United States Department of the Interior
Bureau of Land Management

Environmental Assessment MT- (*DOI-BLM-MT- B070-2010-0003-EA*)
March 18, 2010

Whitetail Basin/Pipestone Watersheds Environmental Assessment

Location: The Whitetail Basin/Big Pipestone project area is located along the eastern front of the Continental Divide north and west of Whitehall, Montana.

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Whitetail Basin/Pipestone Area
Watershed Environmental Assessment
(MT- DOI-BLM-MT- B070-2010-0003-EA)

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1.0 PURPOSE & NEED

1.1 Introduction and Background:

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of the Whitetail Basin/Pipestone Watersheds (WBPW) habitat restoration project as proposed by Butte Field Office on BLM lands. The EA is a site-specific analysis of potential impacts that could result with the implementation of a proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record may be signed for the EA approving the selected alternative, whether the proposed action or another alternative. A Decision Record (DR), including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects) beyond those already addressed in environmental documentation for the Butte Resource Management Plan (April, 2009).

The Whitetail Basin/Big Pipestone project area is located along the eastern front of the Continental Divide north and west of Whitehall, Montana (Jefferson County). The WBPW (Map 1) drains portions of the eastern from of the Continental Divide mountains. The watershed lies within Townships 2-4 North and Ranges 3-6 West, Montana Principal Meridian (MPM.). All legal descriptions in this document are based off of the MPM. Within the WBPW analysis area (based upon 6th level HUCs) there are approximately 235,231 total acres of land, of which 37,061 are public lands administered by the BLM. Of the total BLM-administered lands, 34,481 acres are allotted for livestock grazing and 2,580 acres are unallotted. The analysis area also includes 89,686 acres of private land, 99,189 acres of U.S. Forest Service (USFS) land, 8,775 acres of state land, and 65 acres of county lands.

Over the course of several years, a BLM interdisciplinary (ID) team assessed the land health of BLM administered land in the WBPW by grazing allotment. The ID team assessed the following five Rangeland (Land) Health Standards: Upland Health, Riparian Health, Water Quality, Air Quality, and providing for Diversity. The assessment reports documented the condition/function of resources within the assessment area to the Authorized Officer. The Authorized Officer considered the Assessment Report to determine whether Land Health Standards (Standards) were met, and then signed a Determination of Standards documenting where Standards were or were not met.

The assessed condition/function and recommendations in the Assessment Report and Determination of Standards, along with comments received through public scoping, have been used to develop alternatives to initiate progress towards Proper Functioning Condition (PFC) and address site specific resource concerns where needed. This Environmental Assessment (EA) was completed in accordance with established procedures to analyze and implement area, allotment, or site specific changes.

By working on a watershed basis, a broader landscape is considered and more consistent management can be applied. It is the BLM's intent to implement watershed management cooperatively where ever possible. Changes in management on BLM lands will be implemented through the BLM's decision process.

1.2 Purpose for the Proposed Action

The BLM proposes to conduct project work in the Whitetail Basin/Pipestone area to diversify and restore vegetation communities and habitats as well as renew and update grazing permits with management provisions that will achieve or make significant progress in meeting land health standards. An interdisciplinary team determined that land health standards on many of the allotments within the Whitetail Basin/Pipestone area were not met. Land health assessments completed by BLM in the summer of 2009, and in previous years, along with information contained in recently completed planning documents for Total Maximum Daily Loads (TMDLs) and Community Wildfire Protection Plans, among others, support the need for action to improve land health in the Whitetail Basin/Pipestone area. In addition, this action will assist in achieving goals and objectives of the approved Butte Resource Management Plan (April 2009).

One purpose of this project is to restore the plant communities to conditions that are more representative of the pre-settlement historic range of variability (reference conditions) within upland and riparian habitats, which will improve the quality of habitat for some species of wildlife. Additionally, reducing erosion and sedimentation, protecting and restoring soil productivity and restoring streams to a PFC from human caused impacts are purposes of this project. Implementing treatments to address these issues will be accomplished through a combination of vegetation restoration, administrative actions and direct action to reduce and mitigate impacts from proposed and historic management.

1.3 Need for the Proposed Action

The Fundamentals of Rangeland Health and subsequent Land Health Standards require the BLM to initiate management actions that ensure, "Watersheds are in, or are making significant progress toward, properly functioning condition, including their upland, riparian-wetland, and aquatic components…" (43 CFR 4180.1 (a)), if an assessment determines one or more of the Land Health Standards are not being met. In several of the allotment assessment reports, the ID team described several causal factors combining to negatively impact the biological, physical, and ecological processes in the watershed. As a result, the Authorized Officer determined that one or more of the Standards are not met in 5 of the 11 assessed allotments. The Bull Mountain Game Range Allotment is unalloted. Table 1.1 lists the 11 allotments, as well as the unallotted parcels, and shows the determination of each standard by allotment.

Table 1. Determination of Land Health Standards by Allotment

Allotment Name, Number, Category, and BLM acres	Year Assessed	Are land health standards being met?				
		Uplands	Riparian	Water Quality[1]	Air	Diversity
Big Pipestone Creek,20230, (I), 4,357 acres	2009	NO	YES	NO	YES	YES
Ringing Rocks, 20258, (I), 3,650 acres	2003	YES	N/A	YES	YES	YES
Dry Mountain, 10208, (M), 2,234 acres	2003	YES	YES	YES	YES	YES
East & West Pastures, 20375, (M), 1,280 acres	2003	YES	YES	YES	YES	YES
Fitz Creek, 20308, (M), 1,733 acres	1998	YES	YES	Not Assessed	Not Assessed	Not Assessed
Bull Mountain, 20220, (I), 5,299 acres	2003	YES	NO	YES	YES	YES
Yellowshack, 20221, (M), 160 acres	Summer 2010					
Whitetail Basin, 20242, (I), 3,469 acres	2005	YES	NO	YES	YES	YES
Big Foot, 20239, (M), 1,520 acres	2009	YES	NO	YES	YES	YES
Bull Mountain Game Range, 11668, (I), 1,427 acres	Summer 2010					
Rocky Canyon SGC, 10240, (M), 243 acres	2009	YES	NO	YES	YES	YES
Spring, 20358, (I), 480 acres	2003	YES	YES	YES	YES	YES

[1] The Montana Department of Environmental Quality (DEQ) has been given the responsibility for making water quality determinations and has completed its evaluation of 303(d)-listed streams.

1.4 Scope of this Environmental Analysis – Scope, Plan Conformance, Critical Elements, and Issues

1.4.1 Scope

The scope of the proposed action includes implementing specific use of herbaceous vegetation through authorizing livestock grazing and implementing vegetation treatments to restore specific habitats on public lands. The proposed action also includes installation and construction of structural projects such as fences and water developments. The proposed action is not an all-inclusive management plan for the area or a programmatic EA, but it addresses several program areas that affect land health.

Notification of the proposed project was made available to the public on the Montana/Dakotas BLM internet site on January 11, 2010, and a press release was printed in local newspapers in February to ensure that local citizens were given the opportunity to comment on the project proposal. The press release generated interest by local interest groups as well as private citizens. Comments received during scoping were considered during ID team meetings.

1.4.2 Conformance with BLM Land Use Plan(s):
The proposed action is in conformance with the terms and conditions of the Butte Resource Management Plan (RMP) of April 2009 and the Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana, North Dakota and South Dakota ("Montana S&G" EIS) approved in August of 1997. Goal LG1 of the Butte RMP states, "Manage for a sustainable level of livestock grazing while meeting or progressing toward Land Health Standards."

All of the allotments have been monitored and all but two allotments have been assessed to determine whether land health standards are being met. No known information has been presented that would substantially alter the land use plan decisions. The land use proposed by this action does not differ materially from the allocation made in the above referenced land use plan.

1.4.3 Relationship to Statutes, Regulations, or other Plans:
The proposed action and no action alternatives are consistent with the following federal laws and regulations and address the Standards for Rangeland Health and have taken into consideration Native American religious concerns:

Title 43, Code of Federal Regulations, Part 4100
Taylor Grazing Act of June 30, 1934, as amended
Sikes Act of 1960, as amended (Habitat improvement on Public Land)
National Historic Preservation Act of 1966, as amended
Carlson-Foley Act of 1968 (Weed Control on Public Lands)
National Environmental Policy Act of 1969 (NEPA)
Endangered Species Act of 1973
Federal Noxious Weed Act of 1974, as amended in 1988, 1994
Federal Land Policy and Management Act of 1976 (FLPMA)
Fishery Conservation and Management Act of 1976
Clean Water Act of 1977
Public Rangelands Improvement Act of October 25, 1978
Fish and Wildlife Improvement Act of 1978
State of Montana Streamside Management Zone Law of July 1991
National Fire Plan of 2000
Clean Air Act as amended (42 USC 7401 et seq.)
Clean Air Act of Montana as amended (75-2-102, MCA).
Safe Drinking Water Act, as amended (43 USC 300f et seq.)
Montana Clean Water Act (75-101 et seq., MCA)
E.O. 11990 Protection of Wetlands 5/24/77
E.O. 11988, Floodplain Management, as amended
Farmland Protection Policy Act (7 USC 4202 et seq.)
Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.)
Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana, North Dakota and South Dakota (*"Montana S&G"EIS*) approved in August of 1997.

In addition, many of the actions contained in the EA would further goals and objectives described in the Jefferson River Watershed Council's (JWRC) "Watersheds Restoration Plan", which is currently under development.

1.5 Summary:

This chapter has presented the purpose and need of the proposed project, applicable laws and regulations, and the scope of the analysis area. In order to meet the purpose and need of the proposed project in a way that resolves the issues, the BLM has developed an action alternative. This alternative, as well as a no action alternative, are presented in Chapter 2. The relevant issues brought forward in this analysis are described in Chapter 3. The potential environmental impacts or consequences resulting from the implementation of each alternative are then analyzed in Chapter 4 for each of the identified issues.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Introduction:

This chapter describes the alternative development process, alternatives considered but eliminated from further analysis, and the alternative that will be carried forward and fully analyzed. The alternatives that will be fully analyzed are the No Action Alternative (continuation of current management) (Alternative A) and one action alternative (Alternative B). Various combinations of tools, allowable use levels, grazing strategies, range improvement projects, erosion control strategies, and vegetation treatment options were discussed at length and carefully considered during scoping and during the formulation of the alternatives by the ID team.

The development of management alternatives for the multi-watershed project area was guided by provisions of FLPMA and NEPA, as well as planning criteria listed in Chapter 1 and public input received during scoping. Other laws, as well as BLM planning regulations and policy, also directed alternative considerations and focused the alternatives on appropriate watershed-level decisions. Chapter 1 discussed the issues and resource concerns considered during the alternative development. The Affected Environment (Chapter 3) discusses resource concerns and other factors considered during alternative development.

2.2 Alternative A – No Action:

The no action alternative is a continuation of current management with further details by resource below.

Livestock Management

All grazing permits would remain the same as the previous 10-year term grazing permits/leases. No additional or new terms and conditions would be added to the grazing permits/leases, and no changes to the season of use, number of livestock or active use (AUMs), or allotment boundary changes would occur. New range improvement projects would not be implemented.

Vegetation Treatments (including riparian, upland, and forested areas)

No vegetation treatments would be completed to improve land health and improve the diversity of habitats across the WBPB. No riparian vegetation treatments would occur in any areas of the project area. No treatments to manage forest resources within the project area would be completed at this time. No projects to reduce fuel loads within the WBPW, nor would any risks identified in the Jefferson Community Wildfire Protection Plan associated with BLM lands in the project area, be addressed. The risk of erosion and sedimentation in response to a high intensity wildfire would continue to increase.

Noxious and Invasive Species

Weed treatments and inventory would continue to be prioritized and implemented based on weed staff availability and funding according to the Butte Field Office Weed Management Plan Revision (BLM-BFO, 2009). No additional emphasis on weeds would be placed within the WBPB area.

Erosion Control (Soils)
Erosion control structures along the Pipestone OHV use area routes would not be implemented. Erosion control structures within other upland sites in areas where spring run-off contributes additional sediment loading to streams and wetlands would also not be implemented. BLM lands contributing sediment to state listed streams would not be stabilized.

2.3 Alternative B – Proposed Action:
Improving land health would be completed through a variety of grazing strategies, rangeland improvement projects, erosion control projects, and vegetation treatments. Priority areas for commercial harvest and other vegetation treatments to improve land health within the WBPW are identified in Alternative B. Implementation of treatments would require coordination with private landowners to provide access and/or additional field work to determine unit boundaries and road locations. Further details are discussed below by resource:

Livestock Management
Adjustments would be made and 10-year term grazing permits would be renewed for the following allotments: Big Pipestone Creek, Big Foot, Rocky Canyon SGC, East and West Pastures, and Ringing Rocks (Table 2, Map 1). The following additional terms and conditions would be added to each grazing permit/lease to address range improvements, wildlife management, travel management and rangeland health standards:

> The allotment is to be used in conjunction with your normal livestock operation, during the period shown, as long as such use is not detrimental to the public lands and fees are paid prior to turnout, unless you have actual use billing.
>
> You are required to perform normal maintenance on the range improvements to which you have been assigned maintenance responsibility as a part of your signed range improvement permit(s), cooperative agreement(s) or assignment of range improvements agreement.
>
> No salt and/or mineral blocks shall be placed within ¼-mile of livestock water, springs, meadows, or streams. In the event that topography and/or available water sources do not allow for the ¼-mile requirement, coordination will be necessary with BLM personnel prior to placement of salt.
>
> No livestock grazing will be allowed within any fenced spring or riparian area or vegetative study exclosure.
>
> Motorized wheeled cross-country travel is limited to the administration of the lease or permit.

