Record of Decision

Bozeman Municipal Watershed Project

USDA Forest Service
Gallatin National Forest
Bozeman Ranger District
Gallatin County, MT

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I. Introduction

The Bozeman Municipal Watershed Fuels Reduction Project is in the northern Gallatin Mountain Range near the city of Bozeman, Montana (see Vicinity Map, Figure 1). The area encompasses approximately the lower one third of the Bozeman Creek and Hyalite Creek drainages beginning just to the north of the Moser Creek Road in the Hyalite drainage. The northern part of Hyalite is also drained by Hodgeman and Leverich Creeks. A portion of the Gallatin Fringe Inventoried Roadless Area is included on the eastern side of the project area. The entire project area is considered wildland urban interface (WUI) with many adjacent private homes, and sub-divisions within one-half mile of the Forest boundary. In addition, the project area provides much of the municipal water supply for the city of Bozeman.

The city water treatment plant is located just outside the National Forest boundary on Bozeman Creek. Two water diversion dams that channel water to the treatment plant, one each on Bozeman and Hyalite Creeks, are approximately one half mile inside the Forest boundary adjacent to the Hyalite and Bozeman Creek Roads.

The Gallatin National Forest intends to create vegetation and fuel conditions that will reduce the risk of excess sediment and ash resulting from a wildfire event from reaching the municipal water treatment plant. The Supplemental Final Environmental Impact Statement (SFEIS) and Final Environmental Impact Statement (FEIS) analyze the effects of six fuel reduction alternatives for this project, were published in February 2010 and March 2011, respectively, and are available for review.

My decision is to implement Alternative 6 with three modifications related to water quality mitigation and monitoring. This alternative was developed to respond to changed economic conditions between the Draft Environmental Impact Statement (DEIS) and FEIS, and to respond to public comments on the DEIS. The decision also reflects consideration of court decisions since March 2010 and our response to issues raised during the administrative appeal process in the spring of 2010, which resulted in a withdrawal of the decision. Treatment units in Alternative 6 were adapted from and are within the range of the alternatives analyzed in the DEIS and FEIS.

The purpose of this Record of Decision (ROD) is to document my decision on this project and the rationale behind it. The ROD includes background information that led to the proposed action and describes the purpose and need for the project.

Other components of the ROD include: the issues raised during the environmental analysis, effects of implementing the alternatives relative to key issues, a summary of each of the alternatives, an overview of the public involvement process, a description of the associated Forest Plan Amendment, and documentation regarding policy and regulations and administrative review and appeal opportunities.

II. Background

On March 11, 2005, the Forest Service and the City of Bozeman signed a Memorandum of Understanding to "establish a framework for cooperation between the parties to maintain (in the long term) a high-quality, predictable water supply for Bozeman through cooperative efforts in part by implementing sustainable land management practices." *(MOU 2005)* This memorandum was a culmination of three different assessments of the Bozeman Municipal Watershed including a Forest Service risk assessment (USFS 2003), a Bozeman Creek watershed assessment by the Bozeman Creek Watershed Council (Sourdough Creek Watershed Assessment, 2004), and a City of Bozeman Source Water Protection Plan (Source Water Plan 2004). All three of these assessments concluded

that fuel conditions within the Municipal watershed posed risks to the municipal water supply in the event of a wildfire.

Bozeman and Hyalite Creeks are the primary sources of water supply for the City of Bozeman. The City has water intake diversions on both streams near the Forest boundary with pipelines to the City Water Treatment Plant near the Bozeman Creek trailhead. Approximately 80% of the City's municipal water supply originates from these drainages with an additional minor source in Lyman Creek in the Bridger Mountains. Water quality in both Bozeman and Hyalite Creeks is very good and in compliance with water quality standards. The Montana Department of Environmental Quality (DEQ) water quality standards for both drainages are very restrictive. Bozeman Creek is designated as A-Closed and Hyalite Creek as A-1. These are non-degradation classifications with very strict controls on turbidity and non-point sources. Of all the activity that occurs and user demands that are made in the project area, I believe that long term protection of the integrity of the water supply to the City is paramount because water is essential to the community and residents and protection of municipal watersheds has consistently been a priority identified both nationally and regionally.

The Hyalite Creek and Bozeman Creek drainages have been designated as wildland urban interface (WUI) by the Community Wildfire Protection Plan (CWPP 2008). The plan identifies the project area as being within the designated protection plan area. There are several homes and sub-divisions in this WUI area. Many of the homes are within one half mile of the forest boundary.

Because of the importance of the municipal watersheds and their proximity to the urban interface, the Gallatin National Forest proposed to mitigate the potential effects of wildfire in the watershed and WUI by using thinning and prescribed fire to reduce fuel loads that have accumulated over the years. This proposal became known as the Bozeman Municipal Watershed Fuels Reduction Project. The Gallatin National Forest first asked for public comments on the proposed project in September of 2005.

A Final Environmental Impact Statement (FEIS) and Record of Decision for this project were published in March 2010. The decision was appealed by two parties to the Regional Appeal Deciding Officer in Missoula, MT. In the review of these appeals, the Deputy Regional Forester agreed that it was not clear how the analysis was consistent with the Regional Soil Quality Standards. Consequently, the decision was remanded to the Forest.

Since that time the Forest Interdisciplinary Team has taken the opportunity to spend additional time in the field to collect additional soils information and validate conclusions from the FEIS. Many of the allegations brought up in the appeals were field checked, considered for further analysis and discussed with other agencies such as Montana DEQ. Literature citations from the appeals were reviewed and, where applicable, added to the discussion in the resource analysis. The compilation of these reviews and additional analysis make up the Supplemental Final Environmental Impact Statement (SFEIS). Where no changes or additions were made, the original FEIS stands as the complete analysis document. Where changes or additions clarify or further the analysis, sections from the FEIS are replaced in total or supplemented, in the SFEIS.

This period of time also allowed for additional field data to be collected that could validate or invalidate the assumptions and modeling documented in the FEIS. The prescriptions for the vegetation treatments were refined and finalized and many of the treatment areas were laid out or refined on the ground. This was valuable information that usually is not available until final implementation after a decision is made. I found nothing in this additional data that was contrary to the analysis and conclusions made in the FEIS or that leads me to think that the alternatives or decision are not well founded. Therefore, there is no need to republish the FEIS or prepare a draft supplemental EIS for public comments.

During this time period from March 2010 to February 2011 several new pieces of information have come to light that I also wanted us to consider. One of these items was the information presented in the administrative appeals. The team considered any new information presented in the appeals and checked the original analysis to ensure that issues raised were addressed and documented in the project record. Also during this time four projects came to light that could be considered in the cumulative effects for some resources. These proposals include:

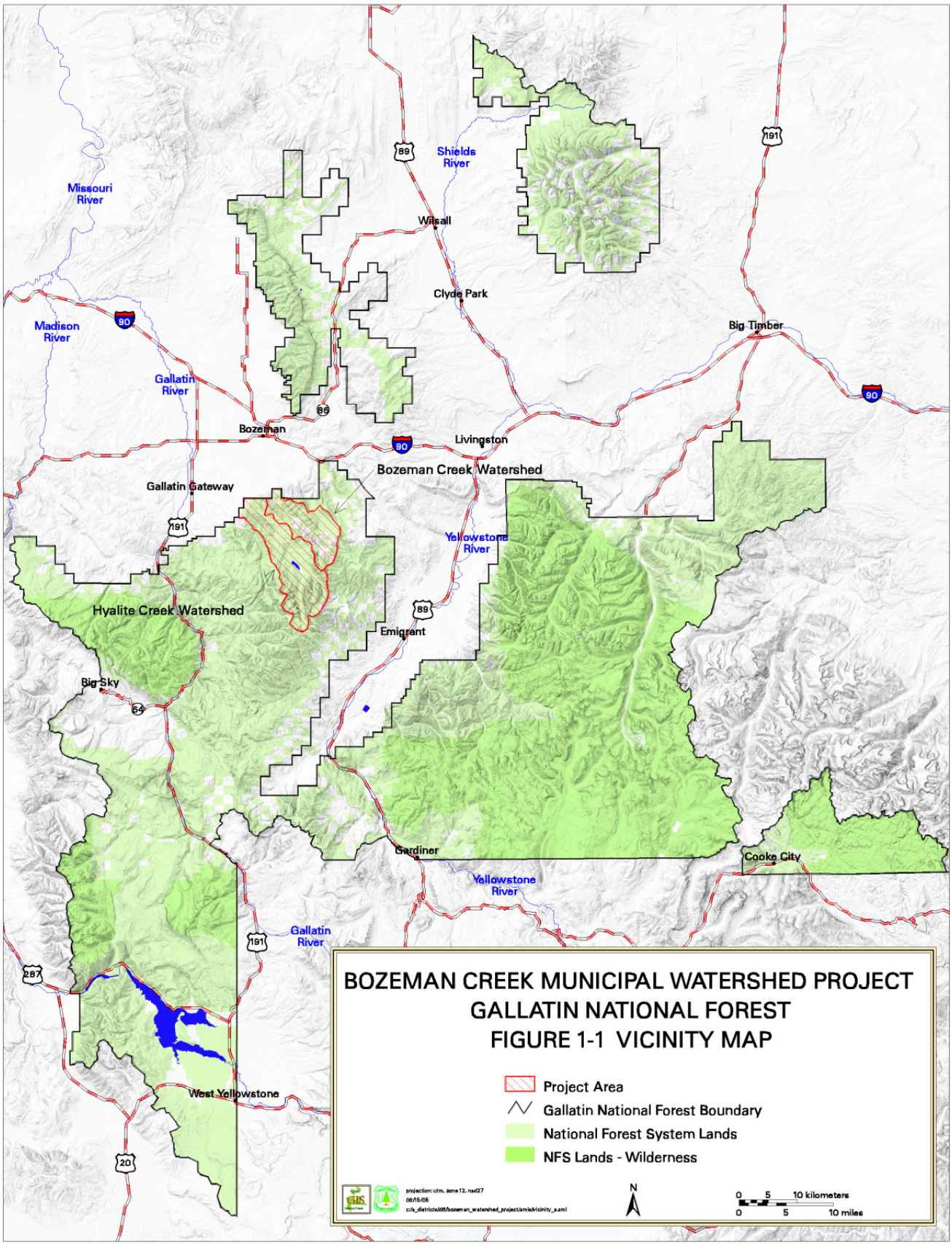
- Improvement to the trailhead adjacent to the Forest boundary in the Bozeman Creek drainage;
- Implementation of the City of Bozeman forest management plan for their lands in the Bozeman Creek drainage;
- Implementation of the initial proposal from the Montana Department of Natural Resources and Conservation to implement vegetation treatment on their lands outside the Forest boundary to the north and east of the BMW project area;
- And, consideration of a water impoundment facility in Bozeman Creek.

This cumulative effects analysis is included in the record and was considered in the analysis by resource specialists.

Finally, over the course of these months, several court cases were decided that may have implications or findings for the BMW project. These include direction on species viability in the Antelope Basin case, Beaverhead-Deerlodge National Forest [**Native Ecosystems v. Tidwell.** (06-35890, 9th Cir.)], a ninth circuit decision on the Smith Creek Fuels Reduction Project, Gallatin National Forest [**Hapner v. Tidwell** (09-35896, 9th Cir.)] concerning big game habitat components and an Oregon case [**Northwest Environmental Defense Center v. Brown** (07-25366, 9th Cir.)] concerning the use of a Clean Water Act exemption for forest roads. The reader will find a discussion of these recent findings in the SFEIS. It is important that we consider all of the current information available at the time of this decision.

See Figure 1, Vicinity Map for the general location of the project.

Figure 1: Project Vicinity Map



III. Purpose of and Need for Action

The principal purpose of this project is to reduce the risk of severe and extensive wildfire on National Forest System lands within the Bozeman Municipal Watershed and thereby reduce the risk to life and property in and adjacent to the project area. More specifically, the purpose and need for the project is described below.

Protection of the municipal water supply for Bozeman:

The Bozeman Municipal Watershed project is designed to strategically modify vegetative fuel conditions using thinning and prescribed fire to lower the risk of severe, extensive wildfires in the Bozeman Municipal Watershed, thereby reducing the risk of excess sediment and ash reaching the municipal water treatment plant. Thinning and prescribed burning will reduce crown fire potential, thus reducing the rate of fire spread. Thinning will reduce ladder fuels which allow fire, when it starts, to reach and spread through the crowns of dense stands of trees.

Fire behavior modeling and field inventory indicate that fuel conditions in key areas near the water treatment plant, diversion point at Hyalite, and along the streams, if left untreated, are highly likely to support large and severe wildfires (USFS 2003).

Ash and sediment from a major wildfire in Bozeman and/or Hyalite Creeks would be a major source of contamination to Bozeman's water supply. A wildfire of large and severe extent in Hyalite or Bozeman watersheds could result in a loss of water supply from a few days to several weeks. Furthermore, the duration of the effects could last up to 2 years following a major wildfire, in the event of heavy rainfall in the drainages.

This would directly affect the water supply for Bozeman. At the very least, water would need to be rationed from the storage tank on the east side of Bozeman if a temporary shutdown of the treatment plant was needed. This source could supply about three days of drinking water, under conservative use. If a prolonged shutdown was necessary, bottled water would be needed to supply drinking water to Bozeman residents until the treatment plant resumed operation.

