved by the BLM manager prior to any changes taking place. The guidelines for upland utilization, riparian stubble heights and progress toward meeting site-specific objectives will be evaluated when reviewing requests for deviation from scheduled use. Requests to change use will not be granted unless it has been demonstrated to be consistent with achieving healthy, properly functioning ecosystems and site-specific objectives.

Guideline #8: Drought

During periods of drought, or at the earliest possible time when it becomes apparent that drought conditions are likely, the BLM and permittees will meet to discuss and arrange management changes needed to reduce resource impacts and continue progress toward meeting specific objectives (Refer to BLM Montana, North Dakota and South Dakota drought policy).

Guideline #9: Terms and conditions/management prescriptions

Management prescriptions are identified on a site-specific basis and will be implemented as terms and conditions of the grazing permit/lease. Permittees should provide periodic input to BLM on needed adjustments to grazing plans so that refinements can be made to improve resource conditions.

Guideline #10: Water developments

Locate facilities (water developments, etc) away from riparian-wetland areas. Water tanks must have an escape ramp, float valve and overflow pipe to eliminate over flow around tank.

Guideline #11: Weeds

Noxious weed control is essential and should include: cooperative agreements, public education, and integrated pest management (mechanical, biological, chemical).

Guideline #12: Water quality

Livestock management should utilize practices such as those referenced by the published Natural Resources Conservation Service (NRCS) prescribed grazing technical guide to maintain, restore or enhance water quality.

Guideline #13: Threatened, endangered and sensitive species

Grazing management should maintain or improve habitat for federally listed threatened or endangered species and any state listed sensitive species. BLM will keep permittees informed of changes in listing status of any species known to exist on their allotment.

Guideline #14: Native plants

Grazing management should maintain or promote the physical and biological conditions to sustain native populations and communities.

Guideline #15: Control of livestock

Control of livestock is the permittee's responsibility. Monitoring should be conducted by permittee to insure livestock are in proper locations. Livestock that are allowed to roam onto public lands without a permit will be treated as trespass livestock. Additional monitoring will be conducted by the BLM to insure this guideline is met.

Appendix E: Standards of Rangeland Health Assessments

Allotment Number	Allotment Name	#1 Upland	#2 Riparian	#3 Water Quality*	#4 Air Quality	#5 Habitat
00920	East Pasture	Yes	NA	NA	Yes	Yes
02524	Whiskey Gulch GR	No (1)	Yes	Yes	Yes	No (1)
02525	Alpine Gulch JR	No (1)	No (4)	Yes	Yes	No (1)
02603	Maginnis Mountain	No (1)	Yes	No**	Yes	No (1)
02615	Ross Pass	No (1)	Yes	Yes	Yes	No (1)
02617	Sheep Mountain	Yes	No (5)	No**	Yes	Yes
02624	Black Butte Ranch	Yes	Yes	Yes	Yes	Yes
02627	Judith Peak	No (1)	No (4)	No**	Yes	No (1)
02635	South Black Butte	No (2)	Yes	Yes	Yes	Yes
02639	Brasier Place	No (2)	NA	NA	Yes	Yes
02640	Flat Mountain	Yes	NA	NA	Yes	Yes
02644	Three Links	Yes	Yes	Yes	Yes	Yes
02649	Lookout Peak	Yes	NA	NA	Yes	Yes
02660	Flat Mountain East	No (1)	NA	NA	Yes	No (1)
02661	Alpine Gulch GR	No (1)	No (5, 6)	Yes	Yes	No (1)
02667	Shelternook	No (7)	NA	NA	Yes	Yes
02674	Box Elder Ranch	No (1)	NA	NA	Yes	No (1)
02680	Black Butte	Yes	NA	NA	Yes	Yes
02681	East Fork Fords Creek	No (3)	NA	NA	Yes	Yes
09796	Phillips School	Yes	NA	NA	Yes	Yes
09848	Big Spring Creek	Yes	NA	NA	Yes	Yes
10036	North Moccasin	No (1)	Yes	Yes	Yes	No (1)
10042	Judith Mountain Common	Yes	NA	NA	Yes	Yes
10043	Boyd Creek	No (1)	NA	NA	Yes	No (1)
10053	Deer Creek	Yes	Yes	Yes	Yes	Yes
10058	Spear T Ranch	No (3)	Yes	Yes	Yes	Yes
10059	Spear T Common	No (3)	Yes	Yes	Yes	Yes
10060	Milburn Place	Yes	NA	NA	Yes	Yes
10073	Whiskey Gulch JR	Yes	NA	NA	Yes	Yes
10092	Sennett Canyon	No (1)	NA	NA	Yes	No (1)
12602	Rattlesnake Butte	Yes	NA	NA	Yes	Yes
12610	Elk Peak	No (1)	NA	NA	Yes	No (1)
19741	South Moccasin	Yes	Yes	Yes	Yes	Yes