<u>Big Foot and Rocky Canyon SGC Allotments:</u>
The following term and condition would be added to the Big Foot Allotment permit in addition to those previously listed:

Grazing use in BLM's Big Foot Allotment will be made in accordance with the United States Forest Service (USFS) Big Foot Allotment Management Plan (AMP) approved 10/15/81. The USFS is the lead agency for the Big Foot Allotment.

The Rocky Canyon SGC Allotment would be combined with the Big Foot Allotment, because it is already being used as part of a multi-pasture BLM/FS annual rotation plan. Combining the Rocky Canyon SGC Allotment would also allow the BFO to more efficiently administer the grazing permits. The season of use for the new Big Foot Allotment would be changed from 6/16-10/15 to 6/16 to 11/30, with 30 cattle for a total of 331 AUMs.

In the Rocky Canyon Pasture (combined with the Big Foot Allotment), a 30 inch long x 38 inch wide metal tray type headbox would be placed directly in the stream or a 30" high x 32" diameter culvert type headbox box would be installed adjacent to the East Fork of Rocky Canyon Creek and ~917' pipeline would extend to an 1,100 gallon stock tank (Map 1). The headbox originates on USFS land as well as ~827 feet of the pipeline as coordinated with USFS. The remaining pipeline and stock tank would be placed on BLM lands within the Rocky Canyon Pasture. A 100-150' over flow pipeline would be added to the stock tank so any additional water would flow towards the stream. Most of the pipeline would remain aboveground with the exception of the 50-90 feet before the trough, which would be buried ~12-18" below the soil surface to avoid any potential damage to the pipe from livestock. The area where the stock tank would be placed would be leveled and the pipeline buried by a rubber tired 4x4 John Deere 550 backhoe. The stock tank would be equipped with a small animal escape ramp and float valve that would allow additional water, above that required for the stock tank, to remain in the stream, and the water would be turned off to this stock tank and pipeline when not in use. Any areas with high soil disturbance would be seeded with native seed mix. If the ID team determines that livestock use along Rocky Canyon Creek in the area that was rated Functional at Risk is causing a downward trend, fencing may be implemented to exclude cattle from that portion of the stream. The bottom rail or wire would not be lower than 18" from the ground and the top rail or wire would not be higher than 48" from the ground.

Table 2. Proposed changes to allotments within the WBPW.

Allotment Name & Number	Proposed Changes
Big Pipestone Creek (20230)	Update terms and conditions, correct administrative errors, livestock were not identified as a causal factor of standards not met.
Rocky Canyon SGC (10240)	Allotment will be combined with the Big Foot Allotment, a stock water pipeline and trough would be built, and a hardened crossing on the creek added near the BLM/FS border
Big Foot (20239)	Change in season of use from 6/16-10/15 to 6/16 to 11/30, number of cattle would be 60 for a total of 331 AUMs active use with the addition of the Rocky Canyon SGC Allotment. Additional terms and conditions would be added.
East and West Pastures (20375)	Name will change to Three East Pastures and AUMs reduced to 184 to reflect changes to the allotment from the Ward Ranch land exchange in 2002
Ringing Rocks (20258)	Process application to change the season of use to 5/1-8/15, AUMs remain at 286 AUMs, the number of cattle would be 113 cow/calf pairs the same number of yearlings, or a combination of both

Big Pipestone Creek Allotment:
On the Big Pipestone Creek Allotment, the allotment would no longer be managed under the 1969 Allotment Management Plan (AMP). An administrative error would be corrected adjusting the active use from 154 AUMs to 150 AUMs, and actual use billing would no longer occur. The following terms and conditions would be added to the permit in addition to those previously listed:

> Livestock numbers will not be regulated as long as 150 AUMs are not exceeded during the authorized season of use.

Additionally, two pipeline extension projects that originate on the adjacent Forest Service would be constructed. One of the pipeline extension projects would originate in the Coyote Flats area located on Forest Service lands at T. 2 N., R. 6 W., Sec. 16, and would be extended onto BLM lands in Sec. 14. Total length of the Coyote Flats Pipeline would be ~1 ¼ miles with the potential for two 1,000 gallon troughs located on BLM lands. The second pipeline extension, also originating on Forest Service lands, would begin at T. 2 N., R. 5 W., Sec. 6 (west of Dry Creek) and would be extended onto BLM lands in Sec. 7 with one trough location. Total length of the pipeline would be ~1 mile. As with all proposed range improvement projects, native seed mixes would be used to reseed disturbed areas where appropriate.

The pipe would be 1 ¼" or 1 ½" PE pipe buried up to 18" underground. All excavation would be conducted using the crawler tractor or back-hoe machine and would be confined to only the spring source of the pipeline, the route and the trough locations for both pipelines. Installation would be conducted using a crawler-tractor equipped to install the 1¼-inch PE pipe in a trench ~18 inches deep over the total length for both pipelines (~2 ¼ miles). A small hill of approximately 24 inches wide, as well as the track imprint would remain as the machine passes.

A 2,400 square foot wood jack and leg exclosure, approximately 40 ft. x 60 ft., would be built around both spring sources and headboxes on Forest Service lands for both pipeline projects. Three new 1,000 gallon troughs (two troughs for Coyote Flats and one for Dry Creek) would be installed, at the proposed locations. All troughs would be equipped with float devices and small animal escape ramps. The trough locations would disturb an area of approximately 400 square feet (20'x 20'). Installation of the new fiberglass round troughs would involve excavation of 3 post holes per trough to support the trough and frame. The locations of the pipeline and trough will be determined after final cultural clearances have been completed on Forest Service and BLM lands.

Near the corners of T. 2. N., R. 5 W., Secs. 5 and 8, the permittee would be authorized to construct a permanent corral made of jack-legs and rails of ~1 acre in size to allow better livestock management when moving cattle from BLM to Forest Service. The bottom rail will be no lower than 18" above ground and the top rail no higher than 48" above ground. Construction of this project will only occur after cultural and sensitive plant clearances have been completed. Additionally, near one of the stream crossings at Halfway Creek, and ATV cattleguard and <1/4 mile of fence would be built to improve livestock management. The permittee would install the

section of fence, and the BFO would install the cattleguard. An additional AVT cattleguard would be installed in along the fence between the BLM and FS boundary where a gate was removed in T. 2 N., R 6 W., Section 1.

East and West Pastures Allotment:
The East and West Pastures Allotment would now be referred to as the Three East Pastures Allotment and the AUMs would be adjusted to 184 AUMs due to the changes in the allotment boundary from the Ward Ranch land exchange of 2002. The pasture containing the state section has no BLM lands within it, and therefore would be removed the allotment (Map 1).

Ringing Rocks Allotment:
The permittee submitted an application to change the season of use on the Ringing Rocks Allotment from 5/1-6/15 to 5/1-8/15 to allow more flexibility in pasture rotations. The previous 10-year term permit only allowed grazing during the growing season, while the proposed change to the season of use would allow grazing later in the season after native grasses have set seed and are beginning to senesce. The current grazing permit that expires on February 28, 2013 would be cancelled.

Noxious and Invasive Weeds
Weed treatments particularly focusing on knapweed and yellow toadflax in uplands and thistle along riparian areas would be prioritized according to the Butte Field Office Weed Management Plan Revision (May, 2009). Efforts to increase awareness would be implemented, such as trail side signs, to attempt to reduce the spread of noxious weeds by OHVs and other sources. The rock used for the hardened crossing (described in detail under Vegetation Treatments: riparian) would be treated for weeds prior to placement along the stream for the hardened crossing. Pre and post vegetation treatment weed inventory and treatments will be completed, and weed control would be completed for many seasons after vegetation treatments have been completed. The same scenario would apply for any new temporary road construction needed to complete vegetation treatments.

Vegetation Treatments (including riparian, upland, and forested areas)
The Proposed Action alternative is designed to be responsive to the purpose and need (diversify and restore vegetation communities and habitats). Vegetation treatments would be completed to facilitate restoration of up to 4,100 acres within the project area. Treatments would occur in grassland, dry forests, riparian, and sagebrush habitats and would be designed to increase habitat diversity and promote healthy land conditions. Juniper would be retained up to 5% canopy cover within treatment areas where it is present within the project area.

Vegetation treatments would focus on creating more acres of reference seral stages across the landscape. The reference seral stages are discussed in the Biophysical Setting Models BPS. Within each habitat (grassland, shrubland, forest, and riparian), acreages treated within each seral state may vary, however the total amount of acres treated within each habitat would not exceed 1,600 acres in grasslands, 800 acres in shrublands, 1,400 in forests, and 100 acres in riparian areas to achieve objectives.

Grasslands

In potential grassland habitats, acreages treated within each seral state may vary, but no more than 1,600 total acres could be modified by vegetation treatments to meet the following objectives:

- Create early seral stands characteristic of post fire conditions on up to 960 acres (~60% of grassland area). Hand crews, mechanized equipment, and/or masticators in combination with prescribed fire (broadcast and/or under burning) could be used to remove/reduce woody vegetation up to 90%. The desired condition is described as being dominated by bunchgrasses and forbs and having between 0-10% canopy cover.

- Create mid- seral stands on up to 1,280 acres (~80% of grassland area). Hand crews, mechanized equipment, and/or masticators in combination with prescribed fire (pile and/or jackpot burn) could be used to remove/reduce woody vegetation up to 90%. Vegetation removed during treatments may be piled and burned. The desired condition is described as being dominated by bunchgrasses and forbs and having between 11-30% canopy cover.

Forests

Objectives of forest treatments are to return stand characteristics to those associated with development under a mixed severity fire regime. Decrease the amount of juniper found in the understory. Restore characteristic patchy stand openings by increasing the spacing between residual Douglas-fir trees. Decrease the likelihood of spruce budworm activity by reducing the amount of crown overlap between Douglas-fir trees.

In forested areas, acreages treated within each seral state may vary, but no more than 1,400 total acres could be modified on dry forest stands within the planning area.

- Create early seral stand conditions on up to 700 acres (~50% of forested area). Hand saws, mechanical equipment, and masticators in combination with prescribed fire (broadcast burn) could be used to remove/reduce up to 90% of the overstory vegetation. The understory may be burned to stimulate new growth of grasses, herbaceous, and woody species. The desired condition is described as having between 0-90% canopy cover comprised of grasses and tree seedlings.

- Create open canopy mid-development stand conditions on up to 700 acres (~50% of forested area) of closed canopy mid -seral stands. Hand saws, mechanical equipment, and/or masticators in combination with prescribed fire (pile or jackpot burn) could be used to remove/reduce up to 50% of the overstory vegetation. Vegetation removed during treatments may be piled and burned. The desired condition is described as having between 21-40% canopy cover of pole to medium sized trees over a patchy understory of bunchgrasses and shrubs.

- Create open canopy late-development stand conditions on up to 700 acres (~50% of forested area) of closed canopy late seral stands. Hand saws, mechanical equipment, and masticators, in combination with prescribed fire (broadcast and/or under burning) could be used to remove/reduce up to 50% of the overstory vegetation. The understory could be burned to stimulate sprouting of desired herbaceous and woody species. The desired condition is described as having between 21-40% canopy cover of medium to large sized trees over a patchy understory of bunchgrasses and shrubs.

The project area was broken into 2 broad regions to analyze forest treatments as the result of issues related to 1) soil characteristics and 2) road access. The 2 regions are: 1) the northern or Whitetail Basin area (upper portion), and 2) the southern or Pipestone area (near Interstate 15).

Planned activities include designated firewood/post and pole cutting (either commercial use or personal use or a combination), small saw timber removal, biomass removal, and chipping/mastication with materials left on site. Any commercial permits could be assessed additional fees to pay for weed treatments within the project area. Prescribed burning could be used to reduce slash residues and invigorate shrubs and grasses. Weeds surveys would be completed prior to and after treatment activities to determine weed management strategies.

Road access to possible treatment units is much greater in the Pipestone area than in the Whitetail area. It may be necessary to construct as much as 4 miles of temporary road to gain access to facilitate treatment activities in the Whitetail area. The actual amount of road would be determined by the final selected location and type of equipment needed to complete activities. All temporary roads would be rehabilitated after use to prevent habitat degradation, erosion, motorized access, and weed spread. Native seed mixes would be used to establish vegetation in these locations. In contrast, numerous roads exist in the Pipestone area and access to units should not be problematic, however existing trails may need upgraded to minimum standards. Travel for administrative purposed would be allowed on seasonally restricted or closed roads during treatment periods when necessary.