It is important to realize that reducing crown fire potential is probably the most important factor in this decision to prevent detrimental effects from high severity fire such as increased sediment delivery into the watershed. The most effective strategy for reducing crown fire occurrence and severity is to (1) reduce surface fuels, (2) increase canopy base height (CBH)[1], (3) reduce crown bulk density (CBD), and (4) reduce continuity of the forest canopy (Graham et al. 2004 pp 23-24). Treatments in this decision were designed to affect those changes by reducing surface fuels and continuity of ladder and crown fuels in the treatment units. The treatments identified in each of the units focuses on the existing fuel composition. The effect of treatment prescriptions is to reduce fuels both vertically and horizontally; to reduce total crown density and ladder fuels; and to reduce surface fuel loading (FEIS, pp 3-4 through 3-10). The thinning treatment and subsequent harvest of larger size trees is necessary to achieve the proper crown spacing in the dense, continuous forest canopy. The thinning will remove a majority of less fire resistant species such as lodgepole pine and Engelmann spruce, leaving the larger, more fire resistant Douglas-fir. Removal of trees is one of the tools to meet the purpose and need of this project; it is not the purpose of the project.

Reduce fuels along road corridors to provide safer conditions for fire-fighting and evacuation in the event of a wildfire:

Both the Bozeman and Hyalite Creek road systems are potential evacuation corridors for the recreating public in the area. Hyalite is the most heavily used recreation area on the Gallatin National

[1] Discussion of CBH and CBD is located in the Fire/Fuels issue section of this document on page 23.

Forest, with up to 2,000 vehicles per day on a busy summer weekend. At the same time, these roads would be the access routes for incoming firefighters and equipment to fight a fire or respond to an emergency. The primary roads are essentially a one-way in, one-way out situation in both drainages. The corridors are often narrow and winding with few places to pull off the road or turn vehicles around. There is a need to strategically reduce fuels along these corridors in order to change fire behavior and change a crown fire to a surface type fire in order to provide safer conditions for fire-fighting efforts and public evacuation. In a national survey, nearly 80% of all wildland firefighters identified fuel reduction as the single-most important factor for improving their margin of safety on wildland fires (Tri-Data 1996).

Reduce the risk of high intensity wildfire spreading from National Forest System lands onto private lands that border these watersheds:

Intense wildfire produces embers or firebrands, which are the primary cause of home ignition during wildland fire events. Fuel reduction through thinning and prescribed fire also reduces the risk of high intensity firebrand exposure within the WUI adjacent to National Forest System lands in the project area (Cohen, personnel communication; BMW field trip, August 2009).

Heavy forest fuels in the WUI, steep terrain, prevailing winds and long term drought all contribute to the likelihood of wildfire spreading either from National Forest lands to private lands or from private lands onto the National Forest. The entire analysis area is WUI, as delineated by the Gallatin County Community Wildfire Protection Plan (CWPP 2008). Fuels reduction in the WUI will improve the probability of successful control and suppression of wildfires (FEIS, pp 1-13 and 1-14).

This project also responds to specific policy and Gallatin Forest Plan direction directing the Forest Service to take action to protect municipal watersheds and wildland urban interface areas from wildfire. That direction is summarized here.

The National Fire Plan (2000) assigns highest priority for hazardous fuel reduction to communities at risk and municipal watersheds where conditions favor the high liklihood for severe and intense wildfires. The Cohesive Strategy (USDA, 2000) focuses on priorities of the National Fire Plan: wildland-urban interface, municipal watersheds, threatened and endangered species habitat, and maintenance of areas that currently have low risk of catastrophic fire. The Healthy Forest Initiative (2004) and Healthy Forests Restoration Act (2004) also promote the reduction of fire risks in the wildland urban interface and at-risk municipal watersheds.

The Gallatin Forest Plan assigns the following standards and goals central to the purpose, need and primary issues associated with this project.

> In watersheds with intermingled landownership, efforts will be made to develop mutually agreeable watershed management direction (FP pp II-5, II-24).
>
> In municipal watersheds, such as Bozeman, Hyalite, and Lyman Creek drainages, all project activities will be implemented to ensure State water quality standards will be met. Coordination with City of Bozeman officials and the State Water Quality Bureau [now Montana DEQ] will be done throughout the project planning process (FP, pp II-5, II-24).
>
> Treatment of natural fuel accumulations to support hazard reduction and management area goals will be continued. Prescribed fire (planned or unplanned ignitions) may be utilized to support management area goals. (FP, p II-28).

IV. Decision, Issues, and Alternatives Considered

A. Selected Alternative

My decision for the Bozeman Municipal Watershed project is to implement Alternative 6 including mitigation and monitoring requirements and a site specific Forest Plan Amendment for visual quality. Different from Alternative 6, my decision includes two new water quality protection measures and additional monitoring to be implemented during project implementation. The changes include:

- Eliminate unit 22C in the Hyalite Creek drainage.
- Retain a no-ignition buffer of at least 100' for burn treatments adjacent to Bozeman Creek, Hyalite Creek, and other perennial tributaries rather than 50' that was inlcluded in the alternatives.
- Expand Water Quality Monitoring to include turbidity monitoring in cooperation with the City of Bozeman.(SFEIS p. 173).

Alternative 6 was developed between the DEIS and FEIS to respond to public comments and also address evolving economic realities. While still accomplishing the project's purpose and need, Alternative 6 reduces the amount of helicopter harvest and also reduces the level of mechanical treatment in the Gallatin Fringe Inventoried Roadless Area (IRA). Alternative 6 also responds to comments received concerning wildlife habitat, potential weed spread, effects on recreation, and ensures that sedimentation thresholds are being met during project activities. To compensate for the loss of overall treated acres relative to Alternative 5, Alternative 6 includes fuel breaks on ridgelines to serve as important fire suppression control points. Thinning of the forest within the fuel breaks will improve the likelihood of controlling fires at the ridgeline and limiting the spread of fire into adjacent drainages. These fuel breaks could also help limit the potential size of wildfires (FEIS, p 3-23). This alternative was designed to meet the overall purpose and need in a manner that is more cost effective, primarily due to the high cost of helicopter treatments in Alternative 5.

Upon further review between the March 2010 FEIS, the SFEIS and this decision, I chose to remove prescribed burning activities in Unit 22C due to this unit's direct proximity to Hyalite Creek and a side drainage and the possibility, albeit unlikely, that additional nutrients could be delivered directly to the stream as a result of this burning treatment. My changes also increase the prescribed burn unit no ignition buffer zones in Bozeman Creek from 50' to 100', which further reduces potential nutrient and sediment effects from these Bozeman Creek units. There are no prescribed burns planned along Hyalite Creek. The trade-off between preventing this type of potential sediment and nutrient movement and the minimal reduction in fuels treatment effectiveness is acceptable to me.

I am adding more stringent water quality monitoring during project implementation. The turbidity monitoring data gathered during implementation, as a result of a new water quality mitigation measure, will inform the Forest if ongoing activities from this project are resulting in unexpected turbidity. If detected, this information will enable the agency to mitigate short term sediment impacts mre effectively.

I selected Alternative 6 over the other action alternatives primarily because it provides the most realistic way to reduce the risk that wildland fires in this area would result in the type of ash and sediment levels that would compromise the water supply for the community of Bozeman. Alternative 6 is responsive to effectively meeting the purpose and need for action for protecting community water supply and reducing potential fire spread and intensity between National Forest System lands and adjacent private lands, while balancing high project costs from helicopter use, lack of local timber

markets, and the high cost of prescribed burning in urban interface areas. My decision strikes a balance of limiting short-term project-caused sediment delivery while still providing long term positive effects of accomplishing the purpose and need of the project.

B. Description of the Decision – Treatment and Location, Mitigation, Monitoring and Site Specific Forest Plan Amendment for Visual Quality

Treatments and Location

To achieve a meaningful reduction in potential fire severity and extent within strategic areas of the Bozeman and Hyalite drainages, the selected alternative, Alternative 6, will reduce overstory and understory forest stand density through thinning, reduce surface fuels and maintain existing meadows and natural openings through the use of prescribed fire. Treatment units are strategically placed in that they are focused within the lower reaches of both drainages, close to the municipal water intakes. These treatments are expected to maintain greatest effectiveness during the 10-15 years after the project is implemented.

Detailed descriptions of the treatments follow (see Figure 2 and Table 1):

Thinning and partial harvest in mature timber stands

Treatments include thinning (using mechanical equipment) of some larger trees in mature forest stands, followed by additional hand or machine thinning of smaller diameter trees in the understory. Yarding systems (how the trees are removed) for these operations will include tractor, skyline (cable), and helicopter. Generally, the prescription for thinning will leave the largest and healthiest trees with spacing of a crown width (about 13-15 feet) between individual trees. To facilitate the use of a helicopter to yard trees and to create visual diversity, some units will be thinned in clumps rather than more uniformly. The effects of both types of prescriptions is to reduce fuels both vertically and horizontally, reduce total tree crown density and ladder fuels, and reduce surface fuel loading (FEIS, pp 3-4 to 3-10). Overall about 50 - 60% of the existing tree canopy within a unit will be removed. In all of the treatment units, the tops and branches will be removed from the unit. These tops and branches will be burned at specific landings or removed as biomass. Where this is not possible, the fuel created by treatments, such as tree tops and branches, will be removed by piling and jackpot or understory burning.

Shaded fuel breaks

Some of the thinning units have ridgelines that are important control points for fire suppression. Within a 100 to 200 foot band along these ridgelines, the project will remove about 70% of the overstory conifer canopy, leaving 60-70 feet between tree trunks. These fuel breaks are planned to slow the spread of fire, from one drainage to the next. See Figure 2 for fuel break locations.

Thinning in previously harvested small diameter stands

Mechanical or hand cutting and piling will occur in some previously logged units that have second growth and smaller trees. This thinning will reduce the density of these younger trees and reduce fuels. These previously harvested areas are located along the upper slopes and the divide between Bozeman Creek and Hyalite Creeks. If markets allow, some commercial products, such as post and poles or biomass, may be removed from these stands to help offset the costs of treatment.

Prescribed burning in thinned stands

Prescribed burning will take place subsequent to thinning in some units to further reduce ground fuels. This may be either a broadcast type burn in the understory or burning of piles.

Prescribed burning

Some treatment areas have natural openings or sparse tree cover. These areas will be burned under prescribed conditions to reduce ground fuels, remove smaller trees, and maintain natural openings. All these actions will help change wildfire intensity and slow fire spread, while maintaining open areas.

Temporary Road Construction and Reconstruction

Approximately 7.1 miles of temporary road will be constructed and 3.1 miles of old road temporarily re-opened. Roads constructed for project activity will be designed with the minimum development standards necessary for project implementation. The roads will be temporary in nature and effectively closed to public motorized use during project implementation. Upon completion of the project, these roads will be permanently closed and revegetated. The standards for road closure are incorporated in best management practices (BMP) for soil and water protection in Appendix A. Road construction, road closure and road rehabilitation will be included in contract provisions.

Figure 2. Treatment Units in my Decision except Unit 22 is not included in my decision.

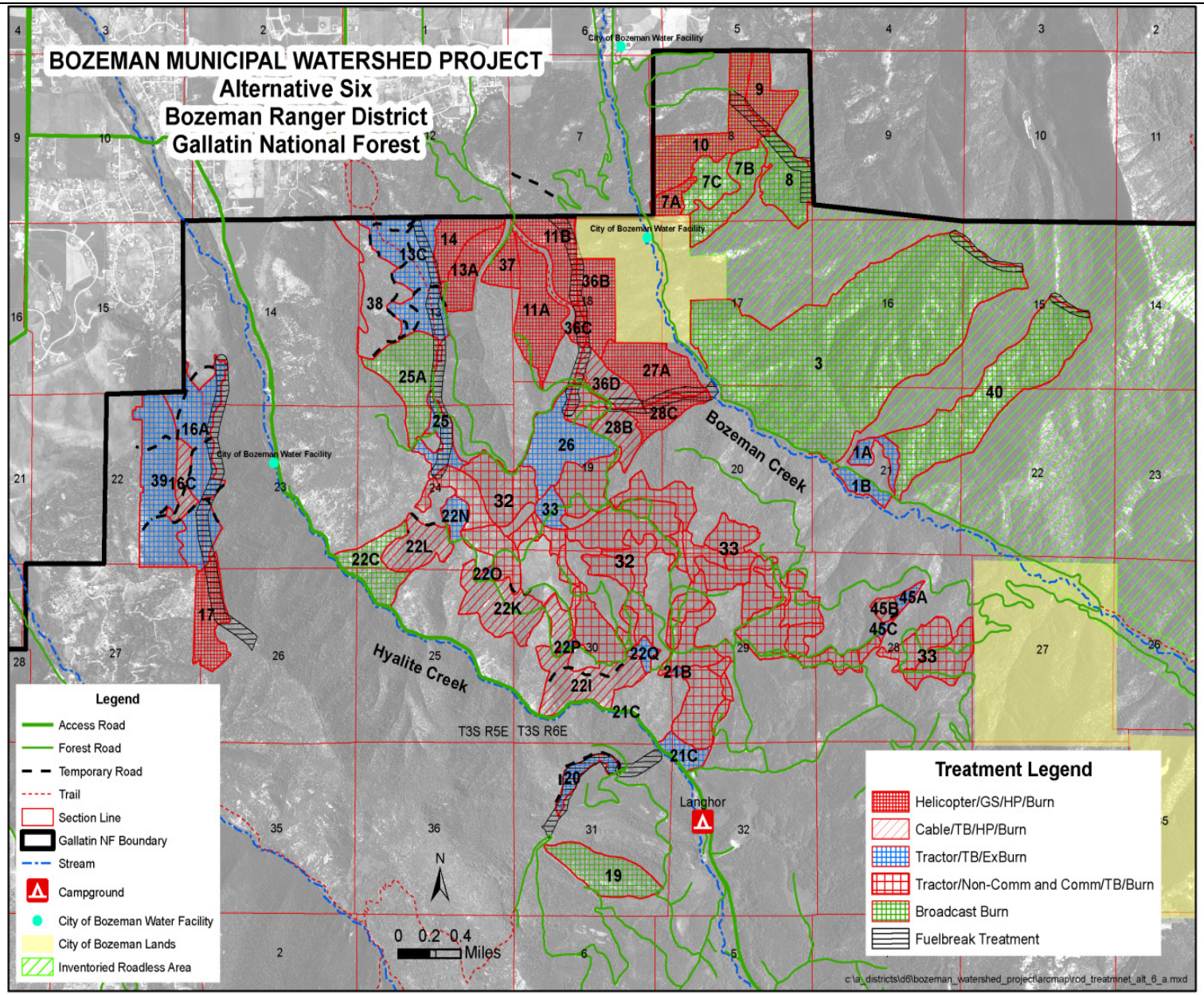


Table 1. Decision (Alternative 6), Treatment Acres by Unit *

Unit Number	Skyline thinning	Helicopter thinning	Tractor thinning	Small tree thinning	Prescribed burning
1A			32		
1B			21		
2					
3					876
7A		21			
7B					68
7C					48
8					79
9		51			
10		128			
11A		105			
11B		70			
13A		57			
13C			148		
14		50			
16A			149		
16C	29				
17		69			
19					82
20			23		
21B			2		
21C			24		
22I	120				
22K	89				
22L	58				
22N			20		
22O			3		
22P			4		
22Q			13		
25			39		
25A			39		101
26			103		
27A		98			
28B	38				
28C		40			
32				574	
33				543	
36B		74			
36C		11			
36D	47				
37		31			
38	104				
39			150		
40					258
45A			8		
45B	12				
45C			4		
Acreage Subtotal by Treatment	497	805	744	1117	1512

* Unit 22c was dropped from the Decision. Table 1 shows this change Figure 2 (Map) does not show the change.