Allotment Number	Allotment Name	#1 Upland	#2 Riparian	#3 Water Quality	#4 Air Quality	#5 Habitat
20032	Jackson Coulee	Yes	NA	NA	Yes	Yes
20056	North Fork Warm Springs	No (1)	Yes	Yes	Yes	No (1)
20068	Ruby Gulch		No (6)	Yes	Yes	
20069	Mason Canyon	No (1)	No (5)	Yes	Yes	No (1)
20077	Shammel	No (1)	NA	NA	Yes	No (1)
20082	Devils Canyon	Yes	NA	NA	Yes	Yes
20083	Pryamid Canyon	No (1)	Yes	Yes	Yes	No (1)
Unallocated	Limekiln		Yes	Yes	Yes	

Yes = meeting the standard; No = not meeting the standard; NA = not applicable; the allotment includes no streams or riparian areas.

*For allotments meeting the water quality standard: MDEQ has not designated beneficial uses for waters on the allotment. Water quality will be considered to be meeting standards until designated use support determinations are made and then will be reassessed.

** MDEQ has determined that waters in Armells Creek, Chicago Gulch, and Collar Gulch are not fully supporting designated uses. The allotment lies within one of the impaired reaches. Causes for lack of support may be chemistry of the native substrate or impacts from historic mining.

(1) Non-native species are dominant. Noxious weeds are present. Livestock are not a significant factor for not meeting the upland or habitat standard.

(2) Crested wheatgrass seeding is present. Livestock are not a significant factor for not meeting the standard.

(3) Non-native species are dominant. Livestock are not a significant factor for not meeting the standard.

(4) Livestock are a significant factor preventing the allotment from meeting riparian standards.

(5) Mining activities (past and/or present) are preventing the allotment from meeting riparian standards.

(6) Road construction (past and/or present) is preventing the allotment from meeting the riparian standard.

(7) Livestock are a significant factor preventing the allotment from meeting the upland standard.

Appendix F: Riparian Health Assessments

Stream Name	Reach Number	Miles	Acres	Riparian Health			
				PFC %	FAR %	NF %	Upland
Alpine Gulch	8-1	0.63	0.84			56	
Armells Creek	8-2	0.68	0.49		72		
	15-1	0.17	0.28	93			
Black Butte	15-2	0.13	0.10	95			
Tributaries	15-3	0.18	0.37	86			
	15-4	0.70	2.97		63		
	15-5	0.20	0.24		63		
	31-1	0.42	1.27				X
	32-1	0.57	1.38		75		
	32-2	0.33	2.00				X
	33-1	0.30	0.36		75		
	33-2	0.10	0.24		69		
	34-1	0.24	1.16				X
	34-2	0.14	0.44				X
	34-3	0.04	0.01		73		
	34-5	0.15	0.36		69		
Boxelder Tributary	28-1	0.28	0.34	83			
Brickyard Creek	29-1	0.33	0.80		77		
Chicago Gulch	17-1	0.25	4.60	83			
	17-2	0.52	0.63	84			
	17-3	0.34	1.03	81			
	18-1	0.79	0.77	81			
	18-2	0.17	0.31	82			
	20-1	0.56	1.22	81			
Chicago East Fork	19-1	0.31	0.30			54	
Collar Gulch Tributary	25-1	0.11	0.20		61		
Collar Gulch	16-1	0.38	0.69			46	
	16-2	0.34	0.49	91			
	16-3	0.33	0.40	88			
	16-4	0.74	1.79	89			
	24-1	0.18	0.37	80			
	24-2	0.33	0.32	91			
Dexter Gulch	9-1	0.10	0.09	81			
Limekiln Canyon	13-1	0.35	0.43	81			
	14-1	0.25	0.45		79		
Lincoln Gulch	7-1	0.42	1.52	82			
	7-2	0.10	0.36			58	
	21-1	0.23	8.40	98			
	21-2	0.28	0.51		75		
	22-2	0.09	0.13	82			

Stream Name	Reach Number	Miles	Acres	Riparian Health			
				PFC %	FAR %	NF %	Upland
Lincoln Gulch cont'd	22-3	0.09	0.13	82			
	22-4	0.20	0.48		77		
	23-1	0.11	0.66	91			
	23-2	0.12	0.15	93			
	23-3	0.10	0.24	88			
Log Gulch	30-1	0.30	0.72				X
Maiden Canyon	26-1	0.48	0.70			56	
	26-2	0.77	1.30			56	
North Moccasin	2a-1	0.62	0.60	87			
	2a-2	0.25	0.55		77		
	2b-1	0.52	0.63	94			
	3-1	0.12	0.32			44	
	3-2	0.30	0.65		74		
Plum Creek	1-1	0.10	0.11	84			
	1-2	0.55	1.06		61		
Pyramid Gulch	10-1	0.42	0.61	87			
	10-2	0.29	0.63		72		
	11-1	0.16	0.27	89			
	11-2	0.16	0.58		74		
Ruby Gulch	12-1	0.28	0.31	86			
	12-2	0.12	0.26			32	
South Moccasin	4-1	0.38	1.80	92			
	4-2	0.25	0.76	81			
	5-1	0.20	0.29				X
	6-1	0.30	0.44	82			
	6-2	0.28	1.70	81			
Whisky Gulch	27-1	0.25	0.75		74		
TOTALS	**35**	**20.5**	**55.4**	**34**	**19**	**8**	**6**