Soils are more erosive and less stable in the Pipestone area compared to the Whitetail area. Additionally, the Pipestone area presents fewer opportunities to operate mechanized equipment over frozen or snow covered ground. In addition, travel and activity within treatment units in the Pipestone area would be closely monitored and controlled. Interior roads and skid trails would be laid out and approved by the BLM prior to treatment activities and travel would be restricted to these approved paths. Regular site inspections would be required to ensure compliance and prevent soil degradation.

In all proposed treatments, old forest structure would be retained and promoted where it currently exists. In the Pipestone area, the oldest trees are found in boulder outcrops and would be retained. Downed woody material is more common in forests in the Whitetail area than in the Pipestone area; when possible 3-4 large trees per acre would be left on the on the ground to create this feature.

There are no streamside management zones or riparian areas within the vicinity of the Pipestone area, as this is a very dry landscape and terrain limits access to riparian areas. The Whitetail area

is more moist and aspen stringers and associated riparian vegetation found on the landscape would be promoted wherever they occur.

Shrublands

Vegetation treatments would occur on up to approximately 800 acres of existing shrubland habitat. Acreages treated within each seral state may vary, however the total acreage treated would not exceed 800 acres.

- Up to 50 percent of the area, vegetation treatments would focus on restoring stands to early development where vegetation is primarily herbaceous (> 25% cover) with a few scattered shrubs (typically less than five percent cover). Treatments would consist of mechanical (removal or mastication), by hand, prescribed fire (broadcast and/or under burning), and/or a combination of methods.

- Up to 100 percent of the area, vegetation treatments would focus on restoring stands to mid development open where sagebrush dominates open shrub community with abundant grasses. Treatments would consist of mechanical (removal or mastication), by hand, prescribed fire (broadcast and/or under burning), and/or a combination of methods.

Riparian (Including streams, seeps, and springs)

Vegetation treatments would occur on up to 100 acres of the riparian habitat. Appropriate permits from Montana Fish, Wildlife, and Parks have already been obtained for some of the site specific riparian treatments; however additional permits may be required for future riparian treatments.

- Up to 100 percent of the area, vegetation treatments would focus on restoring uncharacteristic seral stages in riparian habitat toward early development closed, where aspen suckers are less than 12ft tall, with grass and forbs present. Treatments would consist of mechanical (removal or mastication), by hand, prescribed fire (broadcast and/or under burning), and/or a combination of methods.

Site specific riparian treatments:

Sections of Little Whitetail Creek (J-15-2) within the Big Foot Allotment were rated as Functional at Risk (FAR) due to trampling and a head cut. Creating obstructions to livestock loafing by felling conifers along the stream and stabilizing the headcuts would improve the condition of Little Whitetail Creek. Nearby conifer encroachment (Douglas fir and Rocky Mountain juniper) would be cut and placed along the streambanks to reduce cattle access to the stream. Some water gaps would be left for wildlife and livestock watering. A minimum of 1,200’ and a maximum of ~ 3,000’ length of the stream by ~20 ft width on both side of the stream would be treated. Rock would be hauled in by non-mechanized methods and placed in the headcuts in order to repair the damage and prevent further degradation to riparian resources from occurring. Rocky Canyon Creek Tributary (J-11), also in the Big Foot Allotment, has a few headcuts, which would be stabilized in the same manner.

In order to promote cottonwood and aspen regeneration along Whitetail Creek within the Dry Mountain Allotment, conifers would be thinned out along the stream and placed to act as barriers to protect aspen and cottonwood seedlings. Temporary fencing may also be installed and maintained for up to 10 years to reduce ungulate browsing of cottonwood and aspen seedlings and saplings. In some areas of Whitetail Creek, planting cottonwoods and aspen may be necessary to increase cover and composition of both species.

The Rocky Canyon Creek hardened crossing would be constructed within the Rocky Canyon and Little Whitetail Pastures of the Big Foot Allotment on an area of the stream bank approximately 30' wide x 40' long to reduce trampling impacts from cattle. The hardened crossing would be located on lands managed by the USFS and the BLM. The crossing area would be covered by a rock/gravel mix of stones 1 to 6 inches in size utilizing a rubber tired front end loader. Some of the downed and dead, and potentially some live aspen would need to be moved to access the project area. Rock material would first be placed on the west side bank of Rocky Canyon Creek and the frontend loader would move across the rock material and then start up the east bank placing the material as it travels. No rock material would be placed in the stream itself, but from the edge of it and approximately 15 feet up the west and east banks adjacent to the stream. The existing access road to the project area would need some improvement for the front end loader to be able to safely navigate. A large rock would need to be moved away from the side of the road, approximately 50 feet of road would need to be leveled at this location and about 500 feet of this road would need ruts repaired. Some Douglas fir and Rocky Mountain juniper trees may need to be removed along the sides of this road. Any soil disturbance from the hardened crossing work would be reseeded with a native seed mix.

Erosion Control

Mitigating and reducing soil erosion is necessary to maintain or improve soil quality and to reduce sedimentation into streams. Trails within the Pipestone OHV use area, primarily located within the Big Pipestone Creek Allotment, are contributing excessive amounts of sediment to several streams and riparian areas. Treatments to mitigate sedimentation would be implemented, consistent with the Upper Jefferson River Tributary Sediment TMDLs and Framework Water Quality Improvement Plan (DEQ 2009a). Sedimentation barriers would be placed along OHV trails to control runoff onto and across OHV trails and ditches would be installed or maintained to decrease sediment loading. OHV trails would be realigned at stream crossings to avoid the most erosive soils. Trail realignment would be limited to segments within 400 yards of stream crossings. For any new road construction needed for vegetation treatments, mitigation measures to prevent soil loss, degradation, and erosion will be implemented.

Streams identified in the Jefferson River TMDL as being on the 303-d list due to increased levels of sediment would receive the highest priority for mitigation. Conifers felled as part of thinning treatments would be strategically placed to capture sediment in gullies and on eroding upland slopes to capture sediment to streams during run-off events. Improving the road crossings on Whitetail Creek within the Dry Mountain Allotment would also be completed. BLM route 1238 would be hardened with rock/gravel where it crosses Whitetail Creek to reduce erosion and sedimentation of the creek at this point.

Design Features of the Proposed Action
Design features incorporated into the proposed action include the following

- The *Montana/Idaho Airshed Group Operating Guide* would be followed.
- All slash, if burned, would have to utilize an air curtain burner to dispose of the slash and adhere to Ambient Air Quality Standards.
- All vegetation treatment activities would contain guidance for protection of any cultural remains and/or Native American Religious Concerns, discovered during the survey process.
- Treatment of invasive, nonnative species would occur in all alternatives as outlined by the Butte Field Office Weed Management Plan Revision (May, 2009)
- Monitor (pre and post treatment) for invasive, non-native species. If monitoring shows increases in weeds, treat the area following guidelines found in Butte Field Office Weeds Management Plan Revision (May, 2009)
- Treatment areas would be surveyed for places with excessive mechanical disturbance. Large areas of 1 acre or more would be seeded with native grasses. Should the area have high potential for erosion, a cover grass would be seeded for soil protection until the native grass has a chance to establish. Smaller areas may be hand seeded to avoid the establishment of invasive weeds.
- Contracts would include a requirement to pressure wash all off-road equipment before entering the project areas and/or moving from unit to unit.
- Cultural clearances would be obtained prior to any project implementation.
- Flag, and avoid BLM sensitive plant species populations within the treatment units.
- Mechanized equipment would be limited to operating on those areas within the treatment area that are 40 percent, or less, slope and are outside any designated streamside management zone.
- Operation of the mechanized equipment would only be permitted when the soils are dry, frozen or sufficiently covered by snow to reduce soil impacts and disturbances.
- Mechanized equipment could vary widely, though desired equipment features (e.g. rubber tires versus tracks) could be specified in areas of concern.
- Mechanized equipment would not be allowed to operate in riparian areas and over saturated soils.
- Slash would be lopped and scattered to within 12” of the ground. Stumps would be cut to within 12” of the ground on the uphill side.
- Piling of slash and other materials would be avoided unless piles are burned or strategically placed to allow for collection of firewood products by the public.
- A variety of sources would be targeted for project funding/implementation including, but not limited to, contracts, stewardship agreements, or youth groups.
- All existing improvements (i.e. cattle guards, fences and the main road) would be maintained during the course of the operation.
- Road maintenance, heavy equipment use, fuels removal practices and slash disposal would follow all the applicable State of Montana Streamside Management Zone (SMZ) laws, as well as Best Management Practices (BMPs).
- Any bank-rooted tree in a cut or gully would be left uncut for stabilization.
- Any road or trail determined to be user created roads with in the units may be decommissioned.

- Treatments would not be completed in Visual Resource Management Class II areas.
- Prescription design would take into account the designated trail system and the need for shade along trails if possible and still meet fuels objectives.
- Maintain at least 5% of sage canopy cover in grassland treatments
- Maintain at least 5% of juniper canopy cover in shrubland treatments
- Road construction activities would follow Montana Best Management Practices.
- Apply Montana Streamside Management Zone laws to all commercial activities that occur within or adjacent to riparian areas and streams.
- On allotments where prescribed fire occurs, the allotment (or portion of the allotment) could be rested up to one year prior to treatment.
- Allotments (or portions of allotments) would also be rested for two growing seasons to promote vegetation recovery, unless BFO staff determines a shorter rest period would meet objectives. BFO would closely coordinate prescribed fire treatments with permittees/lessees to minimize impacts to grazing operations.

2.4 Alternatives Considered, but Eliminated from Further Analysis:

An alternative was considered that excluded vegetation treatment activities from the project area. The only projects proposed under this alternative were the same as those under Alternative B for livestock grazing, riparian vegetation treatments, and noxious and invasive species. Field office specialists determined that excluding vegetation treatments in forests, shrublands, and grasslands, and fuels/WUI projects would not meet the purpose and need for the project, and progress towards meeting land health standards would not be made.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction:

This chapter presents the potentially affected existing environment (i.e., the physical, biological, social, and economic values and resources) of the impact area. This chapter provides the baseline for comparison of impacts/consequences described in Chapter 4.

3.2 General Setting:

The WBPW project area is located along the eastern front of the Continental Divide north and west of Whitehall, MT, in Jefferson County. The project area comprises 37,061 of public lands administered by the BLM. Of the total BLM-administered lands, 34,481 acres are allotted for livestock grazing and 2,580 acres are unallotted. The analysis area also includes 89,686 acres of private land, 99,189 acres of U.S. Forest Service (USFS) land, 8,775 acres of state land, and 65 acres of county lands. Vegetation in the area reflects the diversity of ecological conditions across the landscape. The dominant plant communities and habitat types vary depending upon the soils, precipitation, elevation, slope, and aspect.

Historic and Current Land Uses

Current land use in the area is largely based on agricultural uses, with several large family ranches. More recently, some areas have been subdivided and now contain small acreage (~20 acre) home sites. Many of the ranches utilize BLM and FS grazing allotments to complement forage on private lands. Local citizens often obtain firewood from the project area as well. The project area shows evidence of human activities (grazing, woodcutting, and some mining) which have affected the disturbance regime, and thus plant succession and existing vegetation.

Livestock grazing currently occurs on private land in the Whitetail Basin valley bottom as well as the broken wooded slopes above the valley within the project area. Historically grazing has occurred here for at least 150 years. Domestic livestock grazing increased dramatically in southwestern Montana in the mid-1800s. The level of grazing during this time significantly reduced fine fuel loads from what would be expected to occur. Additionally, several decades of relatively low summer precipitation followed this grazing period. This dry moisture regime enhanced the potential growth of stress-tolerant shrubs such as big sagebrush and increased the mortality of less stress tolerant perennial grasses and forbs (Anderson and Inouye, 2001). When combined, the reduction of fine fuels and drought favors the development of vegetation communities dominated by sagebrush and conifer, rather than grasses. Often these sites have more stems per acre than is expected in open grasslands and savannahs which occurred on these same sites prior to the period of high grazing intensity and increased drought (Heyerdahl et al 2006).

Evidence of mining activity from the turn of the century within the project area includes an abandoned cabin, pits/workings, ditches, claim corners, and scattered old stumps from that time period. It is likely that fires were caused or set by these early settlers relatively frequently (Barrett & Arno 1982).

Additionally, public land management agencies have suppressed almost all fire starts in recent decades (since about 1911). As a result, biomass and fuel loads have increased in forests

managed under this strategy, and species composition shifted away from more fire tolerant species to less fire tolerant species (Barrett & Arno 1982). Recently, land managers have recognized the affects of widespread fire suppression on native vegetation and have identified the desire to "restore" vegetation communities that persisted under a mixed severity fire regime of the pre-settlement era.