Mitigation Measures and Monitoring Requirements

My decision includes the mitigation measures in the FEIS, Chapter 2, two new water quality protection measures as described above in the "Selected Alternative" section, the Best Management Practices (BMPs) included in this ROD as Appendix A, and monitoring. The BMPs were changed in Appendix A (ROD) from the SFEIS Appendix to reflect the 100 foot no ignition buffer. The following mitigation measures reflect my final decision and commitment to implementation features and include modifications of some specialist recommendations necessary for consistency between resource mitigations and the feasibility and effectiveness of each measure. These mitigation practices will be incorporated in the project through design and inclusion in contract provisions. As a result, they do not generally require additional funding post-treatment. For example, when temporary road construction is part of a contract to implement the project, road closure and rehabilitation will also be provisions of the contract. As another example, stream protections are implemented during layout and tree marking, as well as through contract provisions.

Air Quality

- In order to minimize high smoke concentrations near people, the public will be warned about high smoke concentrations and advised not to travel outside of a vehicle or residence during the time of burning within the minimum ambient distances. Pile burn units will be burned one unit at a time to avoid cumulative smoke effects between units. Smoke from the unit should be minimal when the next unit is burned.
- The prescribed burns, underburns, and pile burns will be coordinated with the Montana/Idaho State Airshed Group, as required by other direction.

Amphibian and Riparian Species

These protections are included to minimize impacts to riparian areas which provide amphibian habitat.

- Retain a no-ignition buffer of at least 100 feet adjacent to Bozeman Creek, Hyalite Creek and other perennial tributaries.
- Ignite prescribed burns in a manner that will prevent head fires within riparian areas adjacent to ephemeral or intermittent draws. Ignition will not occur within these riparian areas, but fire will be allowed to back down hill and creep around.
- Select riparian treatment strategies based on location in the project area, treatment type and stream class, as identified in Appendix A. Stream class is defined in the Streamside Management Zone Laws and Rules (DNRC 2006).

Aquatic

These protections are included to minimize potential sediment impacts to streams, which provide aquatic habitat.

- A slash filter windrow will be installed below temporary road B-50, within the Leverich drainage, as needed. This mitigation affects about ¼ mile of road and is limited to the areas where soil movement could be directed to any water. The Forest hydrologist will identify the areas of concern. This practice will minimize erosion.
- Conduct no skidding down to FS Road # 3166 or on roads constructed from FS Road #3166 up to treatment unit 13C within that portion of treatment unit 13C in the Leverich Creek drainage.
- Water quality protection measures are included in Appendix A of the SFEIS for all activities. Gallatin National Forest BMPs and Montana Streamside Management Act compliance rules are included in the appendix. Select treatment strategies are included that are dependent on the location

within the project area, treatment type and stream class (as defined by the Streamside Management Zone Laws and Rules (DNRC 2006).

Heritage Resources

- To avoid disturbance to archeological resources, an archaeologist and the sale administrator will flag off the one known archeological site when work is in the vicinity to protect it from disturbance. If any additional heritage assets should be encountered during the project, ground disturbing actions will be halted immediately and an archaeologist contacted or the asset will be protected as needed until an archeologist is available.

Invasive Weeds

Weed Best Management Practices were indentified in the FSM 2080, R1 2000-2001-1 Noxious Weed Management Supplement and provide the foundation for good management to reduce weed spread and introduction rates. Based on experience of implementing vegetation projects in more recent years,weed experts on the Forest have observed lower spread and establishment of invasive weeds when these practices are implemented.

- Include a timber sale contract provision or contract clause in all vegetation management contracts that includes washing of all wheeled or track type equipment that will be used off roads. Equipment will be washed prior to entry onto the National Forest.
- Conduct activity area surveys and treatment of weeds before activities commence.
- Identify and avoid infested areas where activities could spread weed seeds. Maintain weed-free equipment parking, helicopter refueling areas, equipment staging areas, log landings, and area roads. Monitor for and eradicate new weeds promptly.
- Retain native vegetation in and around logging areas and minimize soil disturbance by adhering to the soil best management practices in Appendix A.
- Minimize the period from end of logging to contract closure, revegetation, and/or reforestation for long-term restoration.
- Post project weed suppression notices on all activity areas.
- Use only certified weed-free seed for rehabilitation of disturbed sites. Refer to local seeding guidelines for detailed procedures and appropriate mixes. Use native seed only. Revegetation may include planting, seeding, fertilization, and weed-free mulching as indicated by local prescriptions.

Range

- Protect fences on the Bozeman-Hyalite divide and pasture fences between pastures in the Hyalite Canyon allotment. If currently existing natural barriers are compromised by fuel reduction treatments, replace the natural barriers.

Recreation

- To allow continued recreation use of some portion of area, restrict helicopter logging operations and hauling such that the Bozeman Creek Trail/Bozeman Creel Road and Moser Creek Road are not closed at the same time during fuels management operations.
- For public safety and understanding of the activity, post information at appropriate access points to inform the public of project activities. Provide local media with updates about project work that may affect the recreating public. Post warning signs notifying forest users of potential hazards from fuel treatment activities when occurring adjacent to dispersed areas, roads, and trails. If necessary, issue special orders (regulations) that temporarily close some areas or routes to protect the public.

Roadless

- Select cut trees to generally small diameter in the Inventoried Roadless Area to minimize the immediate visual impact to naturalness and undeveloped character.

Scenery

These practices identify specific areas of concern for the scenery resource and help to minimize visual impacts from project activities.

- Mark and thin the edges of all units that are be visible from key observation points in such a way that unit boundaries are not easily discernible after the thinning work is accomplished. Refer to the FEIS (pp 2-18 to 19) for details on this mitigation discussion for scenery.
- Within all units, where possible, leave trees with full crowns, as individuals or in groups, to achieve the appearance of naturally open grown crowns.
- Since the north edge of Unit 26 is very visible from the Gallatin Valley, create a transition into the adjacent dense forest to its north and to the west of Unit 33. FIES p 3-113 has a discussion on how to achieve a zone of transition.
- In Unit 1B along the southwest side of Bozeman Creek Trail, stumps should be cut to meet the partial retention Visual Quality Objective (VQO). Standard contract language for stump heights will be implemented and monitored. If the end result does not meet the VQO, additional stump mitigation will be implemented such as angle cuts or lower stump heights.
- Where practical, all slash piles, decks and landings should be located out of sight in the foreground of heavily used recreation corridors and areas, Hyalite Road, Langohr Campground, the Bozeman Creek Trail, and Forest Trails #428 and #435. Where they cannot be located out of sight, they should be rehabilitated in such a way that after work is completed, they will not visually dominate the seen area. This is not a concern for key observation points because they are not in the foreground of the project area.
- Staging areas that are created by grading and flattening, or that receive enough use to compact soil or mix top and subsoil, and large burn piles that are visible from the Hyalite Road, Langohr Campground, the Bozeman Creek Trail, Forest Trails #428 or #435, should be reclaimed and seeded so that within one year of this rehabilitation work the site is fairly natural-appearing. Soil BMPs' (Appendix A) are expected to meet this goal. Recontouring has limited applicability and effectiveness in rocky soil types due to the additional impacts associated with the practice so it may have limited application.
- After thinning work is completed, segments of temporary road that are immediately visible and adjacent to FS roads and trails, will be reclaimed in accordance with soil BMPs. This reclamation is especially important near FS Trail #428 and the Leverich Creek Trail #435.
- An emphasis will be placed on completing all slash burning and post thinning cleanup as soon as practical in the immediate foreground in key visual and heavily used recreation areas and corridors.
- Fire control lines installed prior to burning will tie in, where possible, to existing opening and topographic features to create more natural looking burn patterns.

Soil Protection

- To meet the Region 1 Soils Protection standard, Gallatin National Forest Soils Best Management Practices (BMPs) will be incorporated in project design in order to limit detrimental disturbance associated with implementation. Appendix A of the SFEIS provides a listing of Soil Protection Best Management Practices and design criteria.

Water Quality

These practices will minimize potential sediment and nutrient increases to water sources.

- Retain a no-ignition buffer of at least 100' for burn treatment areas adjacent to Bozeman Creek, Hyalite Creek, and other perennial tributaries.
- Apply timber sale protection provisions to the commercial harvest activities to protect against soil erosion and sedimentation. Include standard BMPs for all activities including Montana SMZ compliance rules. Apply BMPs for Forestry in Montana (DNRC 2006). These are incorporated in the SFEIS Appendix A.
- A slash filter windrow will be installed below temporary road B-50, within the Leverich drainage, as needed. This mitigation affects about ¼ mile of road and is limited to the areas where soil movement could be directed to any water. The Forest hydrologist will identify the areas of concern.
- Prescribed burn unit 22C will be eliminated.

Wildlife

Northern Goshawk Nest Protection

To minimize potential impacts to nesting areas the following practices will be incorporated.

- Maintain a no treatment activity within a minimum buffer of 40 acres around known occupied goshawk nest trees.
- Undertake no ground-disturbing activities within known occupied post-fledging areas (PFA) from 15 April through 15 August. The PFA is an area of roughly 420 acres surrounding an active nest site.
- To further minimize disturbance within the PFA for an occupied nest, establish a "no-fly zone," 2,000 feet in all directions including above the nest, for the period of 15 April through 15 August.
- Adapt thinning prescriptions in treatment units closest to known, occupied nest sites so that the proportion of closed canopy ($\geq$50% canopy cover) habitat in an estimated goshawk home range is within the range of habitat conditions (37-69%) reported in the Northern Region Overview for goshawks.(USDA FS 2007a)

Bald Eagle Nest Protection**,** from the National Bald Eagle Management Guidelines; Category C. Timber Operations and Forestry Practices (USDI 2007:13)

If an occupied nest is identified, the following protections minimize potential nest disturbance.

- Avoid removal of overstory trees within 330 feet (100 m) of an active nest at any time of the year.
- Avoid timber harvest operations, including selective thinning, road construction and chain saw and yarding operations and prescribed burning, during the breeding season (1 Feb – 15 August [GYBEMP 1995:24]) within 660 feet (200 m) of an active nest.

Grizzly Bear

- All activities associated with project implementation will be in compliance with Forest-wide Food Storage Order requirements. This measure will help reduce conflicts with wildlife that can occur due to food-conditioning of wild animals.
- Within the Inventoried Roadless Area (IRA), helicopter logging must be completed in the winter denning season or limited to one non-denning season (March 1 to November 30) (FWS, Biological Opinion, Terms and Conditions, FEIS, Appendix D).

- Manage the schedule for completion of all helicopter logging to be completed in as few days as possible. Track the number of helicopter logging flight days and reinitiate consultation if the operations exceed a total of 144 days for the duration of the project (FEIS Appendix D, USFS, Biological Assessment; FWS, Biological Opinion, Terms and Conditions).
- Roads constructed for project activity should be designed with minimum standards necessary to accomplish the task, temporary in nature, and effectively gated to restrict public motorized use. Once the activity is complete, these roads should be permanently and effectively closed and re-vegetated. (GNF 2006, pp 1-11).

Big Game

- To protect key habitat components, during implementation such as marking, layout or sale administration, marking and/or harvest operations will be designed to maintain at least two thirds of the hiding cover associated with key habitat components such as wet sites, wallows and mineral licks. (Gallatin Forest Plan p II-18).

Snag Retention

- To meet the Forest Plan standard for snag retention according to Forest Plan Amendment No. 15, leave an average of 30 snags (≥ 18 feet tall and ≥ 10" dbh) per 10 acres within harvest units. In addition, for Douglas-fir and subalpine fir on rocky or shallow soils, designate 60 live trees per 10 acres as replacement trees for snags. Trees and snags with obvious large nest structures or cavities should be left intact, with immediately surrounding vegetation retained to provide security cover.

  In addition to Forest Plan standards, the following snag retention prescriptions will be followed to provide additional snag habitat:

- Where existing snags will be otherwise removed for safety concerns, consider leaving the snag(s) in a clump of live trees to meet snag retention objectives.
- Snag Retention Prescriptions by Forest Cover Type:

  Douglas fir dominant: minimum of 40 snags (≥ 10" dbh) per 10 acres, with at least 20 larger (≥ 15" dbh) snags per 10 acres.