Appendix G: The SIMPPLLE Modeling Process

SIMPPLLE, **(Sim**ulating **P**atterns and **P**rocesses at **L**andscape sca**le**s**)**, is the acronym for a computer simulation modeling system that simulates vegetation patterns and disturbances emphasizing the dynamics of landscape level change. It was developed for the USDA Forest Service, Region One as a management tool. In general, its purpose is to help provide an understanding of the dynamics of where disturbances will occur across a landscape.

SIMPPLLE generates a range of possible outcomes for landscapes that can be quantified through multiple simulations. Multiple simulations can provide a prediction of general trends for the disturbances on a specific landscape. Results from multiple simulations can be expressed as a probability of occurrence for the disturbance processes as well as the at-tributes by which plant communities are described.

Individual simulations can be used as an example of one possible outcome of a given landscape. Individual simulations can be selected from a set of multiple simulations to represent worst-case scenarios for specific disturbance processes, a most likely scenario, or a most optimistic scenario.

Specifically SIMPPLLE's purpose is to provide a user with the ability to:

1. Simulate future vegetation changes caused by disturbance processes at multiple landscape scales.
2. Simulate ranges of conditions of plant communities and processes at multiple landscape scales.
3. Simulate how changes in vegetation patterns influence the activity of fire, insect and disease processes.
4. Simulate management treatment alternatives for their impact on disturbance processes and the attainment of desired conditions defined at landscape scales.
5. Help identify areas that have a high priority for treatments that can help achieve and sustain desired conditions at landscape scales.
6. Simulate impacts over time on a variety of resource objectives that can be defined by a combination of vegetation conditions and spatial attributes.
7. Provide a basis for identifying the probability of disturbance processes and the historical range of vegetation conditions.

Appendix H: Monitoring Plan

Treated Acres: Track the cumulative number of acres treated by prescription over the life of this project. The treatment acres will be counted as the actual "footprint" (i.e., the unit boundaries) where thinning and prescribed burning occurs, as opposed to the polygon which includes a mosaic of treated and untreated areas. Total treated acres for each prescription may not exceed the amounts given in the Table 1 below, which are taken from the analysis. Total acres harvested by ground-based machinery may not exceed the amounts given in Table 2 for each fifth order watershed. Coordination must occur between BLM and DNRC, and cumulative figures for each agency will be exchanged at least once each year on or before April 1st.

Table 2: Maximum treatment acres by prescription for each agency.

	Douglas-fir Habitat			Lodgepole	Interface	Vegetative
Agency	**Warm-Dry**	**Moderate**	**Cool-Moist**	**Habitat**	**Areas**	**Diversity**
BLM	2208	5354	309	134^	1165*	4943
DNRC	123	847	80	0	0	0
TOTAL	2331	6200	389	134	1165	4943

^ This is the total cut area (half of 268 treatment acres).
* This is the additional area that does not overlap forest health treatment areas.

Table 2: Maximum machine harvest acres by watershed

Fourth Order Watershed Name	5th Order Number	Machine Acres
BOX ELDER	01	677
	03	1781
BULLWHACKER<DOG	05	30
FORT PECK RESERVOIR	06	619
JUDITH	05	1792
	09	2948
	13	2
Grand Total		7850

Photo Plots: Establish permanent photo points before treatments begin, then repeat the photo points each year for 2 years, then every 5 years.

First Order Fire Effects: Measure first order fire effects after prescribed burning according to currently accepted protocol (e.g., FIREMON inventory system). First order fire effects are those that occur within the first year after fire.

Noxious Weeds: Monitor for noxious weed infestations for two years following thinning and/or prescribed fire. Treat weeds that occur following the advice of the Weeds Specialist.

Livestock impacts: Monitor livestock impacts on vegetation after logging, prescribed fire, and/or riparian treatment occurs. If impacts and/or competition with wildlife are unacceptable, use adaptive management to reduce such impacts. For allotments not meeting Standards for Rangeland Health, establish one or more photo points and read them every three years. Survey as needed for actual use of forage.

Front cover: Photograph of Fort Maginnis on the east side of the Judith Mountains in 1886.

Back cover: Historical photographs paired with recent photographs.

Lewistown ca 1900 (above) and 2002 (below)

Judith Mountains from the west 1907 (above) and 2002 (below). Burnett Peak fire scar visible below, left.