Recreational opportunities within the WBPW vary by season, and include hiking, hunting, fishing, horseback riding, wildlife viewing, and snowmobiling. An OHV riding area is designated on the Big Pipestone Allotment that receives use throughout the year from local riders, as well as riders from across the state and increasingly from out-of-state.

Climate

The "continental climate" which occurs here is generally described as having long severe winters, with hot and sometimes very dry summers. Precipitation is evenly distributed, throughout the year with the exception of a dry period in July and August. (Burns & Honkala 1990). Precipitation ranges within the project area from about 10 inches in the valley bottom (~ 4500 feet) up to 20 inches in the subalpine belt (~6300 ft) (Arno 1979, Ross & Hunter 1976).

Topography

The project area is located on broken mountain slopes on the east side of the continental divide. These slopes frequently face east, northeast, and southeast. Forest stands in the project area occupy toe-slope to mid-slope positions and range in elevation from roughly 4700 feet to 6000 feet. Numerous dry (intermittent/ephemeral) gullies incise the area.

3.3 Critical elements of the human environment

CRITICAL ELEMENTS		
Determination*	**Resource**	**Rationale for Determination**
PI	Air Quality	Prescribed fire may create temporarily affect air quality.
NP	Areas of Critical Environmental Concern (ACEC)	No ACEC is present in the project area.
NI	Cultural Resources	Cultural clearances will be obtained prior to treatments for any proposed projects, and if cultural resources are present, they would not be impacted by any of the alternatives.
NP	Environmental Justice	No alternative considered in the course of this analysis resulted in any identifiable effects or issues specific to any minority or low-income population or community as defined in Executive Order 12898.
NI	Farmlands (Prime or Unique)	Present, but not impacted by the Alternative B. Erosion resulting from potential catastrophic wildfire in the No Action Alternative (A) could result in conversion of Prime Farmland.
NP	Floodplains	No floodplains are present within the project area.
PI	Invasive, Non-native Species	Invasive, non-native plant species are present in the project area, and mitigation measures will be implemented to reduce the potential spread of noxious weeds during pre and post project implementation.
NP	Native American Religious Concerns	By avoiding cultural resources, Native American Religious Concerns would not be impacted by any of the alternatives in the EA.
NI	Threatened, Endangered or Candidate Plant or Animal Species	Canada lynx (*Lynx Canadensis*) may disperse through the area occasionally but would not use this habitat regularly. No other Threatened, Endangered or Candidate animal or plant species are known to inhabit the area.
NP	Wastes (hazardous or solid)	No hazardous wastes are identified in the assessment areas.
PI	Water Quality (drinking/ground)	Alternative B would improve water quality by decreasing sediment loading in streams, and Alternative A would cause water quality to remain static and possibly become more impaired.
PI	Wetlands/Riparian Zones	Wetlands/riparian zones would improve under the Alternative B, and would remain relatively static under Alternative A.
NP	Wild and Scenic Rivers	No wild and scenic rivers present within the assessment areas.
NP	Wilderness	There are no Wilderness Study Areas within the assessment areas.

*Possible determinations:
NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present and may be impacted to some degree. Will be analyzed in affected environment and environmental impacts. (NOTE: PI does not mean impacts are likely to be significant in any way).

3.4 Resources/Issues Brought Forward for Analysis:

Vegetation (Including Riparian, Grasslands, Shrublands, and Forests)
Currently many acres of dry forest communities have been colonized by numerous smaller sized conifers as a result of fire suppression, historic livestock grazing, and climate change. Douglas fir has increased within the majority of the project area in many upland and riparian sites. The combination of fire suppression and conifer expansion has caused changes in the fire regime over the past century. Because of long-term wildland fire suppression, the distribution, quantity, and nature of fuels on the landscape in the project area are altered from what typically would exist under a natural fire regime

Riparian Areas
Approximately ~31 miles of stream reaches (using GIS tabular data) occur on BLM lands, excluding upland springs. Streams within the project area are classified as perennial, ephemeral, intermittent, and interrupted. ID team stream conditions ratings over the past two decades, as well as trend monitoring sites have been used to determine the function classification of each stream and associated tributaries. Streams are rated into four categories: PFC, functioning at risk (FAR), non-functioning condition (NFU), or unknown (UNK) if surveys have not been completed. Within the WBPW project area, there are 17.8 miles are PFC, 10.5 miles are FAR, 1.4 miles are NFU, and 1 mile is unknown.

Riparian vegetation common to most of the riparian reaches consists of a complex of native riparian trees and shrubs, sedges and rushes, and riparian grasses and forbs. Riparian areas that have been disturbed often have non-native herbaceous species, such as Kentucky bluegrass and noxious weeds, and mesic shrubs, such as currant and rose in higher quantities than expected. Typical riparian shrubs and trees common in the project area include cottonwood, aspen, several species of willows, and alder. Sedges and rushes common to riparian areas include beaked sedge and Nebraska sedge, and baltic rush, and riparian grasses include red top, blue joint, and brook grass. Riparian forbs include monkey flower, plantain, viola, clematis, and water cress. The majority of the riparian areas in the project area have been colonized by conifers above those expected for the riparian sites.

Grasslands and Shrublands
Sagebrush and grass dominated plant communities are located on upland sites, and, in many sites within the WBPW area, conifers have become expanded and become established within these sites. Across the landscape, the combination of livestock grazing and fire suppression has altered the sagebrush/grassland habitats in the project area at varying degrees. Livestock grazed many upland sites in the project area, very heavily in years past, which has altered many of the upland plant communities to favor less desirable herbaceous species, shrubs, and conifers. Grasslands have become dominated by shrubs on many sites, and canopy cover of shrubs on many shrubland sites exceeds the amount expected to the point that understory vegetation has become limited.

Common herbaceous species on upland sites include bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass and prairie junegrass. Forbs such as lupine, penstemon, cinquefoil, western yarrow, prairie smoke, strawberry, aster, phlox, and pussytoes are typically found in the

understory. Upland shrubs include Rocky Mountain juniper, Wyoming and basin big sagebrush, antelope bitterbrush, and rabbit brush.

Forest Resources

The project area lies within the Southwestern Montana Forest regime as described by Arno (1979), which is a cold dry forest region having high valley-base elevations, and a continental climate. Forests generally occupy slopes between 5,700 feet upwards to about 9,500 feet. Some of the exposed south and west facing slopes are too dry to support forest vegetation. The growing season in this region is evidently too short and cold for ponderosa pine (only 50-70 frost free days). The cold dry conditions also preclude the occurrence of the Douglas fir/ninebark forest habitat type. In some areas, the lowest forested slopes are occupied by limber pine and/or Douglas fir. Lodgepole pine dominates forests at cooler elevations above Douglas-fir forests. Undergrowth is noticeable sparse in denser forest stands.

Forests occur within the project area on variable mountain slopes from approximately 4,700 – 6,000 feet in elevation. These are dry, open Douglas fir woodlands and forests with bunchgrasses characterizing the understory. Some savannahs, small grasslands and boulder outcrops are included. Douglas-fir /bluebunch wheatgrass (210) and Douglas-fir/Idaho fescue (220) are the common forest types (Pfister 1977). Rocky mountain juniper and sagebrush are common understory components throughout forested stands within the project area. Very little pine forest occurs in the project area but there is a small stand of lodgepole pine forest near the Forest Service –BLM Boundary north of the Four Corners area.

Interior Douglas –fir (*Psuedotsuga menziesii* var. *glauca* Beissn. Franco) is also called Rocky Mountain Douglas-fir. Rocky Mountain Douglas-fir in Montana is commonly found in extensive pure stands, both even and uneven aged. Douglas-fir may also occur in mixed stands as a majority or in association with several other species. Douglas –fir typically is located at mid-elevation between ponderosa pine and spruce-fir forests (Burns & Honkala 1990, Ryker and Steele 1980).

The predominant forest cover type in the project area is dry Douglas-fir forest. Understory vegetation is often patchy (which is common for these dry sites) and alternates with open areas and rock outcrops. Bunchgrasses (bluebunch wheat and Idaho fescue) are common components and are well represented, as are sagebrush and Rocky Mountain juniper. Small groupings of boulders occur frequently across the landscape as these are characteristic of the “Boulder Batholith” formation where the project is located.

Site potential is limited by edaphic and climatic conditions, as a result, much of the forested areas exhibit poor growth. Small trees may be much older than expected as a result. There is evidence of past fire on site, however, fire has been absent long enough from most of the area to allow uncharacteristic infilling of stand openings with small Douglas fir trees and juniper. Spruce budworm defoliation is occurring, especially on trees in the mid and understories.

Forest Habitat Types (Based on Potential Natural Communities)

Pfister (1977) describes 15 Rocky Mountain Douglas-fir habitat types in Montana based on potential natural vegetation. Those identified within the project area representative of the

warmest, driest types: Douglas-fir/Idaho fescue (PSME/FEID) and Douglas-fir/bluebunch wheatgrass habitat type (PSME/AGSP). Descriptions of these and important associated vegetation species are found in the Appendix.

Disturbance Regime and Forest Succession

A mixed –severity fire regime is described as having moderately frequent fires and fires of various severities. This generally forms a complex mosaic of vegetation on the landscape. This mosaic includes areas of early seral, fire-dependent tree species, along with a substantial component of late-successional trees. Resulting forests are often in uneven-aged or multi-layered stands. This regime also promotes the persistence of a component of early seral shrubs and hardwood species like aspen and willow. Small meadows are created and maintained (Arno 2000).

The exclusion of mixed-severity fire regimes can result in landscapes which are more uniform with regard to stand ages and in stand composition and structure. Additionally, there is a decline in the diversity of understory species and vigor. The basal area and number of trees per acre may increase dramatically in stands developed under this regime which ultimately results in increased physiological stress and the opportunity for extensive forest mortality caused by epidemics of insects and disease (Arno 2000). Exclusion of mixed-severity regimes can result in the replacement of fire resistant tree species (like ponderosa pine, lodgepole pine western white pine) with shade-tolerant species (like Douglas fir) (Arno 2000).

Establishment of conifers into shrub-grasslands at many sites in the Interior West has generally been ascribed to factors that include some combination of a cessation of frequent fire, domestic livestock grazing, and climate over the past 150 years or so. In southwestern Montana, Rocky Mountain Douglas-fir has increased on mountain big sagebrush communities. These sites are generally classified as the Rocky Mountain Douglas-fir/pinegrass-rough fescue phase (Heyerdahl et al 2006, Arno 2000, Steinberg 2002). Heyerdahl et al (2006) assumed that Douglas-fir expanded and colonized into sagebrush-grasslands at various times in the past. However, surface fires were frequent enough to kill many of these trees before they reached fire-resistant size. Strang and Parminter (1980) regarded encroachment of trees into rangelands as a natural process fostered by human activities and observed that its perception as positive or negative depended on management objectives (Grove et al 2005).

Types of Restoration Activities/Management Options for Douglas-fir

Multiple layers in a forest stand offer the best conditions for western spruce budworm to flourish. Joy and Huton (1991) describe successful silvicultural techniques in southwestern Montana Douglas-fir types as shelterwood and strip clearcutting methods. Enough trees must be left on the site to ameliorate temperature and moisture extremes in openings. Best success was achieved when leave trees had full pointed crowns (rather than flat topped crowns), crown ratios greater than 40%, good growth, and showed resistance to western spruce budworm.

Byler and Zimmer-Gorve (1991) recommend promoting and developing densities and spacings that compliment site productivity; the goal is to leave stands relatively open to prevent the interception of budworms by the understory crowns.

Noxious Weeds

The primary noxious weeds in the WBPW are spotted knapweed, yellow toadflax, houndstongue, and Canada thistle, which is primarily found near riparian areas. An area of leafy spurge has also been identified in the Big Pipestone Creek Allotment. Several undesirable, invasive species are also found in the project area including, but not limited to, wild mustard, common mullein, and other undesirable roadside weeds. Most weed infestations are found along roadways, ATV and animal trails, and south facing slopes.

Fire Regime

Fire management within the project area focuses on Fire Regime Condition Class (FRCC).
The following coarse scale definitions were developed by Hardy et al. (2001) and Schmidt et al. (2002), and the natural (historic) fire regimes of these major vegetative communities have been classified based on average number of years between fires (fire frequency) as well as fire severity (amount of replacement) on dominant overstory vegetation.

The five fire regime classifications commonly interpreted for fire and fuels management purposes include:
I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced);
II – 0-35 year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);
III – 35-100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced);
IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);
V – 200+ year frequency and high (stand replacement) severity.

The FRCC is a classification of the amount of departure from the natural fire regime (Hann and Bunnell 2001; Hardy et al. 2001). Coarse-Scale FRCC classes have been defined and mapped by Schmidt et al. (2002), and include three condition classes for each fire regime (Table 4). The classification is based on a relative measure describing the degree of departure from the historic natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and diseased mortality, grazing, and drought). There are no wildland vegetation and fuel conditions that do not fit within one of the three classes.