  Lodgepole pine dominant: minimum of 50 snags (>= 10" dbh) per 10 acres.

- If site conditions do not provide adequate snags at the time of project implementation, or if snags must be removed for safety reasons so that the above conditions cannot be met, apply one of the following measures:
  - Retain live replacement trees in the appropriate snag size category for the vegetation type. Leave at least twice as many live replacement trees as the number of snags recommended for the vegetation type.
  - Create snags by killing trees after harvest is complete, striving for the number and size class listed above by vegetation type.

Sensitive Plants

Should any previously undiscovered sensitive plant species be found in any treatment units or associated with any access features (e.g. project roads, helicopter landings), plant populations will be protected with area and/or timing restrictions. This measure is consistent with direction for management of sensitive species (FSM 2670). Standard contract provisions ensure the flexibility to modify contract activities if needed. Project activities implemented by an agency workforce can be modified as needed.

Monitoring Requirements

Project Monitoring

The Gallatin Forest Plan Monitoring Report for the years 2005-2007 is included in the Project File.(USDA, GNF 2008) The report includes the results of the monitoring procedures that Gallatin National Forest specialists have used to measure the effectiveness of various mitigation measures and design criteria associated with recent projects. Specific project monitoring reports were also discussed in the SFEIS.

The Bozeman Municipal Watershed Project incorporates various mitigation and design criteria that have been monitored for effectiveness for the past several years. Forest Service personnel are responsible for the general implementation of the project including project design and contract preparation, contract administration, and assurance that mitigation measures are being carried through in treatment prescriptions, contract provisions, and are implemented on the ground. Contract administration will be conducted on a regular basis to assure acceptable contractor performance. The responsible official and/or resource specialists will review changes in contract requirements or provisions to ensure the intent of project mitigation is met. Contract violations will be addressed promptly. All contract activities and correspondence will be documented and filed in the contract records. Post-treatment monitoring will be conducted and evaluated to determine whether required mitigation was effective at achieving desired results and will be utilized to determine any follow- up treatments that may be necessary. The following monitoring items may be incorporated in a broader project review and/or resource specific review.

Scenery Monitoring

The Forest landscape architects or Forest silviculturist will work with the layout forester to complete the following monitoring: During marking of units, monitoring should be done to ensure that after implementation the mix between full crowned individual trees and tree clumps will achieve a visual transition from dense forest into thinned and open areas. In areas with extensive beetle mortality this may not be possible.

Soils Monitoring

Representative treatment units will be monitored in year 2 and year 5 after implementation to determine if post treatment detrimental soil disturbance estimates are accurate and evaluate effectiveness of BMPs.

Water Quality Monitoring

At least one BMP field implementation monitoring review will be conducted during the BMW project to review the implementation of mitigation measures and BMPs; compliance with project and Forest Plan goals, objectives, and standards; and compliance with the BMW project's BMPs. This implementation review process has been used on the Gallatin National Forest since 2005 to review a wide variety of projects and document conclusions and recommendations relevant to future projects. Several of these reports on past projects were cited in the SFEIS.

The Gallatin National Forest will be working cooperatively with the City of Bozeman in monitoring water quality at water intakes at the City water treatment plant – particularly for turbidity. The water intakes at Hyalite Creek and Bozeman Creek are monitored continuously for turbidity using turbidity meters for each drainage. The treatment plant is required to maintain extensive records of turbidity and multiple other water quality chemical parameters with monthly reports submitted to the Montana DEQ, these are required for all municipal water treatment plants. During the BMW project turbidity spikes will be traced to the watershed source and if appropriate mitigation taken to reduce the turbidity source if related to BMW implementation. The SFEIS Water Quality section includes more discussion of monitoring recommendations.

Wildlife Monitoring

Review treatment units upon completion of prescriptions for snag opportunities. If site conditions do not provide for adequate snags after project implementation, then either ensure that there are at least twice as many live replacement trees as the number of snags recommended for the vegetation type, or, if snags are completely absent, create snags by killing trees after harvest is complete, striving for the number and size class listed above by vegetation type.

Review identified key habitat components (e.g. isolated wet sites, meadows, wallows) post treatment to determine whether buffers and/or leave/take tree marking retained adequate hiding cover to meet the Forest Plan standards.

Site Specific Forest Plan Amendment for Visual Quality

My decision to select Alternative 6 includes a Forest Plan amendment to modify visual quality objectives for this project only. Alternative 6 includes four treatment units (16C, 22I, 36D and 38) totaling 300 acres that will not meet the Forest Plan scenery standard of Partial Retention. The trees in these units, which can be seen from various viewpoints between Bozeman and the National Forest boundary (FEIS p 3-111), will be yarded with a skyline or cable system. Skyline or cable yarding systems can leave pathways where the trees are cabled uphill to a landing. As seen from a distance, these pathways can be visually apparent until vegetation is reestablished.

Alternative 5 would meet visual quality standards because the use of helicopters in these treatment units negates the need for cable or skyline removal systems. I did not select Alternative 5 due in part to the extremely high costs of implementation. Alternative 4, which included substantially more prescribed burning, would also have met visual quality standards. However, Alternative 4 is not nearly as effective toward meeting the purpose and need for action when considering all of the parameters used to evaluate fuel treatment effectiveness, making it an undesirable choice. The other action alternatives (Alternatives 2 and 3) would also have required a Forest Plan amendment for visual quality objectives since they, too, would not meet the standard.

In selecting Alternative 6, I have decided to accept the tradeoff of not meeting the visual standard for four units [16C, 22I, 36D, 38] because of the high cost associated with helicopter yarding and the need to reduce fuels adjacent to private lands. Therefore, my decision site-specifically amends the Gallatin Forest Plan Visual Quality Standard (FP p II-16) by suspending this requirement for units 16C, 22I, 36D and 38 in this project. Section VI of this ROD provides more discussion of this non-significant Forest Plan amendment.

Permit Requirements

All required water quality permits will be acquired by the Gallatin National Forest prior to any ground disturbance activities for the BMW project. If logging road storm water discharge NPDES permits are required for the project, the Gallatin National Forest will work with the Montana DEQ to obtain the permits prior to initiation of project implementation.

As a result of the August 17, 2010 NEDC vs. Brown 9th Circuit Court Decision, Storm water Discharge NPDES Permits may be required on timber harvest and transport projects areas where “Industrial” harvest is to take place. An En Banc review has been requested on this Decision and until it is either denied or the review is completed, the Decision does not specifically apply to Montana projects. In light of the uncertainty as to what legal requirements will be needed for storm water discharge, Clean Water Act compliance information has been highlighted that will be used should a storm water permit be required. The following activities were completed during the planning process of the BMW project to facilitate permit application should a permit become necessary:

- Culverts, with potential connection to jurisdictional waters of the United States, were identified in the field and appropriate BMPs were prescribed.
- Disturbed Water Erosion Prediction Project (WEPP) Tool modeling was conducted to estimate sediment following thinning and broadcast burning.
- WEPP: Road modeling was conducted to estimate potential sediment from logging roads (sediment yields from identified culverts connected to a jurisdictional water were documented).
- Analysis of sediment effects of large wildfires in the BMW area was added to the cumulative effects.

C. Reasons for the Decision

Consideration of Purpose and Need and Primary Issues

The importance of protecting the community water supply for Bozeman

In making my decision, I considered the strong values that people hold for the Bozeman watershed, with water being paramount in our responsibilities, especially in these drainages. The primary long-term objective of this project is to maintain a high-quality, predictable water supply for the community of Bozeman. Wildfire has the potential to greatly affect water quality. My emphasis in implementing the fuels reduction efforts in Alternative 6 is to reduce the risk of extensive and severe wildfire and the resulting degradation of water quality. While implementation of this project will modify vegetative conditions in the watershed and reduce the risk that a fire could compromise Bozeman's water supply, it does not change the probability of a fire start within the project area. None of the alternatives can do this.

Alternative 6 treatments are focused in the lower one-third of these drainages as they are the closest to the City's water intakes and treatment plant and are within the wildland urban interface. Should a wildland fire occur in these areas, ash and sediment would have less distance to travel and settle and could more readily affect the City's ability to provide clean drinking water. With limited ability to treat extensive acres and in an effort to avoid short term risks that are unacceptable, it is important to reduce undesirable fire behavior in these strategic areas to maximize effectiveness.

The perspectives of the City of Bozeman also heavily influenced my decision to select Alternative 6. City officials strongly support the use of fuel treatments designed to reduce the potential negative effects of wildfire in the municipal watershed due to the location of the water intakes and the limited ability of the water treatment plant to handle ash and sediment in an effective way. This decision complements the plans the City is developing for fuel reduction treatments on city properties in the Bozeman Creek drainage (City of Bozeman Forest Management Plan, Peck 2009), and communication with the City Public Works Department (Heaston 2010).

My emphasis on the Bozeman Municipal Watershed is also affirmed by national and regional priorities established by the Forest Service. The Agency has prioritized fuel reduction in municipal watersheds in response to Congressional priorities (FEIS pp 1-11 to 1-13). Protection of water supplies, increased ecosystem resilience and protection of firefighters and the public were again presented as Agency priorities when the Secretary of Agriculture presented his Vision for the National Forests and Grasslands (USDA 2011). While all of the action alternatives begin to address this important need for the project, I selected Alternative 6 over other alternatives for reasons discussed in the following pages.

Effectiveness toward achieving the reduction of fuels along road corridors and fuel reduction in the wildland urban interface to reduce fire spread and intensity between NFS lands and private lands.

In making my decision, my highest priority was protecting the municipal water supply for the City of Bozeman. However, protecting values at risk in the wildland urban interface is also a national, regional

and Forest priority (FEIS pp 1-11 to 1-13). Alternatives 3 and 5 were most effective at protecting the WUI and evacuation routes, as well as at limiting spread between drainages. However, Alternative 5, as discussed earlier, is less likely to be fully implemented due to high costs associated with helicopter logging. Alternative 3 does not meet Forest Plan water quality standards which is not acceptable. Alternative 2 is more effective than Alternative 6 at protecting WUI and evacuation routes but less effective overall. Alternative 4 would implement considerably fewer acres of treatment and therefore is less effective. Alternative 6 provides protection to wildland urban interface and evacuation routes and is effective at limiting spread between drainages while still balancing other objectives and issues.

Sedimentation concerns from our actions or no action

The Forest fuels specialist and hydrologist modeled the current vegetative and fuels conditions in the two drainages, and showed that a wildfire in average humidity and wind conditions could generate an increase in sediment of 250% over natural conditions (FEIS, p 3-40). A wildfire in more extreme weather conditions could cause even higher increases in sedimentation. The City of Bozeman water treatment plant currently can handle only small increases in sediment and ash and certainly not levels modeled for a wildfire under moderate or more extreme conditions.

Our effects analysis also showed that the vegetation treatments in Alternative 6 could reduce potential fire size by 54% when a wildfire occurs in the project area (FEIS, p 2-29 and p 3-29). Further analysis showed that a 4,000 acre fire in the project area after implementation of Alternative 6 would likely increase sediment 30% above natural in the Hyalite Creek drainage, and increase sediment 54% above natural in the Bozeman Creek drainage. The same size fire without treatment would produce sediment increases of 56% and 105% in those same drainages, respectively (SFEIS p. 172). A 2,000 acre fire after implementation of Alternative 6 is predicted to increase sediment by 18% over natural in Hyalite Creek and 32% in Bozeman Creek versus 31% and 57%, respectively, without treatment. The Bozeman Municipal Water Treatment plant is challenged to efficiently treat water when sediment levels exceed even 30% over natural, so 50% or greater increases could result in multiple day reductions in plant efficiency. This analysis convinced me that Alternative 6 will be effective in meeting the purpose and need for the project, and that the no action alternative, is not acceptable when the drinking water of an entire community is at stake.

In preparation of the BMW SFEIS, I asked for additional analysis and some implementation changes to further reduce water quality effects and to clarify compliance with Montana Water Quality Standards. The additional consideration includes clarification of Total Daily Maximum Load (TMDL) listings and Montana DEQ regulations, additional field reconnaissance and mapping of wetlands, additional field evaluation of unit and road connectivity to streams, explanation of a logging road storm water discharge permit lawsuit, commitment to comply with appropriate storm water permit requirements prior to implementation, sediment analysis remodeling with updated Water Erosion Prediction Project (WEPP) tool based coefficients for logging road sediment/prescribed burns/ thinning units and accounting for the 2010 road decommissioning project work in Hyalite Creek, and additional cumulative effects analysis of potential City of Bozeman fuels thinning projects. The additional analysis confirmed to me that Alternative 6 is in compliance with the Clean Water Act requirements and other applicable direction. I believe that my decision provides sufficient protection to minimize short term risk of potential erosion while benefitting the municipal watershed in the long term.

Some of the public comments on the project questioned how thinning and burning, along with temporary road construction, would not impair water quality. The environmental analysis for the project discloses that the activities associated with all the action alternatives increase short-term sedimentation rates and, except for Alternatives 2 and 3, meet the Forest Plan Standard (SFEIS pp 3-38 through 3-52). In addition, the action alternatives include all reasonable mitigation and best management practices to minimize any potential sediment production. With these modifications, my decision includes more protections than are included in the action alternatives. The Montana DEQ, in field and office reviews concluded in a memo (MT DEQ 12/2010) that the BMW project BMPs are reasonable and in many cases more stringent than

Montana Forestry BMPs or Montana SMZ rules and are consistent with Montana water quality regulations and Montana Nonpoint water quality regulations.