Table 4: A simplified description of the FRCCs and associated potential risks is presented below (Hann and Bunnell 2001).

FRCC	DESCRIPTION	POTENTIAL RISKS
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components (e.g., native species, large trees, and soil) are low. Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate; risk of loss of key ecosystem components is moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high.

To determine the current FRCC, a landscape of 233,789 acres was delineated using both BLM and FS stand data across fourteen, 6th code hydrological unit's code (HUC) watersheds. The Whitetail Basin/Pipestone Project area makes up approximately 36,722 acres of this delineated landscape is BLM administered land. A potential/historical reference condition was determined for the landscape by using the Landfire Biophysical Setting (BPS) Model (USGS 2007). It is important to determine reference for the landscape, to see if treatments in the project area will affect the overall condition class of the landscape. The landscape area is divided into five major BPS for analysis of fire regime conditions class (FRCC) (Table 5). Three other classifications (agriculture, urban and barren lands) were dropped from the analysis.

Historic/Reference Condition

The Middle Rocky Mountain Montane Douglas-fir Forest and Woodland BPS (dry forest) historically made up approximately 19% of the area. The Rocky Mountain Poor-Site Lodgepole Pine BPS (wet forest) historically made up 26 % of the area. The Inter-Mountain Basins Big Sagebrush Steppe BPS (shrubland) historically made up approximately 41% of the area. The grass areas fall in the Northern Rocky Mountain Lower Montane-foothill-Valley Grasslands BPS (grasslands) and historically comprised approximately 3% of the landscape. Riparian areas make up approximately 10 % of the area in the Rocky Mountain Aspen Forest and woodland BPS (riparian). A small portion of the acreage present in landscape area was classified into various other BPS, but the acreage was not enough to analyze or make a difference in treatments across the alternatives.

Current Condition

The dry forest BPS makes up approximately 27% of the area. The wet forest BPS historically made up18 % of the area. The shrubland BPS historically made up approximately 51 % of the area. The grass areas fall in the Northern Rocky Mountain Lower Montane-foothill-Valley Grasslands BPS and historically comprised approximately two% of the landscape. Riparian BPS areas make up approximately three % of the area. A small portion of the acreage present in

landscape area was classified into various other BPS, but the acreage was not enough to analyze or make a difference in treatments across the alternatives.

Table 5: Summary of departures from historic/reference conditions by comparing current conditions to historical/reference conditions for the analysis areas.

Departure from Historical/Reference Conditions			
BPS	Analysis Area		Departure
	Current	Reference	
Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest – Ponderosa pine-Douglas-fir	27%	19%	8%
The Rocky Mountain Poor-Site Lodgepole Pine	18%	9%	9%
The Inter-Mountain Basins Big Sagebrush Steppe	51%	41%	10%
Northern Rocky Mountain Lower Montane-foothill-Valley Grasslands	2%	3%	-1%
Rocky Mountain Aspen Forest and woodland	3%	10%	-7%
**A negative % represents a shortage of the BPS on the landscape. A positive % represents an abundance of the BPS on the Landscape*			

The WBPW Analysis Area is in fire regime I and III and is rated as FRCC 2, a condition that is moderately departed from historic reference values. The FRCC standard Landscape Software method was used to determine FRCC for the Whitetail Basin/Pipestone Analysis Area.

Air Quality

The state of Montana is divided into ten airsheds by the Montana Air Quality Bureau (DEQ 2009b) and monitored by the Idaho/Montana Airshed Group. Each airshed in Montana is designated with a “Class 1” or a “Class 2” depending on air quality standards for the particular airshed. “Class 1” designations are the strictest. Air Quality Standards are set by the state.

The project area lies within Airshed 6, having a “Class 2” air quality designation. The Gates of The Mountains Wilderness Area, which has a “Class 1” designation, is located approximately 40 miles northeast of the project area. In addition to monitoring, the ID/MT Airshed Group has established Smoke Impact Zones. These zones surround cities where prescribed burning emissions could adversely affect air quality. Butte is the closest Smoke Impact Zone and is located approximately 15 miles west of the project area. This Smoke Impact Zone coincides with a State and Environmental Protection Agency (EPA) designation for Butte as a particulate nonattainment zone.

Existing air quality within the airshed and project area is affected by smoke, dust and motor vehicle exhaust. Smoke is produced from wildland fires, prescribed burning, residential wood burning and agricultural field burning. Additional smoke is blown into the area from fires outside the area, including western Montana, Idaho, the Pacific Northwest and Canada. Sources of dust primarily result from wind erosion of cropland and vehicle traffic on gravel roads.

Water and Soils

The project area is part of the Big Pipestone Creek, Little Whitetail Creek, Whitetail Creek, Lower and Middle Jefferson River subwatersheds of the Jefferson River watershed (USGS, 2008). The State of Montana lists two streams in the project area with impaired water quality, per section per the Clean Water Act (303-d), including Big Pipestone Creek and Whitetail Creek

(DEQ, 2009c). They do not fully meet state standards for supporting cold water fisheries and aquatic life. Probable contributing sources include agriculture, grazing and hydrologic modifications. Additional sources for Big Pipestone Creek include construction, highways, logging and channelization. Siltation and flow alteration are primary concerns. A Total Maximum Daily Load (TMDL) Restoration Plan for the Jefferson River was prepared by the DEQ (DEQ, 2009a). Treatments should be designed to improve flows and reduce sedimentation into these streams.

Soil information for the project area was obtained from the SSURGO certified soil survey of the project area completed by the Natural Resources Conservation Service (NRCS, 2009). The project area is located upslope from private land on valley floors, and down slope from Forest Service land on mountain slopes. The project area is dominated by moderately sloping hills (10-30%), gradually sloping alluvial fans (2-15%) and terraces. Soils are primarily deep alluvium derived from sedimentary sources (limestone and sandstone) and granite, with some volcanic intrusions. Shallow and lithic residual soils are present with rock outcrop on escarpments and ridges. The combination of parent material, slopes and landforms yields a diverse group of soil types, numbering over 80 identified and mapped soils, including miscellaneous areas, such as rubble land.

Some general characteristics of the soils in the area include loamy textures and few hydric, or wet soils. Erosion risk from off road, mechanized equipment is generally severe to very severe due to coarse soil textures and moderate to steep slopes, particularly on granite and sandstone derived soils and on soils found on slopes greater than 15%. Soils at most risk to erosion from human activity or wildfire are found in the Pipestone area, which is characterized by moderate slopes and granite derived soils. These soils tend to have the high levels of organic matter in the soil surface, ranging from 4% to 50%, placing them at risk of becoming hydrophobic in the event of wildfire. Hydrophobic soils repel water, placing them at risk of increased runoff and erosion (Neary et al. 2005; MacDonald & Huffman 2004; Robichaud 2000; Wondzell & King 2003).

Wildlife/Fisheries

Wildlife present in the analysis area is typical of southwestern Montana. Big game includes elk, mule deer, whitetail deer along lower riparian areas, pronghorn antelope in lower open areas, and black bear. Much of the project area is considered elk and mule deer winter range. Moose occur in the western, higher portions of the analysis area. Bighorn sheep are not present in this area. A variety of smaller mammals are present including badgers, rabbit species, beaver along Whitetail Creek, shrew species, bat species, small burrowing mammals. Common birds include but are not limited to Clark's nutcracker, ruby-crowned kinglet, raven, flicker, Townsend's solitaire, and mountain bluebird. Red-tailed hawk, kestrel, great horned owl, and golden eagle are raptors typical of the area.

Threatened or Endangered species are generally not present in the project area. The Canada lynx is the only listed species that could occur here. The lynx may occasionally disperse through the project area and may make use of the highest elevations of the analysis area. However, habitat types and elevations in the project area are not suitable for lynx. The gray wolf has been delisted. Some local residents have reported seeing tracks or sign of individual wolves within the project area; however no resident packs have been documented in the area. As of March 3,

2010, greater sage-grouse were officially listed as a Candidate species (see Birds discussion below).

Numerous BLM sensitive species and Montana species of concern have the potential to use the analysis area including:

Amphibians: The boreal toad could occur in or near any riparian area.

Fish: Westslope cutthroat trout exist in Big Pipestone and Halfway Creeks. Other trout also exist in these creeks, and the genetic purity of the westslope species here is undetermined. Upper Halfway Creek on Forest Service land does have genetically pure westslope cutthroat.

Mammals: Four sensitive bat species have the potential to use the area. Wolverine and fisher have the potential to disperse through the project area. Habitat preferences of these species are similar to the lynx.

Birds: Greater sage-grouse historically occupied sage habitat of the area but have not been present for a number of years. Recent Fish, Wildlife, & Parks surveys have not verified any in the area; there are no FWP-designated sage-grouse 'core areas' in the vicinity. A herbicide treatment by a private landowner in 2005 reduced the available sage habitat. Long-billed curlew and mountain plover nest in open grass habitats in summer, mostly on private land. Golden eagle nests have been recorded in the action area. Loggerhead shrike, sage thrasher, and ferruginous hawk have been recorded in the action area. Other sensitive bird species that are potential users of the analysis area include but are not limited to great gray owl, McCown's longspur, northern goshawk, Brewer's sparrow, Swainson's hawk, three-toed woodpecker, and bald eagle.

Visual Resources

The BLM managed lands located within the project area were inventoried for visual resources during the Butte Field Office's Resource Management Planning effort, which was completed in April 2009. For each area inventoried, specific Visual Resource Management (VRM) classes were assigned. Within the Whitetail/Pipestone planning area, VRM management classes are as stated in Table 6.

Table 6: The total acres of Visual Resource Management classes located within the project area.

VRM CLASS	ACRES
I	0
II	3,938
III	14,739
IV	18,386

These management classes were derived from assessing a combination of three important visual factors (Scenic Quality, Sensitivity Levels and Distance Zones). Management Classes are used to assess visual resource values and to determine degrees of modifications allowed to the basic elements of the project area landscape.

Management objectives for VRM Class II, III and IV areas are as follows:

• Class II: The objective of this class is to retain the existing character of the landscape. Levels of noticeable change should be low. Management actions may be seen but should not attract attention of casual users. Changes must conform to the basic elements found in the predominant natural features of the characteristic landscape.

• Class III: The objective of this class is to partially retain the existing character of the landscape. Levels of noticeable change should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should conform to the basic elements found in the predominant natural features of the characteristic landscape.

• Class IV: The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of the viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

4.0 ENVIRONMENTAL IMPACTS

4.1 Introduction:

This section discloses the scientific and analytic basis for comparison of the alternatives and describes the direct and indirect probable consequences (impacts, effects) of each alternative on the issues and resource concerns. The first portion details impacts common to all of the alternatives first, and the second portion discloses the impacts that pertain to each alternative beyond the impacts common to each alternative. This section also discloses the cumulative, or combined, impacts of alternative actions with past, present and reasonably foreseeable actions within the project area.

4.2 Direct and Indirect Impacts:

4.2.1 Impacts Common to All Alternatives

Vegetation (Riparian, Grasslands, Shrublands, and Forests)

Riparian/Wetland Areas

Wetland and riparian areas would be accessed by wildlife and cattle within the project area, which may result in some trampling, browsing and grazing of riparian vegetation.

Grasslands and Shrublands

Continued livestock grazing would affect composition of vegetation due to dietary preference and selectivity of forage at varying degrees. AUM allocations on each allotment have been designed to allow moderate utilization of less than 50% annually, which would generally promote production and reestablishment of desired native species. Areas of livestock congregation (e.g. salt licks or near developed water sources) would remain trampled and relatively void of vegetation. However, these areas are few and small in size, and are located primarily along existing and historic two track trails.

Invasive, Non-native Species

Invasive and non-native plant species, such as cheatgrass, musk thistle, Canada thistle, bull thistle, common mullen, spotted knapweed, black henbane, and yellow toadflax, are already present along roads, in some upland sites, in disturbed sites, and some riparian areas. Weeds would not be expected to increase due to livestock grazing in the project area, because the BFO and its partners would continue to aggressively treat noxious weeds. Weed seeds could be transported by visitors who frequent the area on the undercarriages or wheels of vehicles or transported by wildlife and cattle in their fur.

Wildlife/Fisheries

Herbaceous vegetation provides forage for species such as elk and mule deer, and concealment cover for smaller species, such as grouse and migratory birds, particularly during the early spring breeding period when calving, fawning, nesting, and rearing of young occurs. Livestock grazing would reduce the height and amount of herbaceous vegetation. The presence of livestock and the trailing of livestock between areas of use could result in the direct disturbance or displacement of some wildlife from preferred habitats, nesting/birthing sites, or water sources. Both the

disturbance and displacement of wildlife and the reduction of herbaceous forage and cover may limit the productivity and reproductive success of some wildlife species.

4.2.2 Alternative A – No Action:

This section describes the impacts of not implementing vegetation treatments, range improvement projects, updated grazing permits/leases, and erosion control structures. Expiring grazing permits/leases would be renewed with the same terms and conditions, AUMs and season of use as the previously expiring permit/lease, the application to change the season of use on the Ringing Rocks Allotment would not be processed at this time, and no allotment boundary changes would occur.