Alternatives 2, 3, 4, 5 and 6 all reduce fuels in high priority (close to water intake facilities) areas within the municipal watershed (FEIS, pp 2-26 to 2-30). Alternative 3 would be most effective in meeting the fuel reduction aspect of the purpose and need because it would treat the most acres. However, due to the amount of temporary roads needed to facilitate harvest operations in Alternative 3, expected sediment levels would exceed Forest Plan standards for water quality in some areas (SFEIS, Ch 3-43, 44). Even though the increase in sediment from implementation of Alternative 3 would be short-term, I did not want to compromise on the water quality issue, therefore, I did not select Alternative 3. Alternative 2 would not meet Forest Plan standards for water quality or fish habitat needs in Leverich Creek which is not acceptable to me. Alternative 5 would be more effective than Alternative 6, but for reasons discussed in the next section Alternative 5 was not selected. Alternative 4 was less effective in terms of fuel reduction due to fewer acres treated so I did not choose that alternative. Alternative 4 also created concerns related to high risk and implementation challenges due to lack of pretreatment of heavy fuels loads prior to prescribed burning; these uncertainties were also unacceptable to me.

After considering all of the issues, I believe that the benefits of implementing Alternative 6 far outweigh the short term small increases in sediment that could occur. Alternative 6 produces the least amount of sediment relative to the other action alternatives. The City of Bozeman has verified that the amount of sediment produced in the implementation of Alternative 6 will not adversely affect the water treatment facilities and their ability to supply domestic water for Bozeman residents. The Montana Department of Water Quality verified the project plans would be consistent with Montana water quality regulations (MT DEQ 12/2010).

The heart of my decision is the balance between the acres of treatment and effectiveness in each alternative, weighed against potential short term impacts especially to water quality. I feel that my decision best achieves that balance. At this time the City of Bozeman is progressing with plans to upgrade the water treatment plant to a membrane filtration system. Although the changes may mitigate some of the most dire concerns about sediment that the plant can handle, it will not resolve all concerns with ash and sediment entering the water treatment system. In the long term, the cleaner the source water, the better for water quality treatment.

Economic realities, helicopter yarding and addressing purpose and need

Alternative 5 was identified as the preferred alternative in the DEIS because it was nearly as effective as Alternative 3 in addressing the purpose and need, while reducing some environmental effects by virtue of using helicopters to accomplish project activities. However, in today's depressed timber market and with the high cost of fuel, there is a very high cost associated with the use of a helicopter for removing logs and limited availability of helicopter logging operations. The FEIS disclosed that in some areas, because of the benefits relative to scenery and water quality, this cost is justified. For this reason, Alternative 6 retains helicopter-yarded units in these key areas, along with a mix of other prescribed burning and yarding systems (FEIS, Appendix A, pp A7 through A10).

Part of my decision to select Alternative 6 rather than Alternative 5 was in recognition of the dramatically lower costs due to the reduction of helicopter yarding from 2,480 acres (Alternative 5) to 805 acres (Alternative 6) (FEIS p 3-270). Simply stated, Alternative 6 includes enough fuel reduction measures to meet the purpose and need and will be less costly to implement than all of the other action alternatives. Sediment increases are higher in Alternative 6 than in Alternative 5, because more logging will be done with cable systems and there is slightly more temporary road construction. Still these increases are well within Forest Plan standards (SFEIS p. 178-179). In the unlikely event that the timber market recovers enough to substantially reduce the cost of helicopter use, my decision includes the flexibility to use helicopters rather than skyline yarding to treat some units identified in Alternative 6; this would bring the

project into compliance with existing visual quality objectives without the site specific Forest Plan amendment that is included in my decision.

To compensate for the loss of overall treated acres relative to Alternative 5, Alternative 6 includes fuel breaks on ridgelines to serve as important fire suppression control points. Thinning of the forest within the fuel breaks will improve the likelihood of controlling fires at the ridgeline and limiting the spread of fire into adjacent drainages. These fuel breaks could also help limit the potential size of wildfires (FEIS, p 3-23).

Roadless area values

The Forest, the City, and the public were all concerned about project activities within the Gallatin Fringe Inventoried Roadless Area (IRA) and how these activities might affect roadless values. There were also public comments requesting that we use only prescribed fire in the Gallatin Fringe IRA. We developed Alternative 6 to respond to public comments and concerns about the IRA. Alternative 6 will have short term impacts to roadless character (10-15 years) but will not create long term changes to the roadless character. The impacts are reduced by lowering the number of acres to be treated mechanically by two-thirds from Alternative 5 (from 660 acres to 200 acres), and by increasing the number of acres to be prescribed burned.

The 200 acres of helicopter thinning I retained in Alternative 6 are immediately adjacent to private land that was thinned in the past, specifically to reduce fuel loadings. These units, combined with the treatments on adjacent private land, will provide cumulatively important additional protection to the water treatment plant and private properties which is important in order to help achieve the purpose and need of reducing fire spread between National Forest System lands and adjacent land as well as our desire to reduce risk of excessive firebrand exposure to private homes near the Forest boundary. Also in response to the public comments, Alternative 6 will treat about 1,330 acres of the IRA with prescribed fire, compared to 940 acres of the IRA treated with prescribed burning in Alternative 5.

I have also carefully evaluated the actions that will occur in the Gallatin Fringe IRA and have concluded that they are consistent with the Final Roadless Rule, subsequent legal rulings and Forest Service direction. For more details, see the Inventoried Roadless section of this document beginning on page 28.

Need for a Forest Plan Amendment

My decision to select Alternative 6 includes a Forest Plan amendment to modify visual quality objectives for this project only. Alternative 6 includes four treatment units totaling 300 acres that will not meet the Forest Plan scenery standard of Partial Retention. In selecting Alternative 6, I have decided to accept the trade-off of not meeting the visual standard in the short term for these four units because of the high cost associated with helicopter yarding and the need to reduce fuels adjacent to private lands and reduce the potential for fire spread between drainages and ownerships (FEIS p 3-24). Section VI of this ROD has the full disclosure of this non-significant Forest Plan amendment. This site-specific amendment will allow the short-term project actions to occur, in return for the long-term benefits to the watershed.

Summary of Primary Reasons for my decision:

To summarize my rationale for this decision, I believe both mechanical and prescribed burning treatments are necessary to successfully achieve the purpose and need for action. Removal of trees, both large and small, is an important and necessary tool that will help to safely and effectively accomplish the goals of this project. Alternative 6 will help ensure a predictable water supply for the residents of Bozeman while minimizing the amount of short term sediment entering Bozeman and Hyalite Creeks during project activities. Alternative 6 affords some protection for the wildland urban interface along NFS lands adjacent to private land and along evacuation routes. Alternative 6 provides a balance between cost of implementation and achieving a meaningful reduction in wildland fuels to effectively begin to move toward achieving the purpose and need.

The thinning treatments within the inventoried roadless area are near the boundary with private land, near the city's water facilities, and in areas where dense vegetation makes it difficult to conduct a prescribed burn. Therefore, the treatments are important to implement in order to meet the purpose and need and mechanized thinning is an effective treatment method. No road construction will occur in the inventoried roadless area.

Mitigation measures associated with Alternative 6 effectively minimize or eliminate impacts to all other resources considered, specifically aquatic species like westslope cutthroat trout, heritage resources, invasive weeds, livestock management, recreation, scenery (in most areas), sensitive plants, soils and terrestrial wildlife species. These issues are all discussed in the next section. Of particular note, mitigation will help reduce impacts to recreationists by insuring that access is provided to at least one of the drainages during project activities which will allow continued recreational use in the project area. I acknowledge the difficulties associated with implementing a project in such a heavily used and valued area. The Forest is committed to working with interested citizens and groups throughout project implementation.

I believe that the visual quality impacts of skyline corridors and roads within the four units I have included in my decision for a Forest Plan amendment are an acceptable trade-off in providing for the long term protection of the Bozeman municipal watershed.

With my commitment to the design features, mitigation, monitoring and fulfillment of permitting requirements, my decision incorporates all practicable means to avoid or minimize environmental impacts from the selected alternative with the adopted changes. My decision is based on the analysis in the Supplemental FEIS (2011), the FEIS (2010), public comments and feedback received over the course of the project.

D. Consideration of the Other Issues

My decision to implement Alternative 6 represents a balance between the purpose of the project, an evaluation of short term and long term risks, and resources to be protected. My conclusions about the various issues are discussed below.

Fire and Fuels

Mature forests make up 80% of the Bozeman Creek watershed and 63% of the Hyalite Creek watershed. These extensive areas of dense forest, which have multiple canopy layers and large amounts of downed wood, predispose this landscape to a high risk of severe and extensive natural or human caused fire. Vegetative treatments that reduce wildland fuels can reduce the risk of severe wildfire and protect water quality in the municipal watersheds. This is the core purpose and need of the project.

It is important to realize that reducing crown fire potential is probably the most important factor in preventing detrimental effects from high severity fire such as the input of increased sediment into the watershed. The most effective strategy for reducing crown fire occurrence and severity is to (1) reduce surface fuels, (2) increase canopy base height (CBH), (3) reduce crown bulk density (CBD), and (4) reduce continuity of the forest canopy (Graham et al. 2004, pp 23-24). Treatments in my decision were designed to affect those changes through a combination of activities that reduce surface, ladder and crown fuels.

The thinning treatments and subsequent harvest of larger size trees is necessary to achieve the proper crown spacing in the dense, continuous forest canopy. Thinning of trees will remove a majority of less fire resistant species such as lodgepole pine and Engelmann spruce, leaving the larger more fire resistant Douglas-fir.

Fire modeling simulations of the current condition indicate that if a wildfire starts in moderate to high fire danger conditions and is not controlled in the early burning periods, the amount of crown fire would

likely exceed a threshold of 830 acres in Bozeman Creek drainage or 740 acres in the Hyalite Creek drainage. These thresholds, established by sediment modeling (FEIS, p 3-10), show that moderate to high intensity fires in excess of these acreages would likely exceed the 30% over natural sediment yield Forest Plan standard found in the Gallatin National Forest Travel Management Plan (p. I-12). At that level of sediment production, the City of Bozeman water treatment plant would have significant difficulty filtering ash and sediment. The supply of municipal water could be interrupted for days or longer. For these reasons, the potential effects of Alternative 1, the no action alternative, are not acceptable.

Action Alternatives 2-6 address the intent of the land management goals and standards as outlined in the Forest Plan, and the priorities established in the Federal Wildland Fire policy and National Fire Plan direction (FEIS, pp 1-11 to 1-13).

My decision includes effective fuel treatments such as thinning to reduce crown canopy density, removing ladder fuels and reducing "dead and down" surface fuels. Applying fuel reduction treatments simultaneously to multiple fuels strata is the most effective approach to reducing fire severity (Raymond and Peterson 2005). Fire modeling simulations were used as a tool to compare the effects of the different amounts of fuel treatments in the action alternatives. Indicators of effective treatment include reducing fire size, reducing flame lengths, conversion of fuel model 10 to fuel model 184 and reduction in spotting potential, all of which lead to reduction in crown fire potential and fire spread.

Fuel models provide important indicators of how the alternatives meet the objective of reducing the severity and extent of wildfire. Fuel model 10 represents densely stocked mature stands with downed woody material. Fuel model 184 is representative of mature stands with more widely spaced crowns and little downed material. Fuel reduction treatments in my decision will change the represented fuel model on a site by rearranging the size class distribution and fuel loadings and the overall fuel profile. A fuel model 10 stand can be converted to fuel model 184 by implementing effective fuel treatments. The expected fire behavior in fuel model 184 stands includes slower rates of spread, lower intensity, and shorter flame lengths. These fire behavior attributes result in less firebrand production which results in less spotting potential and less potential for rapid fire spread. This type of fire behavior reduces crown fire potential and results in more successful and safer suppression efforts. These attributes move the project area toward meeting the desired conditions to achieve the purpose and need for watershed protection, WUI and evacuation route protection, and less potential for fire spread between ownerships.

Indicators of high crown fire potential include a heavy loading of surface fuels (large "dead and down" woody debris); and the aerial fuel profile measured in terms of crown bulk density (CBD), canopy base height (CBH), ladder fuels and crown spacing. Tree biomass includes the needles and branches from the ground up and the small trees across the area make up the "crown bulk." The amount of this material is measured in density. A high CBD indicates canopy fuels are continuous enough for a crown fire to be sustained. CBH is the average distance from the ground surface to the lowest branches. If the canopy base height is low or close to the ground, the biomass or branches serve as a ladder for flames to move from the surface to the crowns of trees. Small understory trees and shrubs also contribute to a low CBH and serve as ladder fuels. It is desirable to have a break in fuels between the surface and the crown. Elevating or increasing the CBH achieves this separation in fuels. Crown spacing is the distance between individual crowns in the overstory. If there is minimal distance between trees or branches are touching a fire can travel easily between the crowns of trees. A continuous or dense canopy contributes to higher crown fire potential.

Alternative 2 meets the purpose and need by reducing crown bulk density and increasing crown base heights enough to reduce ladder fuels, reduce canopy density, and reduce fuel loadings. The treatments convert 3,239 acres of fuel model 10 to fuel model 184, which greatly reduces fuel loading, reduces spotting potential, and therefore reducing the potential for fire to spread rapidly from tree crown to crown (crown fire); however, they are less effective than the treatments in Alternatives 3, 5 and 6.

Alternatives 3 and 5 convert about the same number of acres from fuel model 10 to fuel model 184 (5,176 and 4,743 acres respectively), therefore reducing crown fire spread and intensity of potential wildfires. These alternatives are the most effective relative to the wildland fuel reduction aspect of the purpose and need for this project.