Vegetation (Riparian, Grasslands, Shrublands, and Forests)

The analysis for Fuels/Fire Management with regard to vegetation focuses on Fire Regime Condition Class (FRCC). The no action alternative would not treat vegetation and would not meet the goals discussed in the purpose and need of this assessment.

This alternative would not treat any vegetation in the five major BPS outlined in Chapter 3, and therefore movement toward diversity of habitats and seral stages within habitats would not be occur within the project area. The FRCC for this landscape would be maintained as a FRCC 2, which is moderately departed in vegetation characteristics, fuels composition, fire frequency, fire severity, fire pattern and other associated disturbances, as compared to the reference regime. With no vegetation treatments occurring under this alternative, the landscape would consist of approximately a 38% surplus of the dry forested acres and 24% surplus of shrubland acres, with a 48% shortage of grassland acres and a 72% shortage of riparian acres, as compared to the reference condition.

<u>Riparian</u>

Without implementing the stock water developments on the Big Pipestone and Big Foot Allotments, livestock would continue utilizing riparian areas for water and as a result use would be concentrated in these areas. On riparian reaches that are rated FAR, continuing to allow concentrated livestock use may cause further degradation or maintain the stream in its current condition class. Additional terms and conditions added to grazing permits/leases that stipulate salting locations away from riparian areas would not be implemented. Without this term and condition, salting could still occur near riparian areas and cause degradation to riparian resources.

Failing to complete the site specific riparian treatments such as the Rocky Canyon hardened crossing, Little Whitetail Creek conifer barriers, head-cut repairs, and Whitetail Creek conifer thinning would perpetuate existing conditions and may cause conditions to further degrade. Without completing riparian vegetation treatments, the riparian stratum would stay categorized in FRCC 3, with an approximate 14% shortage in the early development, a 40% shortage in the mid development closed, and 40% shortage in the late development closed seral stage.

<u>Grasslands and Shrublands</u>

Without completing any treatments in grasslands and shrublands, habitat diversity would continue to be limited. The grasslands stratum would stay categorized in FRCC class 2 with

approximately five percent shortage in the early development and a 25% shortage in the mid development serial stage. The shrubland stratum would stay categorized in FRCC 3, with an approximate 20% shortage in the early development and a 33% shortage in the mid-development seral stage.

Forests

Approximately 90% of the forested areas would remain in a closed canopy structure, keeping the forest stratum in FRCC 2 with the trend moving toward FRCC 3. The no action would not promote the development of large trees, increase the vigor of mid-seral trees or promote a diversity of understory vegetative species. Not treating forests within the project area would also allow for the spread and an increase in populations of western spruce budworm and Douglas-fir beetle into additional areas within the proposed project area. Western spruce budworm is a defoliating insect and does not necessarily kill trees. However, severe defoliation could kill a conifer in one year, and repeated infestation year after year could severely weaken the tree, causing loss in growth and predisposing it to attack by Douglas-fir beetle. This alternative would not promote the development of large trees and old forest structure, where deficient, and would not reduce the risk of mortality due to insects.

Invasive, Non-native Species

Weeds would continue to be treated in the WBPW area as time and funding allows. No additional emphasis or intensive inventories would occur.

Air

Current uses would continue, and undisturbed sites would continue to function as they are presently. Current trends and processes would continue and wildfire would result in temporary conditions of smoke and particulates that could exceed air quality standards. Carbon dioxide (CO_2) would also be released into the atmosphere; this gas is considered by the BLM and State of Montana, among other agencies, to be a greenhouse gas. Wildfire would expose the soil surface, subjecting it to wind erosion in excess of current background levels. This would be a temporary effect until vegetative re-growth and litter cover reestablishes.

Water and Soils

Under this alternative, current trends would continue and the risk of catastrophic wildfire would be high, resulting in runoff and sedimentation that would likely reach surface water. Hydrophobic soils, which could persist for a period of time lasting from a few months to a year, would prevent precipitation from infiltrating the soil profile, resulting in runoff and erosion. The lack of stored soil moisture would, in turn, hinder vegetative re-establishment. Encroachment of conifers into aspen stands would continue, resulting in a decrease in water yield.

Wildlife

Under this alternative, the only action taken would be to renew grazing permits as they have been for the previous 10 years. Wildlife would continue to use the area, but proposed actions to improve habitat would not occur. Sedimentation from head cuts, crossings, and OHV trails would continue to deteriorate stream and riparian habitat quality. Expansion of conifer species into grass, shrublands, and riparian areas would continue to occur, diminishing the mosaic of habitat types used by wildlife. The wildlife community over time would likely become reduced in native species numbers and diversity.

Visual Resources
Under the No Action Alternative, no vegetative treatments would occur to the existing landscape; and impacts to visual resources would not be human-induced. However, taking no action would subject the area to a potentially more extensive wildland fire and greater tree stand mortality due to insects and diseases over the long-term. These events, depending on their scale, could create high impacts to the scenic quality of the area, both in the short and long term.

4.2.3 Alternative B – Proposed Action
The proposed action would implement updated grazing permits/leases, range improvement projects, erosion control structures, increased emphasis on weed treatments, and vegetation treatments.

Vegetation (Riparian, Grasslands, Shrublands, and Forests)
On all allotments where permits/leases would be renewed, additional terms and conditions would ensure that livestock grazing practices are promoting healthy vegetation states and not causing resource degradation. Livestock management facilities including the pipelines on the Big Pipestone Creek and Big Foot Allotments would improve grazing management by improving livestock distribution and promote healthy upland and riparian conditions. Providing off-site water sources reduces the amount of livestock use along riparian areas, which reduces grazing, browsing, and trampling of riparian vegetation. The corrals, AVT cattleguards, and fence extension promote livestock management and keep livestock from accessing adjacent allotments.

Implementing these projects allows grazing management to continue during the authorized seasons of use and prevent grazing outside of authorized use periods to promote healthy rangeland conditions. The physical impact of the crawler tractor to vegetation along the pipeline routes would involve the crushing, breaking and uprooting of some sagebrush, grasses, and forbs. The impacts from construction, however, would diminish after several years. Natural re-vegetation and settling of the sod layer over the pipeline would allow for near total rehabilitation of the site.

Vegetation treatment in four of the five major BPS's. The proposed action would treat up to 4,100 acres of grassland, dry forests, riparian, and sagebrush habitats (approximately 11% of the BLM administered lands). This would result in a small change of FRCC across the landscape, due to the fact that the BLM administered lands make up only approximately 16 % of the of landscape. The treatments would move vegetation stratums within the project area toward reference condition stratums, meeting the intent of the purpose and need of this assessment outline in Chapter 1. However, the combination of treatments implemented by this alternative would maintain the landscape level FRCC 2, described as a moderate departure from the natural or historical regime of vegetation characteristics, fuel composition, fire frequency, fire severity, fire pattern and other associated disturbances.

<u>Riparian</u>
Treatments on approximately 100 acres would occur in the riparian BPS, with the treatments creating more early development structure on the landscape. The riparian stratum would change by eight percent but would stay categorized in FRCC 3, (high departure). The treatment would

make up eight percent change in each of the early seral structure. Eight percent of the 48 % shortage of grassland would be recovered on the landscape.

Grasslands and Shrublands

Treatments on approximately 1,600 acres would occur in the grassland BPS, with the treatments creating more early and mid development structure on the landscape. The grassland stratum would change by eight percent but would stay categorized in FRCC 2, (moderate departure). The treatment would make up to one percent change in each of the mid-open canopy structure and early seral structure. Five percent of the 48 % shortage of grassland would be recovered on the landscape.

Treatments on approximately 800 acres would occur in the shrubland BPS, with the treatments creating more early and mid development structure on the landscape. The shrubland stratum would stay categorized in FRCC 3, (high departure). The treatment would make up to one percent change in the mid-open canopy structure and early seral structure.

Forests

Treatments on approximately 1,400 acres would occur in the dry forest BPS, with the treatments designed to move the late and mid-closed canopy structure toward late and mid-open canopy structure and to an early seral structure. The dry forest stratum would stay categorized in FRCC 2, (moderate departure). The treatment would make up one percent change in each of the late and mid-open canopy structure and to early seral structure.

Thinning late seral stands would promote the development of large trees and old forest structure (where deficient), maintain the vigor of mature trees, increase the vigor of mid-seral trees, reduce the risk of mortality due to insects and promote a diversity of understory vegetation species. Reducing the number of Douglas-fir and juniper per acre would promote an open forest canopy with a high shrub component and other understory species. Thinning would also reduce the risk of spruce budworm activity in adjacent mid and late seral stands. Thinning would emphasize retaining genetically superior trees that have not stagnated and those that have been minimally defoliated by spruce budworm.

Invasive, Non-native Species

Treatments to restore wildlife habitat by opening up parks, meadows, aspen stands and forest habitat types would help native vegetation, thus creating a natural competition against weed infestations. Mechanical and burn treatments would cause more disturbance, allowing weed infestations to occur. Positioning handcutting treatments, or no treatment, in areas where there are known weed infestations lowers the risk of exposed areas where weed locations are likely to occur. Weed invasions that would occur as a result of burning and mechanical treatments would be expected to be less severe than those resulting from wildfires, because wildfires would burn more severely and potentially sterilize the soils. The native seedbank would be lost with this scenario, and noxious weeds would have no competition for seed establishment.

Air

The proposed action would treat up to 4,100 acres of grassland, dry forests, riparian, and sagebrush habitats, by prescribed fire and mechanical methods. Prescribed burning would

release carbon dioxide (CO_2) into the atmosphere; this gas is considered by the BLM and State of Montana, among other agencies, to be a greenhouse gas. CO_2 emissions from exhaust and prescribed burning would be temporary and, given the comparative acreage of fuels consumed, would be less than what would be emitted in the case of wildfire.

Water and Soils

The semiarid landscape and ephemeral drainages that characterize much of the project area reduces concerns for sedimentation, but results in slower recovery of disturbed soils from treatments under the proposed action. Conversely, moister conditions and perennial streams in the project area present concerns for sedimentation, but recovery of vegetation in disturbed areas should be more rapid. The diversity of climate, soils, streams, and ecological site types require that treatments be implemented on a soil and stream specific basis.

The greatest possibility of erosion due to management actions is expected in mechanical treatment and prescribed burn treatment areas. Chemical applications and hand cutting operations are expected to have the least impact on soils. The amount of erosion would be much less than in the no action alternative, should a wildfire occur. Reducing current erosion would address immediate concerns to water quality. Conifer encroachment into riparian areas is a concern, because the uptake of water in large quantities and reduction in groundwater recharge (Shepperd et al. 2006; Gifford et al. 1984). Treating conifer encroachment would improve subsurface flow and increase water yield to improve stream flow and reduce susceptibility of soils to erosion and sedimentation in response to wildfire.

The variability in soils requires treatments to be implemented and monitored on a site specific basis. Temporary roads required for treatment implementation would be designed to reduce overland traffic, and potential soil compaction, which reduce soil productivity and infiltration (NRCS 2004; Carr et al. 1991). Temporary roads would be remediated to restore hydrologic function.

Construction of the range improvement projects in the Big Foot and Big Pipestone Creek Allotments would cause some soil disturbance, however as vegetation re-grows soils would become stabilized at these sites. At the new proposed trough sites bare soil and compaction would increase due to the concentration of livestock.

<u>Vegetative treatments</u>

Overland travel related to implementing all vegetative treatments would be limited to routes designated on a soil specific basis to reduce potential for erosion and compaction. These routes would be temporary, as would the effects including erosion and compaction, because they would be rehabilitated through a combination of ripping or subsoiling and seeding with a native seed mix.

Mechanical treatment of riparian areas would be avoided to prevent issues of compaction and sedimentation. Limiting overland travel and disturbance also minimizes impacts to litter levels, thereby limiting impacts to the carbon and nutrient pools. This, in turn, lessens impacts on overall soil productivity.

Mechanical and burn treatments would expose the soil surface, rendering it subject to erosion and sedimentation. Positioning hand cutting operations and chemical treatments on soils with a higher risk of erosion, and positioning mechanical and burn treatments on soils with moderate to low risk of erosion would decrease the risk of erosion and sedimentation from treatment implementation. Following SMZ guidance and implementing BMPs would further mitigate impacts from treatments.

Compaction resulting from mechanical treatment would limit infiltration of surface water, temporarily lowering the amount of stored soil moisture and limiting ground water recharge. Levels would return to normal, pre-treatment condition over time due to tree roots, organisms and weathering breaking up the compacted layer. Lower infiltration rates, due to compaction, would be greater than for the no action alternative; however, hydrophobic soils, formed in response to a wildfire would cause a much lower infiltration rate. Mechanical treatments would be implemented on a soil specific basis to reduce the potential for compaction.

Slash from hand cutting and mechanical treatments would be lopped and scattered, providing a source of organic matter that will provide long-term nutrient availability, and protect the soil surface from erosion. Slash would be deposited in front of mechanical equipment as much as possible to mitigate soil disturbance from equipment. Organic matter is an important sink for atmospheric carbon and an important source of nutrients for plants. Many organisms, including fauna, enzymes and microbes act to mix soils and break down organic matter to forms that provide nutrients to plants. High intensity wildfire has the potential to disrupt this natural cycle by consuming organic matter, releasing carbon into the atmosphere and killing organisms in the soil profile close to the soil surface. A low intensity burn would consume some organic matter, but would affect the microorganism community for a shorter period of time than a high intensity wildfire. A low-intensity burn would not remove potential sources of future organic matter contributions (such as trees and grasses) to the extent that high-intensity wild fire would, so recovery is quicker.

Prescribed burns would be controlled so as not to produce heat sufficient to produce hydrophobic soils, as would be the case in a wildfire scenario. Prescribed burning would not negatively affect productivity as a wildfire would, which is more likely to occur under the no action alternative. The use of prescribed burning would likely produce a short term increase in soil productivity (Robichaud et al. 2000) and a long term decline, in response to changes in available organic matter as a source of nutrient supply (Caldwell et al. 2000). Should a wildfire occur in the project area after implementation, those areas where prescribed burning was applied would exhibit higher productivity compared to areas receiving mechanical, chemical, or no treatment due to the attenuating effects of low intensity burns on soil microbes (Choromanska & DeLuca 2001).

Prescribed fire would take place when soils are less prone to erosion and grass can recover quickly to hold soil in place. Soil erosion that would occur, would be temporary and insufficient to change the potential of the soil to maintain existing correlated ecological sites. However, in the case of a high severity wildfire, erosion could be significant enough to alter soils to the point that they could not support plants in the existing ecological site, particularly on shallow soils and steep slopes.

Regeneration following prescribed fire is expected to occur within one year following the fire. Treatments of prescribed fire on steep, highly erosive soils would be avoided to prevent erosion.

Hand-cutting is proposed exclusively in a firewood gathering area. The probability of erosion and compaction would be minimal, compared to mechanical or burn treatments. Compaction and erosion would result from vehicular access for cutting and hauling fire wood. These effects would be mitigated by limiting access to designated routes stipulated in fire wood gathering permits.

ATV Trail Treatments

Erosion and sedimentation from ATV trails into surface water at stream crossing would be addressed by improving the crossings through a combination of hardening crossings and changing the angle of approach to the crossings. Erosion and sedimentation from trails above streams would be mitigated by installing erosion control barriers, water bars and ditches to divert sediment away from surface water.

Wildlife

Under this alternative, habitat quality for the native wildlife community would be improved for a longer term than the No Action alternative. Grazing permit stipulations such as not placing mineral blocks within ¼ mile of water, no grazing in fenced exclosures, and grazing use not being detrimental, would improve range condition for wildlife related to cattle use.

Water developments, hardened stream crossings, headcut repairs, and work to address erosive portions of OHV trails would improve stream habitat quality for aquatic species. Temporary fencing around cottonwood or aspen stands would allow stand regeneration.

Vegetation treatments would be designed to restore more natural vegetative communities that would be present without having had human interference across the landscape for approximately the past 150 years. Big game habitat and overall species diversity would benefit from induced disturbances that would move treatment units back to earlier seral stages.

Wildlife would be subject to disturbance during implementation of the proposed projects. Big game could be displaced from feeding/loafing areas. Equipment could crush small mammal and reptile burrows. Trees in burning, cutting, or mastication units would be surveyed for nesting birds if treatment occurred between May 1 and August 30, unless surveys document low potential impact to nesting birds. However, nests could be missed and nestling birds could be killed, but negative effects would be temporary.

Visual Resources Management

The Record of Decision (ROD)/Approved Butte RMP states that, “Contrast ratings will be completed for proposed projects in Class I and II areas, and for proposed projects in Class III and IV areas that are high impact projects or located in highly sensitive areas” (Page 65).

Because no major treatments would occur under this alternative in VRM Class II areas, and because the level of treatments in VRM Class III and IV areas would not be considered to be

high impact, or occur in areas determined to be highly sensitive, Key Observation Points (KOPs) were not established, and thus visual contrast ratings were not completed.

In general, there may be some reductions in overall visual quality due to the proposed vegetation management actions in the VRM Class III and IV areas. However, these reductions would be short or mid-term, and would generally be considered to be compatible with respective VRM Classes. In the long term, impacts to visual resources would generally be positive as areas would be returned to a more natural condition. Treatment specific impacts would be as follows:

Limiting the spread of noxious weeds would be beneficial as the natural appearance of the respective landscapes would generally be enhanced.

Timber cutting and thinning could reduce visual quality, but generally only temporarily, in regard to apparent modifications to color, line and texture.

Management actions for fire, including wildland fire use, prescribed fire, and fuels reduction, could result in a short-term reduction in visual quality; however, these actions could ultimately promote long-term benefits, as fewer acres would be available to burn during an uncharacteristically large or severe event. In addition to reducing the potential for severe wildland fires, these actions could also benefit visual resources by creating open vistas and more diverse landscapes with open, park-like settings and interspersed shrubs and trees.

Protection and enhancement of riparian conditions would generally improve visual resources over the mid to long-term, due to greater color and texture diversities and overall healthier appearances.

4.4 Monitoring

Vegetation (Riparian, Grasslands, Shrublands, and Forests)
Vegetation monitoring within the project area would consist of a variety of trend monitoring, qualitative assessments, and inventories/surveys. Trend monitoring sites already established would continue to be utilized, however additional monitoring sites will be implemented pre and post treatment to determine and document changes in vegetation composition, cover, structure, and frequency.

Noxious Weeds
Inventory prior to implementing vegetation treatments would be completed to identify areas where mitigation measures may be needed to prevent and reduce the spread of noxious weeds and to identify areas to treat prior to vegetation treatment implementation. Post treatment inventory and monitoring would also be completed to assist staff in future treatment efforts and to determine changes in vegetation.

Water and Soils
Degradation of water quality would most likely result from sedimentation tied to erosion and bank destabilization, so monitoring measures and costs are described for soils and in the Riparian section.

Soil monitoring would involve ensuring that treatments and BMPs are employed on suitable soil types to minimize erosion, compaction and loss of soil productivity at the time of implementation.

Following treatment, soil monitoring would involve assessing erosion and compaction the year following treatment, to determine if additional mitigation is required. Areas where treatments do not reveal compaction or erosion a year following treatment, or additional mitigation, monitoring would occur on the third and fifth years.

Monitoring methods would be consistent with methods specified by the NRCS National Soil Survey Center for assessing soil quality and BLM Standards and Guidelines. Although the presence of soil biota (living organisms) is a good indicator to monitor for soil productivity, it is difficult to accomplish, so the presence of soil organic matter, on which soil biota depend, would be monitored instead.

4.5 Cumulative Impacts Analysis:

"Cumulative impacts" are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions.

The BLM lands within the allotments in this EA have been impacted by various human activities since pre-Euroamerican settlement. In historic times, these activities have included livestock grazing, road building, mining, timber harvest, and agriculture. Vegetation, wildlife distribution, and species presence and diversity have all been altered to some degree by recreational activities, mining, and other human practices, individually or in combination.

4.5.1 Cumulative Impacts:

No Action

The intermingling of private and state lands with public lands throughout the watershed ensures that activities outside the control of BLM will continue. Grazing on these lands at various times throughout the year will influence forage and cover availability, and distribution of seasonal wildlife uses. Although wildlife habitat needs are generally met within the watershed, this grazing may influence suitability and availability of that habitat on a localized basis or during a specific time frame. By continuing current management, the diversity of habitats and seral stages within habitats will continue to become more limited as sagebrush and conifers continue to colonize grasslands. Limiting the diversity of habitats and seral stages within habitats, may also limit the diversity of wildlife species that occupy the project area and their available range. Weeds would continue to expand in varying degrees, even though weed treatments would continue to be applied throughout the watershed.

Action Alternatives

Short-term effects of soil erosion are likely to occur within treatment units. Treatment design away from surface water and use of BMPs and design features should prevent this sediment from

reaching streams. Runoff from temporary roads would be diverted away from streams. Long-term effects are an improvement in water quality for perennial streams in the watershed. The potential for catastrophic high-intensity wildfire would be reduced, resulting in less potential for sedimentation. Grass production and riparian conditions would improve, thereby increasing the potential of buffers to trap sediment before entering streams. Reducing conifer encroachment into aspen stands should increase water yield due to the lower water demand of aspen. Because the Jefferson Watershed Committee is interested in pursuing similar land health treatments on private land, the cumulative effect in the watershed would be cleaner water and productive soils.

Managing to improve riparian conditions throughout the watershed would allow for better dispersal of wild ungulates and reduce site specific riparian impacts. The proposed changes in livestock management would generally improve riparian function on BLM-administered land and other lands within BLM allotments at varying degrees and timeframes. The expected effect to downstream riparian habitats and water quality would be improved sediment transport, better access to floodplains, dissipation of energy and, over time, improvements in channel morphology. Additional reliable water sources later in the grazing season would create more livestock management options, such as a better rotational grazing system, where plants are not grazed during the same time period each season. Such structures, in conjunction with other management measures, are intended to protect or enhance watershed and/or riparian condition to maintain or improve vegetation conditions.

Forest health treatments completed on BLM-administered lands and other ownerships would increase the diversity of forest structure and composition throughout the WBPW area. This increase in structural diversity across the landscape would likely result in a more patchy spruce budworm outbreak regime in the future (Swetnam and Lynch 1989). Increasing structural and compositional diversity across the landscape as a result of forest treatments and prescribed burning decreases the probability of large-scale disturbances that produces negative impacts over a large area. Large-scale disturbances would still have the potential to occur; however, areas treated would create buffers of less susceptible (in terms of insects/disease) and more fire resilient habitats.

Vegetation treatments that would be completed under the proposed action in combination with vegetation treatments already completed within the WBPW on BLM lands, as well as FS, state and private lands, increase habitat diversity and promote healthy watershed conditions.

Noxious weeds and non-native species are already in the area. With the disturbance of soils and more traffic, undesirable non-native species would gain an added advantage in the area.

5.0 CONSULTATION AND COORDINATION:

5.1 Introduction:

During preparation of the EA, the public was notified of the proposed action through a posting on the Butte Field Office NEPA Register on January 11, 2010. The agency considered input from persons or groups regardless of age, race, income status, or other social and economic characteristics. Contacts established in response to the notice are shown below. The process used to involve the public included the opportunity to respond to the scoping notice published in local newpapers by contacting the Butte Field Office or via the Montana Dakotas BLM public website where current NEPA projects are listed. A public comment period was offered due to scale of the project listed in the newspaper printing.

5.2 Persons, Groups, and Agencies Consulted:

Table 5-1:
List of all Persons, Agencies and Organizations Consulted for Purposes of this EA

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
MT Fish, Wildlife, and Parks	State agency managing wildlife populations within the project area	Participated in the planning process, field evaluations Coordinated to obtain the 124 permit.
Permittees who hold grazing permits/leases on the allotments included in the EA	Applied for 10-year grazing permit/lease renewals, or applied for other changes grazing permits/leases	Participated in developing alternatives for allotments
USFS-Jefferson Range District	Manage lands within analysis area	Participated in development of grazing alternatives and range improvement projects
Western Watersheds Project	Interested Public	Requested to be an interested party on all grazing decisions, no response to scoping
Jefferson River Watershed Council (JRWC)	Local interest group focusing on improving land management practices with the Jefferson River Watershed	Partner in project planning and implementation
Jefferson Valley Sportsman	Local interest group focused on hunting and fishing	Vested interest in promoting wildlife habitat within the project area, potential partner for project implementation
Coalition for Appropriate Management of State Lands	Local interest group	Submitted a letter in response to scoping notice and requested to receive a copy of the EA and decision
John Guidoni	Interested public	Requested to receive a copy of the EA and decision

5.3 Summary of Public Participation/Response to Public Comments:

As a result of the newspaper notification of the proposed project, the BFO received contacts via telephone and one letter. As result of the phone contacts, further explanation of the project area and concerns regarding travel planning were addressed and clarified. Two local interest groups, the JRWC and Jefferson Valley Sportsman requested briefings on the project that were provided

by BFO staff members. BFO responded to the letter received by a local interest group. All comments received from the public were considered during project scoping.