Alternative 4 features the use of prescribed fire and no mechanical treatments and converts only 1,571 acres of fuel model 10 to fuel model 184. I also considered that Alternative 4 is less effective at reducing crown fire potential because treatment is focused on only those stands that can be prescribed burned without pretreatment, which naturally are the stands with the least crown fire potential to begin with. This alternative includes treatment of the fewest acres by far of any of the alternatives, about 3,300 acres, versus the 4,675 acres in my decision (Alternative 6). When considering all parameters for changed fire behavior and effectiveness toward meeting project objectives Alternative 4 is least effective (FEIS pp 3-29 through 3-30).

In conversations with the IDT fuels specialist, I learned that some of the units still included in the prescribed burn treatment have higher fuel levels than is desirable for ideal prescribed burning conditions. There are possible negative consequences of trying to implement Alternative 4. More specifically, the prescription parameters are difficult to meet, which could result in unacceptable fire effects such as excessive amounts of fire-killed trees, or escaped fires that could be costly to suppress. On the other hand, to minimize those implementation concerns by spring burning or burning when moistures are high, fire intensities may be less than desired, resulting in areas that are burned with minimal results. Meeting prescription parameters in some of the units would be very challenging. For these reasons, this is the least effective of the action alternatives in meeting the purpose and need for the project. This alternative was designed around public comments requesting the elimination of harvest of mature trees and no additional road construction.

My decision will convert about 3,640 acres of fuel model 10 to fuel model 184, and effectively reduce crown fire potential on those acres (FEIS, p 2 – 27, Table 2-1). With the reduction in surface fuel and crown fire potential, flame length, spotting potential and potential for fire spread will also be reduced. The probability of stand replacing and mixed severity fire will decrease in both drainages but most notably in the Hyalite Creek drainage.

Ridgeline fuel breaks incorporated into my decision 6 create safe places to defend and hold a wildfire. They also provide for quicker access and ease of line construction for equipment and hand crews. Fuel treatments that create more open stands can facilitate wildfire suppression by providing safer access and egress for firefighters, as well as provide more tactical options such as direct attack and burning out (Omi, Martinson, 2002 p 25). Air operations such as retardant and water delivery will be more effective in reaching the ground to knock down flames on these more open ridge tops. The net result will be to help keep wildfire from spreading into adjacent stands and nearby drainages.

With the implementation of my decision, the potential extent of future wildland fires in the Bozeman and Hyalite watersheds could be reduced by 54% from the current condition (FEIS, p 2-29, Table 2-2) versus 58% in Alternatives 3 and 5. During a wildfire, public and firefighter safety will be improved, and threats to private property and the municipal watershed will be reduced due to conversion of fire behavior. However, the added fuel reduction effectiveness that Alternatives 3 and 5 provide result in other resource effects that I cannot accept.

Elimination of unit 22C and the increased “no ignition buffer” that were incorporated in my decision do not measurably reduce overall fuel treatment effectiveness of the project. Unit 22C is 63 acres in size, which is about 1 % of the treatment area. With regard to the increased stream buffer, the west-zone fire crew routinely stops ignition along perennial streams within approximately 100 feet, the mitgation formalizes the practice (Brickell, personal communication).

Water Quality

Sediment modeling of Alternative 1 (the no action) estimates wildfire generated sediment in Bozeman Creek to peak about 254% over natural for average fire conditions and 520% over natural for extreme fire conditions. Similar sediment response would be expected with a robust wildfire in Hyalite Creek. These modeling numbers are consistent with recent (since 2001) wildfires on the Gallatin National Forest, where modeled and actual sediment yields after wildfires were frequently 200–300 % over natural resulting in extensive impacts to the stream channel system.

All of the action alternatives reduce the potential for wildfire accelerated sediment effects in Bozeman, Hyalite, and Leverich Creeks. Alternatives 3 and 5 would be most effective at reducing wildfire accelerated sediment effects. However, implementation of Alternative 3 would exceed Forest Plan standards for water quality, which is unacceptable to me. Alternative 2 does not meet water quality standards either, and is less effective toward meeting the purpose and need, so it was not selected. Alternative 5, though slightly more effective toward meeting the purpose and need was not selected for reasons associated with high implementation costs.

My decision (selection of Alternative 6) will produce less project related sediment as compared to Alternative 5 especially in Bozeman and Leverich Creeks. About 1,100 fewer acres are included in my decision, which is the primary reason less sediment would be produced. However, Alternative 6 will be nearly as effective at meeting the purpose and need as Alternative 5 while balancing other issues.

My decision best addresses the prescribed fire nutrient increase issues in Hyalite Creek as Unit 19 is not directly connected to streams tributary to Hyalite Creek and prescribed burning in Unit 22C is eliminated. The selected alternative therefore has negligible potential for prescribed burning nutrient impacts to Hyalite Creek. My decision increases prescribed burn unit "no ignition" buffer zones in Bozeman Creek and Hyalite Creek to 100' which further reduces potential nutrient and sediment effects from these units.

The Gallatin National Forest sediment standards were revised during the Travel Plan process, in cooperation with the Montana DEQ, to be much more restrictive than previous standards and are based on sediment modeling and calibrated with actual Forest water quality data (instream suspended and bedload sediment) and sediment core data (spawning substrate fines). The analysis in the water quality section of the SFEIS demonstrates that the BMW project in Hyalite and Bozeman Creeks will be considerably below and well within compliance with the 30% over natural standard.

Projected sediment level increases in Alternative 6 have been further mitigated with the road decommissioning and BMP improvements included in my decision. The sediment increases as a result of project implementation are expected to be very low and not readily measurable with conventional sediment measurement equipment. The maximum Alternative 6 increase in Bozeman Creek shows sediment of 1.3%, with maximum Bozeman Creek level of 4.7% over natural, maximum increase in Hyalite Creek of 1.4% with maximum Hyalite Creek level of 4.9% over natural, and maximum increase in Leverich Creek of 1.3% with maximum Leverich Creek level of 5.7% over natural. These increases are well within compliance of the Gallatin National Forest 30% over natural standard for municipal watersheds or sensitive streams. As a result of road decommissioning in 2008 and 2010, sediment levels in both Hyalite Creek and Leverich Creek in Alternative 6 are projected to decrease by 1.2% and 4.0%, respectively, over natural compared to pre-road decommissioning and pre-BMW project levels.

None of the streams in the BMW project area, including Bozeman Creek or Hyalite Creek, are currently 303(d) listed for sediment. The definition of "naturally occurring" (SFEIS p 145) allows some sediment and nutrient levels above natural providing "all reasonable land, soil, and water conservation practices have been applied" per Administrative Rules of Montana 16.20.603(11). My decision incorporates standard BMPs or in many cases more stringent BMPs than Montana Forestry BMPs or Montana SMZ rules and certainly meets the definition of "all reasonable." The Montana Code Annotated – 2007 75-5-703 section (10)(c) additionally specifies that "Pending completion of a TMDL on a water body listed pursuant to 75-5-303 new or expanded non-point source activities affecting a listed water-body may

commence and continue if those activities are conducted in accordance with reasonable land, soil, and water conservation practices." This provision allows the small sediment and nutrient increases associated with the BMW project since "reasonable" BMPs are being planned and required. The Montana Department of Water Quality verified that the project plans would be consistent with Montana water quality regulations (MT DEQ 12/2010).

The BMPs that are incorporated into my decision were based on the Montana Forestry BMPs, which form the nucleus of the Montana BMP audits. The project BMPs were augmented by more stringent SMZ guidelines used on the Gallatin National Forest due in part to Trout Unlimited Settlement Agreement provisions. In addition, multiple Forest BMP reviews of fuel treatment projects and timber sales/roads (1994-2010) were used to refine the BMPs for this project. All reasonable BMP's have been incorporated into the project design. For these reasons I trust that the BMPs in Appendix A that are part of my decision will be very effective at minimizing short term sediment impacts.

Public and agency comment responses are listed in the response to comments section in the FEIS (pp C-22 to C-30) and include responses to comments pertaining to road sediment reduction, Bozeman drinking water and wildfire considerations, existing sediment sources in Hyalite Creek, BMW project water quality monitoring, peak flows, rain on snow events, channel stability, water temperature, Travel Plan road closures in Hyalite and Leverich Creeks, environmental baseline, sediment standards, road conditions, stream crossings, Montana water quality standards, Department of Environmental Quality (DEQ) 303(d) limited stream segments, watershed restoration, BMPs, the Hyalite grazing allotment, SMZ rules, wetlands, and USGS stream gages. These considerations were incorporated in the supplemental analysis as well.

Overall, Alternative 6 represents the best balance between minimizing short term impacts to water quality from thinning and broadcast burn treatments and long term mitigation of the risk from wildfire impacts to the City of Bozeman municipal water supply.

Fisheries

Leverich Creek drainage is the focus of concerns related to the fisheries issue because of the presence of westslope cutthroat trout in Leverich Creek. Leverich Creek is a relatively short drainage that flows northward between Hyalite and Bozeman creeks. The majority of the fisheries mitigation measures incorporated in my decision were tailored around the Leverich Creek area to minimize impacts to habitat for westslope cutthroat trout.

<u>Short-term Effects</u>

All five action alternatives (Alternatives 2 through 6) meet the Forest Plan standard for sediment delivery in the Hyalite and Bozeman Creek analysis areas. Alternatives 4 through 6 also meet this standard within the Leverich Creek area. Alternatives 2 and 3 exceed the standard for Leverich Creek and would require a site-specific Forest Plan amendment to be implemented, so they were not selected (SFEIS, p 64-65, Table 10). Exceeding the Forest Plan standards for water quality has detrimental implications for fisheries because excessive amounts of sediment can reduce inter-gravel survival of incubating trout embryos and pre-emergent fry.

Fine sediment (less than one-fourth inch) is the sediment that has the most negative impact on incubating trout embryos and pre-emergent fry. As a result, discussion of sediment impacts in water quality analysis is translated to changes in fine sediment. Projected changes in percent fine sediment in the Leverich Creek analysis area would be less than 1 % for Alternatives 4, 5 and 6. These impacts are minimal and westslope cutthroat trout habitat would be protected in these three alternatives, and would meet the intent of the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (Powell 2002). The mitigation I incorporated in my decision further protects this habitat. Alternatives 2 and 3 would not meet the MOUCA (Powell 2002). This determination relates to projected short-term sediment related effects (SFEIS, p. 64-65, Table 10).

Long-term Effects

All five action alternatives reduce the probability and assocoated severity of fire within the Leverich Creek drainage as compared to the No Action Alternative. Alternative 3 would result in the lowest weighted probability of a stand replacing and mixed severity fire in Leverich Creek Drainage (within 10 to 20 years), but the short term sediment increase is unacceptable to me. Alternatives 5 and 6 both minimize short term effects to westslope cutthroat trout, and effectively reduce the probability of stand replacing fire and mixed severity fire within the Leverich Creek drainage.

My decision coupled with recent road decommissioning in the Hyalite Creek analysis area will have beneficial effects to management aquatic indicator species (all trout species). Populations of MIS are expected to remain viable within the entire Gallatin National Forest planning area (GNF 2010).

Overall, Alternative 6 represents the best balance between minimizing short-term sediment related effects and long-term benefits related to wildfire, as well as for all other resource considerations. My decision incorporates mitigation that ensures protection of this important habitat. My decision also complies with all Forest Plan and agency direction related to fisheries, in particular for westslope cutthroat trout.

Scenery

The viewshed of Bozeman and the Gallatin Valley is highly valued by local residents and visitors. The Gallatin Valley is ringed by views of five mountain ranges, including the most visually dominant Bridger Mountains, the Gallatin Range, the Madison Range, the Tobacco Root Mountains and Horseshoe Hills. The southern edge of this viewshed, which is defined by the north end of the Gallatin Range, is often referred to as the Gallatin Face. A few places along this face are not currently meeting Forest Plan standards for visual quality due to the sharp, straight and discernible edges left by old harvest units, cable corridors and roads.

Fuel reduction activities could change the scenery on the Gallatin Face and interior to the area in three ways. These impacts are not mutually exclusive meaning they could all be a result of project activity. Treatments could lower the visual quality as a result of residual effects, such as unnatural-appearing vegetation patterns, obvious cable drag lines, stumps, slash piles, skid and temporary road corridors. Treatments could improve the scenery quality by adding desirable diversity or opening up vistas, and/or by reducing or mitigating existing negative visual elements of past harvests.

Alternatives 2, 3 and 6 do not meet current visual quality objectives and include a site specific Forest Plan Amendment to exempt certain areas from the Forest Plan standards. Alternative 5 meets the current VQO but includes a site specific Forest Plan amendment to improve the existing condition from past activity. Alternative 4 would meet current VQOs. Alternative 4 or 5 would be the most desirable from a scenery standpoint but do not meet other project objectives as effectively.

My decision (Alternative 6) includes a Forest Plan amendment to exempt four fuel reduction treatment units from meeting the Forest Plan visual quality standard as discussed in this decision in Section VI. The four units are:

- Unit #36 D,
- Unit #16 C,
- Unit #38,
- Most of unit #22I.

These units (representing a total of 300 acres) are on slopes that are highly visible from the Gallatin Valley. To accomplish the necessary fuels treatments through thinning on these steeper slopes, cable logging is planned. Cable corridors tend to be sufficiently unnatural-appearing as to visually dominate, especially when there is snow on the ground but not on the trees. My decision includes several mitigation measures for scenery protection; however, the effects of the cable corridors cannot be completely mitigated. A complete discussion of the Forest Plan Amendment and process is in Section VI of this

decision. Because of these potential effects, I am including as part of my decision, the option of using helicopter logging in these units should this become economically viable during the implementation of the project.