5.4 List of Preparers:

Name	Title	Responsible for the Following Section(s) of this Document
Tanya Thrift	Rangeland Management Specialist	Project Lead, range, riparian, and sensitive plants
Scot Franklin	Wildlife Biologist	Wildlife and riparian
Lacy Decker	Range Tech.-Weeds	Noxious and invasive species
MaryLou Zimmerman	Forester	Forest resources
Charles Tuss	Fire Management Specialist	Fuels/WUI
Corey Meier	Soil Scientist	Soils, Water, erosion control projectcs
Brad Colin	Outdoor Recreation Planner	Visual Resource Management
John Sandford	Rangeland Management Specialist	Range, range improvement projects
Brian Mueller	GIS Specialist	FRCC Modeling and Maps

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6.2 List of Acronyms Used in this EA:
BLM-Bureau of Land Management
BFO-Butte Field Office
PFC-proper functioning condition
FAR-functional at risk
WBPW-Whitetail Basin/Pipestone Watersheds

6.2 List of Maps
1. Project Area Map

APPENDICES:

APPENDIX A:

Pfister Habitat Types:

PSME/AGSP- Douglas-fir/bluebunch wheatgrass habitat type: represents the warm- dry extreme of the Douglas-fir climax series. It occurs mostly on steep southern or western exposures. Elevations of sample plots ranged from 5,000 to 6,500feet. Trees are widely spaced and stand structure is similar to the grassy Ponderosa pine habitat types. On limestone derived soils, limber pine is commonly present as a minor seral component. Undergrowth is dominated by bluebunch wheatgrass and arrow leaf balsam root. Scattered shrubs may be present. There is no appreciable presence of Great Plains grassland species. Timber productivity is low to very low, as indicated by site indexes and stockability limitations. Clearcutting in this type reverts the site to grassland with very slow reinvasion of trees. Natural regeneration may take 20 to 40 years. Light selection or sanitation cuts are recommended.

PSME/FEID - Douglas-fir/Idaho fescue habitat type – is found on dry sites that are generally cooler than those that support the PSME/AGSP type. It occurs on a variety of aspects, usually between 5,600 and 7,350 feet in elevation. It is common in southwestern Montana, but is rare elsewhere. It often occurs as a topographic climax at the lower edge of forested north slopes; or on higher elevation southern facing slopes. On southern slopes stands are more open and undergrowth is more well developed. PSME/FEID differs from other Douglas –fir types in that ponderosa pine is essentially absent; this type occurs where even the valley bases are up above the elevational reaches of ponderosa pine. Small amounts of limber pine may be present on limestone derived soils. Undergrowth is sparse; common associates include Idaho fescue, wax current, big sagebrush, and bluebunch wheatgrass. Stands occurred on a variety of calcareous and noncalcareous soils, texture ranged from sandy loam to silt. Forage production is moderate in cleared/open stands; timber productivity is low, reflected by

PSME/FESC – Douglas-fir/Rough fescue habitat type – Most stands of this type were found on south or west facing slopes between 2,700 and 5,700 feet (up to 7,400 feet). Ponderosa pine is often a major seral or climax associate; only occasionally are sites found above the cold limits of Ponderosa pine. Limber pine is a minor component in some stands on calcareous soils.

Bitterbrush was abundant in 2 samples; and small amounts of serviceberry, chokecherry and woods' rose were often found in the understory. Major grasses and forbs include bluebunch wheatgrass, Idaho fescue, junegrass, arrowleaf balsamroot, and western stoneseed. Stands were found on a variety of calcareous and noncalcareous parent materials. This is one of the better forest habitat types for production of forage. Timber productivity is low to very low due to both low site index values and stockability limitations. Natural regeneration may take 20 to 40 years. Light selection or sanitation cuts are recommended.

Understory species:

Juniperus scopulorum or Rocky Mountain juniper is a native perennial evergreen shrub. It may grow as a small tree up to 30 feet tall. It is a long-lived, slow-growing species often surviving 250-300 years or more. The average height of 8-year-old trees is 1 foot. Saplings grow slowly and steadily until age 40, when they average 13-14 feet (3.9-4.3 m) tall. Then growth slows, and at age 80, the average height is 18 feet. Rocky Mountain juniper is usually found in long-term seral or near-climax vegetation, it is often found as a climax species in juniper associations in the Rocky Mountain region. The species may also be climax with Douglas-fir, or it may occur as a "pioneer" tree species in Douglas-fir succession. Small trees up to 3-4 feet tall are easily killed by fire; and trees are especially susceptible to fire for their first 20 years or more. Reduced fire frequency, along with climate change and introduction of grazing, accounts for the expansion of juniper woodlands into meadows, grasslands, sagebrush communities, and aspen groves that began in the late 1800s. Prior to this time, more frequent fires probably maintained low density in woodlands and often restricted junipers to rocky sites. In general, the species grows in areas that do not burn frequently or intensely (Scher 2002).

Festuca idahoensis or Idaho fescue is a vigorous, native, long-lived, perennial, cool-season, bunchgrass that grows on many landforms, elevations, aspects, and soil types. In Montana, it commonly occurs from 5000 to 8000 feet in elevation. Idaho fescue decreased in abundance with increasing snowpack in Montana. It is a major component of late-seral ecosystems, but may also colonize suitable disturbed sites. In cases where the level of disturbance is such that cover of Idaho fescue decreases (e.g., heavy grazing pressure or severe fire), Idaho fescue succeeds to various native and non-native increaser species (bluegrasses, sagebrush, rubber rabbitbrush, broom snakeweed, needlegrasses, lupine, phlox, spotted knapweed, yellow starthistle , timothy, and cheatgrass). It can survive light-severity fires; however, a decrease in or loss of dominant seral species such as Idaho fescue due to fire exclusion has been noted in many areas.

Mollisols are most commonly associated with grassland ecosystems; however, Mollisols occur in southwest Montana under dry end Douglas-fir forests, usually on sites where Idaho fescue is among the understory grass component. These sites may have been grasslands that were invaded by conifers. (Zouhar, 2000).

Artemisia tridentata **-** Big sagebrush

Agropyron spicata – Bluebunch wheatgrass is a native, cool-season, perennial grass with densely tufted culms, 12-30 in. tall, erect or nearly so. It is distributed throughout the West and

is among the most drought-resistant native bunchgrasses. The plants do not flower and produce seeds every year; but the seeds are able to germinate under a wide range of temperatures, a characteristic that allows the plant to dominate in an inconsistent environment. Bluebunch wheatgrass usually reproduces and establishes on newly disturbed sites by tillering. It is a facultative autumn-emerging species and seeds will germinate in the fall given appropriate climatic conditions. It needs at least 10 inches of moderately coarse, loam soils, and is intolerant of excessive salts or soil moisture. A mass flowering response after fire suggests that on burns, it may also establish from seed, but seedling establishment after fire or other disturbance is not documented in the literature. Bluebunch wheatgrass is also common in older, established plant communities (Zlatnick, 1999).

In Montana, on several Douglas-fir/bluebunch wheatgrass sites, fire regimes were characterized as moderate severity, frequent surface fires, with an MFI of less than 1 to 23 years. Arno (1976) estimates mean fire-free interval in the years 1735-1900 to be from 6 to 11 years in the Douglas fir/bluebunch wheatgrass habitat type at 3,800 to 5,000 feet in the Bitterroot National Forest, Montana. Bluebunch wheatgrass probably suffers the least amount of damage if burned while dormant, and the most if burned while actively growing, prior to dormancy. Most authors conclude that fall burning generally causes less damage to the plants than spring burning and stimulates productivity of bluebunch wheatgrass following the fire. Bluebunch wheatgrass responds more favorably to fire than does Idaho fescue. Burning has been found to improve the nutritional quality and palatability of bluebunch wheatgrass in some studies.

Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for both livestock and wildlife. Burned bluebunch wheatgrass may have higher protein content than unburned controls for 2 years following the burn. Older bluebunch wheatgrass plants lose palatability (Zlatnick, 1999).

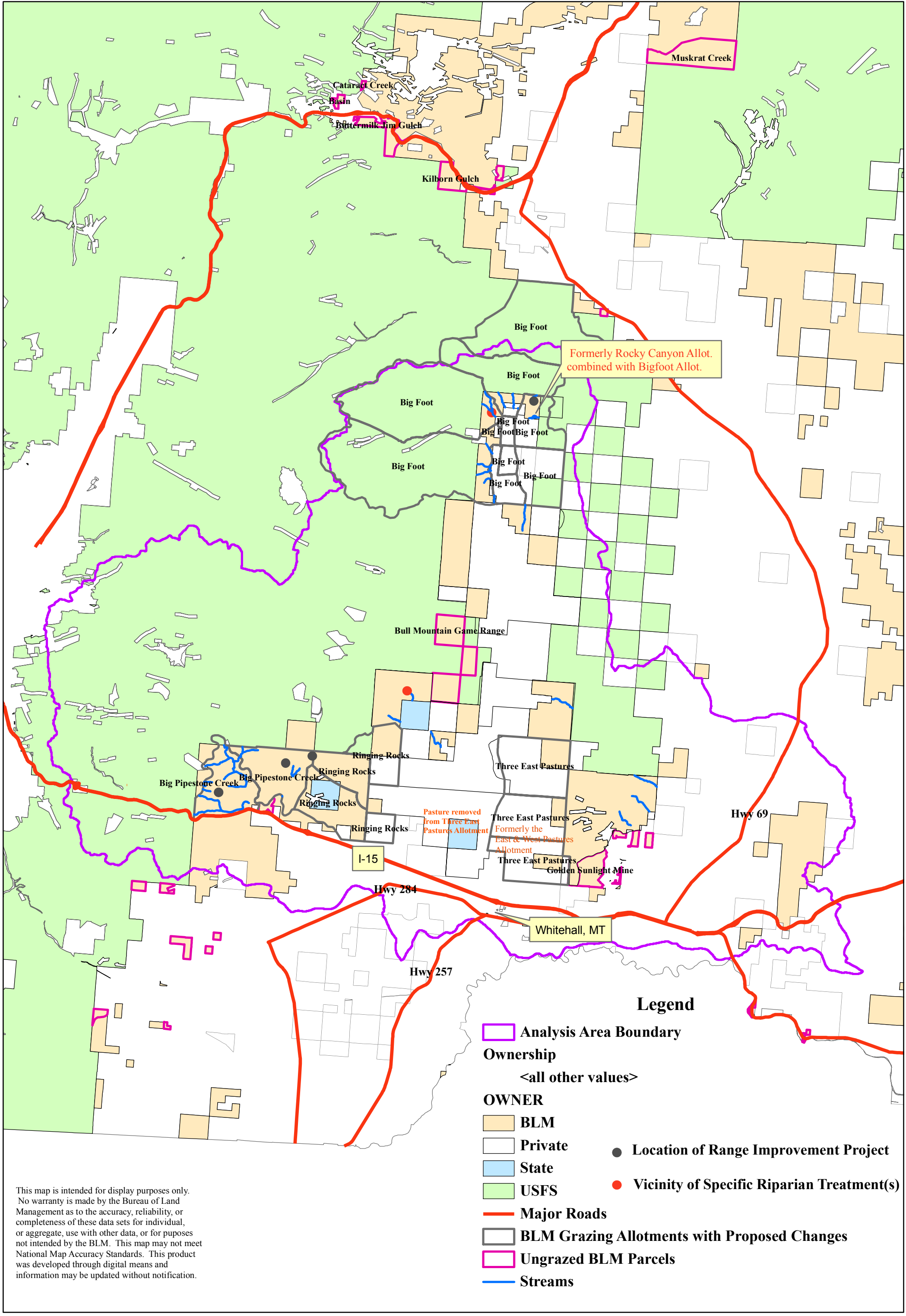
Festuca scabrella – Rough fescue

Ecology of Interior Douglas-fir:

Rocky Mountain Douglas-fir is a shade tolerant conifer species of dry to moist, lower to middle elevation sites in the northern Rocky Mountains. On dry sites in Montana without disturbance, Rocky Mountain Douglas-fir can become the climax species and will replace more fire resistant ponderosa pine and lodgepole pine. On moist sites it is usually seral and is replaced by spruce, firs, cedar, and hemlock (Steinberg 2002, Ryker & Steele 1980).

Historically, Douglas-fir savannahs were frequently found on middle to upper slopes or ridges and on convex landforms in southwestern Montana. In contrast, sagebrush-grass types frequently occurred on lower slopes or valley bottoms and on concave landforms (Heyerdahl et al 2006). Douglas-fir generally becomes fire resistant/tolerant when it develops thick bark. Some references suggest this to be around 40 years in age (Steinberg 2002, others). Heyerdahl et al (2006) suggested that in the relatively dry southwestern Montana climate it may take longer for this species to become fire-resistant. The character and development of the Douglas –fir type may be altered by one or more serious pests including dwarf mistletoe, Doug-fir bark beetle, western spruce budworm, and Doug-fir tussock moth (Ryker & Steele 1980).

Multiple storied forest stands are preferred by the western spruce budworm and are predisposed to damage from that agent. (Joy & Hutton, 1991). Campbell *et al.* (2006), reported episodic outbreaks of western spruce budworm in approximately 30- to 43- year cycles over the past 300 years in interior Douglas-fir forests of British Columbia, Canada. Notable outbreaks tended to occur during years with average spring temperatures following winters with less than average precipitation. From this, they proposed that high over-winter survival rates and a longer growing season may increase outbreaks.



Whitetail Basin/Pipestone Watersheds Analysis Area