Portions of the shaded fuel breaks in my decision will be visible from the Gallatin Valley. However, these fuel breaks will mimic the natural openings and sparser trees of the north ridge/shoulder of "False" Mount Ellis in the eastern portion of the Gallatin Face. Some of the ridges in the Bozeman Creek and Hyalite drainages, especially on the south facing sides, are naturally open. Therefore, the fuel breaks will not have a large impact on visual quality.

Inventoried Roadless Lands

Fuel treatments in the Bozeman Watershed project may affect roadless character within the Gallatin Fringe Inventoried Roadless Area (IRA) (# J1-548, Mt. Ellis parcel, Final Environmental Impact Statement, Gallatin National Forest Plan and Gallatin National Forest Roadless Area Inventory) and in unroaded lands that are within the project area. The alternative treatments were analyzed to disclose the effects on wilderness attributes and the acres of roadless lands (inventoried roadless areas as well as unroaded and undeveloped lands) affected (FEIS, p 3-149). Wilderness attributes include natural appearance, undeveloped character, outstanding opportunities for solitude or primitive and unconfined recreation, special features and values, and manageability.

My decision responds to some of the public input concerning development in inventoried roadless areas. Some groups were concerned about mechanical harvest in inventoried roadless areas, even though harvest in any alternative would be done by helicopter with no road construction. The amount of helicopter thinning was reduced from 666 acres in Alternative 5, the preferred alternative in the DEIS, to 200 acres in Alternative 6 (the selected alternative). The 200 acres of thinning retained in my decision is in WUI, immediately adjacent to private land.

Prescribed burning will also be used in the IRA. Prescribed burning most closely replicates natural processes and best retains the inherent roadless characteristics of apparent naturalness, sense of remoteness, opportunities for solitude or a primitive recreation experience. Typically the mechanical treatments associated with prescribed burning are minimal (some slashing of undergrowth trees) and not obvious to most observers. Mechanical thinning has some of the more obvious and longer lasting effects on the roadless characteristic apparent naturalness.

On Jan 21, 2001, the 2001 Roadless Conservation Rule was established (36 CFR 220). The 2001 rule prohibited road construction, road reconstruction and timber cutting, sale and removal in inventoried roadless areas with some exceptions. On July 13, 2003, the 2001 Roadless Rule was enjoined by a U.S. District Court Judge Brimmer in Wyoming, after which the Forest Service established Interim Directives for the management of roadless areas.

In May 2005, the 2005 State Petitions Rule was established which allowed governors to petition for individual, state-specific rules to manage IRAs in national forests and grasslands in their states. In October 2006, Judge Laporte (Northern District Court of California) set aside the State Petitions Rule and reinstated the 2001 Roadless Rule. In December 2008, the Court limited its injunction to states within the Ninth Circuit Court and New Mexico (excluding Idaho). In August 2009, the 9th Circuit Court of Appeals affirmed the Northern District Court of California's opinions.

On Jan 12, 2007 the state of Wyoming again challenged the 2001 Roadless Rule. On August 12, 2008, in the District Court of Wyoming, Judge Brimmer issued a ruling enjoining the 2001 Roadless Rule for the second time. This opinion has been appealed to the 10th Circuit Court of Appeals.

On May 28, 2009, Secretary of Agriculture Tom Vilsack issued Memorandum 1042-154, which reserves "to the Secretary the authority to approve or disapprove road construction or reconstruction and the cutting, sale, or removal of timber in those areas identified in the set of inventoried roadless area maps contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume

2, dated November 2000." The Secretary has since re-delegated five categories of activities back to the Forest Service. These are:

a) Road construction and timber cutting in emergency situations involving wildfire suppression, search and rescue operations, or other imminent threats to public health and safety.

b) Timber cutting incidental to the implementation of an existing special use authorization.

The cutting, sale, or removal of generally small diameter timber:

c) To improve habitat for threatened, endangered, proposed, or sensitive species;

d) To maintain or restore the characteristics of ecosystem composition and structure; or

e) For personal or administrative use.

The area of fuels treatments included for the project includes lands within the Gallatin Fringe Inventoried Roadless Area. The Gallatin Fringe IRA was allocated to Management Area (MA) 12 in the Forest Plan. The management emphasis for MA 12 is wildlife and dispersed recreation and is unsuitable for timber production. There have been no proposals for timber harvest in the IRA until this time. Prior to the 2001 Roadless Rule there had been no proposals for road construction.

The focus of this project has always been to reduce the risk of wildfire by reducing wildland fuel and biomass through thinning and prescribed fire, not timber production. There was no differentiation between the IRA lands and the rest of the watershed outside the IRA in choosing priority treatment areas. Both thinning and prescribed burning treatments in the IRA will be accomplished without road construction. This is consistent with past management of roadless areas on the Gallatin as described above. Additionally, the cost of constructing roads into the IRA would be prohibitive.

Water quality was the major issue both within and outside the IRA. Sediment production was a limiting factor in the amount of thinning and burning treatments and their associated activities. The City of Bozeman water treatment plant could not operate effectively if large amounts of ash and sediment were produced and entered the streams as a result of erosion following a severe wildfire. With this in mind, the location of vegetation treatments were prioritized to most effectively protect the quality of water that reached the treatment plant and to protect private property in the WUI. Acreage treated was limited to meet Forest Plan sedimentation standards.

The portions of the project lands closest to the water treatment facilities and adjacent to private land were in the priority locations targeted for necessary fuels reduction. These lands are both within and outside the IRA and were chosen for their location and relative importance irrespective of roadless status. The types of thinning and prescribed burning to be implemented in the IRA will not require road construction. Thinning in dense mature forest stands will be done by helicopter and prescribed burns are planned in less dense forest.

The DEIS and FEIS for the project analyzed and disclosed the effects of these treatments to determine if implementation would significantly affect the roadless character (FEIS pp 3–149 through 3-169). The rationale for fuel treatment within the IRA is the same as that for the rest of the project area, that is, to reduce the risk of severe and extensive wildfire in the municipal watershed and reduce the risk to life and property in the project area.

My decision includes helicopter thinning on 200 acres of mature timber in a portion of the IRA. The diameter of trees to be commercially harvested is generally 10-12 inches or less. These 200 acres are closest to the water treatment plant and water intake structure and are directly adjacent to private lands and WUI. Because of the density of fuels, the proximity of the 200 acres to the City of Bozeman facilities, and the nearness to private forested lands which have been thinned, the treatment of these stands is important in achieving the purpose and need of the project.

Timber cutting in the IRA meets the 2001 Roadless Rule exception 294.13(b)(1)(ii) (FEIS p 1- 151). The exception permits timber cutting, sale, and removal of generally small diameter trees to maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period. The prescriptions for cutting in the IRA specify trees less than 12 inches. Marking guidelines for implementation will focus on generally small diameter trees not older larger trees.

I did not include in my decision the recommendation to limit stump heights to 8 inches (FEIS p 2-18). This recommendation is difficult if not impossible to implement on steep slopes. Since the trees will be helicopter yarded, timber fallers will use chainsaws to fell the trees. On steep slopes the uphill side of some trees can be 8-12" higher than the downhill side of the tree. The faller would be forced to saw into the ground in some instances, which is a safety issue and an unreasonable expectation. The effects analysis indicates that stumps would have impacts on "undeveloped character" but does not distinguish that 8 inch stumps are less apparent than 12 inch high stumps. Rather it indicates that minimizing the number of stumps may minimize impacts and screening will result from a vegetation flush that will occur shortly after harvest (FEIS p 3-167). I will not impose this restriction during implementation when there is no realized reduction in impacts to roadless character.

A range of alternatives was developed to address public comment and concerns about harvest in the IRA. The alternatives range from 1,150 acres to 1,630 acres of treatment units within the IRA and vary in the amounts of helicopter thinning and prescribed burning. The Selected Alternative treats a total of 1330 acres of prescribed burning and 200 acres of forest thinning within the IRA. The prescriptions for both the IRA and lands outside the IRA are the same regardless of the 2001 Roadless Rule. In addition, the mechanical thinning within the IRA is consistent with the management area direction in the Forest Plan. These lands are not suitable for timber harvest, but vegetation management is permitted to maintain or restore the characteristics of ecosystem composition and structure. Based on specialist review (FEIS, pp 3-149 to 3-169), treatments in the IRA comply with all Forest Plan management standards as amended with this decision. Therefore, my decision for the Bozeman Municipal Watershed project is not in conflict with Judge Brimmers' decision.

I have also determined that I have the authority to approve this decision based on the October 2, 2009 re-delegation letter from the Secretary (USDA 2009) , and subsequent November 10, 2009 letter from the Regional Forester (USDA 2009a). My decision authorizes the harvest on 200 acres within the Gallatin Fringe Roadless Area. Generally small diameter timber will be removed, with the emphasis on retaining larger trees that are more resilient to wildland fires. Thinning on the 200 acres will maintain or improve ecosystem composition and structure by retaining trees that are spaced so they are more resilient to fires, and reducing fuel loads to reduce the risk of uncharacteristic wildfire effects.

Soils

My previous 2010 decision was remanded based on the soils analysis in the FEIS. It was not clear to the Appeal Deciding Officer how the Forest would meet the Regional Soils Standard (USFS-R1 1999). I asked my staff to completely revisit the soils analysis. Extensive soil sampling and monitoring was conducted in the summer and fall of 2010 to assess the level of detrimental soil disturbance (DSD) in previously harvested areas and to gain better knowledge about local soil resources in the BMW area.

Field sampling in 2010 confirmed past disturbance in stands with prior timber harvesting by either clearcut or partial overstory removal systems. The majority of that disturbance, however, does not meet criteria for detrimental soil disturbance. Repeated field observations of suitable forest floor depths and underlying mineral soil layers with friable to very friable soil consistency, granular structure, and abundant roots supports the finding that detrimental soil disturbance did not exist at the majority of sites sampled along transects. Nor was there any discernable change in site productivity except when recognizable evidence of DSD was present in the soil. At the request of the Forest, the Northern Region

Soil Scientist participated in soil monitoring and data collection because of the difference in estimates from the analysis in the FEIS. The Soil Scientists' conclusions were supported by the Regional Soil Scientist for the Northern Region of the Forest Service. She concurred with current field verified estimates after assisting in soil monitoring within the core BMW area (Webster-personal communication 2010). This measure was intended to make sure sampling was accurate and conducted according to established procedures.

Soils associated with treatment units of the Bozeman Municipal Watershed project are primarily coarse textured. Sandy loam and loamy sand are predominate soil textures in and near surface mineral soil layers. Coarse soil textures and abundant rock fragments in the soil profile limit the susceptibility of soils to compaction. Field evidence suggests that soil compaction is not currently and will not be a significant problem in the treatment units of the Bozeman Municipal Watershed. Soil erosion will likely be more of a concern on steeper portions of trails and roads, especially in areas of sandy soils over shallow bedrock.

A substantial amount of past timber harvesting has occurred in less steep core areas of the Bozeman Municipal Watershed. Treatment units currently slated for pre-commercial thinning (PCT) have the highest levels of past harvest in small diameter stands that were harvested 30 to 60 years ago. Evidence of past harvest is apparent in these stands but only limited amounts of detrimental soil disturbance were found during soil monitoring. In all cases, no treatment unit from any of the alternatives is predicted to exceed the Region One 15% maximum DSD standard (SFEIS p 71 and Tables 30-34 pp 123-128).

Gallatin National Forest Soil BMPs are incorporated in my decision (p. 15) and are listed in Appendix A. These practices minimize the occurrence of soil disturbance during harvest operations and will remediate the disturbances that do occur. Design features to minimize the occurrence of detrimental soil disturbance include using a systematic skid trail system, placing reasonable limits on off trail use of skidding and harvesting equipment, maintaining proper siting of skid trails and temporary roads, and using ground-based harvest systems only on slopes having less that 35% sustained grades. Soil remediation focuses on the major areas of potential DSD in timber harvested units: temporary roads, landings, and skid trails. Gallatin National Forest soil remediation BMPs applied to this project will provide a moderate amount of immediate remediation while enhancing long term natural recovery of these sites. As stated previously, the application of soil remediation BMPs will also ensure that the Northern Region detrimental soil disturbance standard will be met in all fuels treatment units. As a result, Gallatin Forest Plan direction will also be met (SFEIS p 132). The BMPs in my decision were refined specifically for this project, based on field data collection and knowledge gained during summer and fall fieldwork. These practices will limit soil erosion and detrimental disturbance (SFEIS, pp 97-101). Soil monitoring is also included in my decision (p. 17). Monitoring will help us to validate estimates of soil impacts and BMPs effectiveness. Monitoring is planned for all BMPs as a standard practice on the Gallatin National Forest. When monitoring results indicate the need to revise BMPs to improve effectiveness or to eliminate ineffective practices it is assumed that all project related BMPs will be updated to incorporate the most current knowledge and practices.

For all fuel treatment alternatives, no treatment unit or subunit is predicted to exceed the Region One detrimental soil disturbance standard (USFS-R1 1999). Conversely, the no action alternative may pose the greatest threat to Bozeman's Municipal Watershed for creating large, continuous areas of detrimental soil disturbance due to severe burning if and when large wildfires burn through areas of heavy fuels during extreme drought conditions. Upon consideration of the analysis provided in the SFEIS (pp 70-133) and the protection measures that are incorporated in my decision (p. 15 and Appendix A) I have determined that my decision complies with applicable Forest Plan and regional direction for soils.

Recreation

The majority of recreation use in the project area occurs during the summer months when some of the fuel treatment activities are expected to occur. At times while treatment activities are being implemented, recreationists can expect to see and hear equipment and to experience an increase in dust and smoke

resulting from project implementation activities. Winter recreationists may also be impacted by project activities as some roads and trails could be temporarily closed while equipment is working in the area. During the summer and winter seasons, recreationists can expect to encounter additional truck traffic on roads within or accessing the project area. Specifically this would affect users of the main Hyalite Road, Moser Creek roads, Leverich Canyon area, and the Bozeman Creek Road.

Public use of some areas including roads, trails and dispersed sites may have to be temporarily restricted during treatment due to hazardous situations from helicopter operations, equipment, commercial thinning, log hauling, burning operations, and other fuels activities. Portions of the Bozeman Creek Road will have to be closed during some helicopter and treatment operations.

All existing recreation opportunities will continue to be available after the project has been completed but in a slightly modified visual setting. Although fuel treatments may temporarily displace or prevent recreation use of some routes and areas and affect some dispersed opportunities, this will be on a limited, short-term basis. I included mitigation in my decision to minimize impacts to recreationists by allowing access to some part of the project area at all times during implementation.

Wildlife and Wildlife Habitat

The wildlife effects analysis (FEIS, pp 3-171 through 3-209 and 3-247 through 3-417, SFEIS p. 10-30) disclosed varying levels of possible impacts to wildlife habitat across the range of alternatives. I included in my decision mitigation that was designed to protect several wildlife habitat components and in some cases wildlife itself (15-17). These practices will minimize impacts to wildlife and habitat. The alternatives are in compliance with all applicable direction (SFEIS p. 29-30; FEIS Chapter 3).

The Canada lynx is listed as a threatened species under the Endangered Species Act (ESA) and, as such, I carefully considered potential effects to lynx and lynx critical habitat. Effects of Alternative 6 were addressed in a Biological Assessment in consultation with the U.S. Fish and Wildlife Service (FWS). As defined by the Northern Rockies Lynx Management Direction FEIS (USDA FS LRMD 2007), the Lynx Analysis Unit (LAU) is the appropriate scale for analysis and consultation (Ibid, ROD: Attachment 1, p.12). In the Biological Opinion (FEIS Appendix D) issued for the BMW project, the FWS found that the project falls within the range of fuel and timber management projects analyzed for while amending Forest Plans for lynx management. The FWS found that effects of the BMW project were adequately analyzed, and that the project conforms to the incidental take statement developed for the lynx amendment. Further, the FWS determined that the effects of the BMW project are not likely to result in the destruction or adverse modification of lynx critical habitat.

On September 21,2009 (between publication of the BMW DEIS and FEIS) a court order vacated the delisting of the Greater Yellowstone Area grizzly population segment, thus re-establishing the Yellowstone grizzly bear as a threatened species. In compliance with the ESA, a Biological Assessment was prepared and we entered into consultation with the FWS with a determination of may affect, likely to adversely affect. The Biological Opinion issued by the FWS found that the effects of the BMW project are not likely to jeopardize the continued existence of the grizzly bear. (FEIS, D-85) My decision incorporates the Terms and Conditions set forth in the Biological Opinion as mitigation measures for project implementation (p. 15). These measures were included in the mitigation measures common to action alternatives in the FEIS (p.2-22).

Since the FEIS was released, two species that are either known, or suspected to occur on the Gallatin National Forest, have been added as “candidate” species for listing under the ESA. Candidate species are those species for which the FWS has sufficient information on biological status and threats to propose to list them as threatened or endangered. The FWS encourages consideration of candidate species in environmental planning; however, none of the substantive or procedural provisions of the ESA apply to candidate species. The two new candidate species are the wolverine and Sprague’s pipit. The wolverine is a medium-sized carnivore, known to occur at low densities across the Gallatin National Forest. It is typically associated with high elevation habitats and is not expected to be present within the BMW project

area except for infrequent transitory movement associated with dispersing animals. Wolverines were addressed as a sensitive species for the project, with a Biological Evaluation determination of "may impact individuals or habitat, but would not lead to a trend toward federal listing" for all action alternatives, including the selected Alternative 6. Sprague's pipit is a grassland-associated bird species. There are no recorded observations of Sprague's pipit within the project area, and no recent observations (within the past 20 years) for all of Gallatin County (Montana Natural Heritage Program website 2011). The project area does not contain large expanses of grassland habitat that could provide suitable habitat for Sprague's pipit.

The northern goshawk is a Management Indicator Species for the Gallatin National Forest. The wildlife analysis showed that there could be some impacts to goshawk habitat; however, mitigation measures were identified to protect known occupied nesting and post fledging areas (p. 15). The mitigation measures I incorporated into the decision follow the most current Regional guidance for management of northern goshawk habitat (FEIS, p 3-196).

Elk is the Forest's Management Indicator Species for big game. Managing habitat to provide for stable or increasing populations of big game is a Forest Plan goal. The wildlife analysis for big game identified potential benefits as well as possible negative impacts associated with habitat alteration and disturbance factors resulting from proposed treatments. Analysis evaluated possible impacts to foraging habitat, security cover, and other key habitat features such as wallows and other moist sites. Since big game species provide important contributions to ecological processes as well as local economies, I carefully considered effects to big game habitat and project compliance with Forest Plan direction for managing habitat. In order to ensure that the Project meets Forest Plan direction and intent, I asked for additional field work and analysis between the FEIS and the SFEIS, to further validate the habitat modeling used for big game habitat assessment (SFEIS, p 16). The Forest conducted extensive field sampling and analysis to determine whether the Forest Plan standard for big game hiding cover would be met. The additional work confirmed my previous conclusion that the project meets Forest Plan direction for big game cover (SFEIS p. 29). In addition, I have added mitigation to increase the no ignition buffer for burn treatments to at least 100 feet adjacent to Bozeman Creek, Hyalite Creek and perennial tributaries. This measure, combined with original SMZ buffers, will further ensure retention of hiding cover associated with key habitat components associated with stream courses (e.g., moist sites and foraging areas).(p. 15)

Management Indicator Species (MIS) are identified in the Forest Plan as those species groups whose habitat is most likely to be affected by Forest management activities. MIS were addressed in project analyses (FEIS Chapter 3). A recent review of information regarding population trends of Management Indicator Species shows stable to increasing population trends of MIS at the Forest scale, or at the unit level USDA, GNF 2011). This broader scale information helped me put into perspective potential impacts to MIS disclosed in the project-level analyses.

Sensitive Species are those plant and animal species identified by the Regional Forester for which population viability is a concern. The wildlife analysis (FEIS, p. 3-417 to 419) determined that there would be no impact to most of the sensitive species known to occur on the Gallatin National Forest. For those sensitive species that could be impacted by fuel treatments, the determination made through a Biological Evaluation process was either "no impact" (NI) or "may impact individuals or habitat, but would not lead to a trend toward federal listing" (MIIH) of the species. Table 2 summarizes the determinations by Alternative for Gallatin National Forest Terrestrial and Plant Sensitive Species.

Table 2: Project Determinations for Sensitive Species on the Gallatin Forest for Terrestrial Wildlife and Plant Species.

	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
Black-backed Woodpecker	NI	MIIH	MIIH	MIIH	MIIH	MIIH
Bald Eagle	NI	NI/MIIH	NI/MIIH	NI/MIIH	NI/MIIH	NI/MIIH

	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
Wolverine	NI	MIIH	MIIH	MIIH	MIIH	MIIH
Trumpeter Swan	NI	NI	NI	NI	NI	NI
Harlequin Duck	NI	NI	NI	NI	NI	NI
Peregrine Falcon	NI	NI	NI	NI	NI	NI
Flammulated Owl	NI	NI	NI	NI	NI	NI
Western Big-eared Bat	NI	NI	NI	NI	NI	NI
Sensitive Plants	NI	NI	NI	NI	NI	NI

Snags are recognized as an important component of wildlife habitat. With the number of trees currently dead or dying due to epidemic levels of insect infestation in the project area, there is no indication that implementation of the BMW project will adversely impact this resource. However, to ensure maintenance of adequate habitat for snag-dependent species, I have incorporated mitigation measures for snag retention in treatment units in my decision (p. 16).

Air Quality

The prescribed burning associated with the Bozeman Municipal Watershed Project may temporarily increase particulate matter levels along residential areas and roads (FEIS, p 2-290). In addition, smoke from burning may temporarily obscure visibility along the Hyalite Creek Road. Smoke may also temporarily pose nuisance levels to residences near the WUI areas on the north side of the project.

Air quality within the Bozeman Municipal Watershed area is generally excellent with very limited local emission sources and consistent wind dispersion. Existing sources of emissions in the Bozeman Municipal Watershed area include occasional construction equipment, vehicles, road dust, residential wood burning, wood fires, and smoke from logging slash disposal and wildland fire.

Emissions are very limited with no local visible sources of impairment. Wind dispersion throughout the Bozeman Municipal Watershed area is robust, with no visible inversions or localized concentrations of emissions. Down valley drainage is frequently robust during nighttime and early morning hours, particularly at the mouth of Hyalite Creek and Bozeman Creek. The entire Bozeman Municipal Watershed area is considered to be in attainment by the Montana DEQ. The nearest non-attainment area is Butte, 84 miles to the west for PM_{10}. All of the area and the entire Gallatin National Forest is a Class II airshed. The nearest Class I airshed is Yellowstone National Park, 33 miles to the south.

The project area does not develop temperature inversions, which trap smoke and reduce smoke dispersal. Dispersion of emissions within the project area is very high due to the mountainous terrain and high wind activity. The Wind Energy Resource Atlas of the U.S. (Elliott et al. 1986) shows the Bozeman Municipal Watershed area with high wind energy. The Bozeman Municipal Watershed area has some potential for cumulative concentrations of smoke and residential and transportation emissions but visible inversion conditions do not occur. Up valley winds during daytime and down valley wind (cold air drainage) at night can dominate valley winds more than overall prevailing wind direction on ridge tops.

The analysis shows that all alternatives meet the Clean Air Act (as amended) and the Forest Plan. Based on modeling results (FEIS, p.3-290), projected emissions for my decision from all prescribed burning totals 83.5 tons of PM_2 over the period of the project, which is the lowest emission of all action alternatives. I incorporated mitigation in my decision to ensure appropriate notification and coordination for air quality.

(p. 12) I confirmed with the Air Quality specialist that all alternatives comply with the Clean Air Act (as amended) and the Gallatin Forest Plan.

Economics

While the costs and economic benefits of implementing this project are relevant to consider, it is critical to remember that the intent of this project is to protect the valuable resources of these Bozeman watersheds, not to produce the most economic benefits. The investments for the project are focused on addressing un-quantified benefits such as clean water, public safety, scenic vistas, and high quality recreation experiences. At the same time, I must be realistic about what the Forest can afford to implement and prioritize treatments with this in mind.

The Bozeman Municipal Watershed project has both commercial and non-commercial thinning activities. Helicopter yarding is very costly in today's market with the high cost of fuel and the low value of timber. Therefore, Alternative 6 was a conscious choice to eliminate some of the helicopter logging that was analyzed in Alternative 5 in an effort to provide a better balance between project costs and acres treated.

The difference between the present net value (PNV) for Alternative 5 which was the DEIS Preferred and Alternative 6 (FEIS, p.3-270) was largely due to the reduction of helicopter logging in Alternative 6. This convinced me that the financial tradeoff for reducing the amount of helicopter thinning from Alternative 5 to Alternative 6 was an important consideration in my decision. However, as mentioned before, if economic considerations change during the project, I am including the option of using helicopter yarding in some cable units if this becomes economically viable in order to avoid some adverse effects to scenic resources.

Forest Vegetation

The Bozeman Municipal Watershed analysis area is a landscape dominated by steep canyons and timbered slopes in the lower reaches of Bozeman and Hyalite creeks. Dominant vegetative communities include Douglas-fir and lodgepole pine. Stands in both drainages are predominantly in the mature and older age/size class (72%) with fewer seedling, sapling, or pole size stands (18%).

Mature and older lodgepole pine and subalpine fir are found at all elevations and aspects within the project area. The natural fire frequency in these stands varies from those that experienced thinning fires on a 35 to 40 year frequency to stand replacing fires approximately every 150 to 200 years. Without periodic disturbances like fire, subalpine fir eventually replaces lodgepole pine. Older Douglas- fir is also common in the project area. On Douglas-fir sites, natural fire frequency ranged from 35 to 45 years and typically thinned the stand instead of replacing the stand.

In the last two years, many of the larger lodgepole pine in the project area have been attacked by mountain pine beetles. These beetles are native, but are usually present at endemic levels. The area is currently experiencing an epidemic that may increase mortality in lodgepole pine trees over the next five years. In 2010 very few new beetle attacks were noted. A series of moist and cold weather pulses in 2009/2010 appear to have slowed the beetle attack. Prescriptions for thinning will address removal of some of the increased mortality by favoring removal of beetle-killed trees over other tree species that are not affected by mountain pine beetles.

In all the action alternatives, the amount of old growth forest retained (28-32%) is well above the 10% Forest Plan Standard. Based on the old growth analysis completed for this project (FEIS, pp 3-224, 3-231, 3-237, 3-243, 3-249), Alternatives 2 and 6 proposed treating the least amount of old growth forest (625 and 651acres, respectively). Alternative 3 proposed treating the most old growth stands (944 acres). Alternatives 5 and 4 would treat 885 and 700 acres, respectively.

My decision will provide for the continued availability of older forested stands in these drainages to a greater degree than Alternative 3, 4, or 5, and will help reduce potential loss of old growth forest that will eventually occur under the no action alternative.

In addition to the discussion concerning old growth, there is much interest in global climate change and how it relates to this type of project. Trends indicate that the area in and around the Pacific Northwest has been warming with slightly below average amounts of precipitation also occurring. This climatic change is likely to continue into the foreseeable future (50 to 100 years). My decision will help to create a more resilient forested ecosystem better able to handle potential outbreaks of insects (bark beetles) and moderate to severe wildfire. Protecting mature and old growth forest from such disturbances is ecologically unrealistic since such disturbances are likely to increase with warmer and possibly drier conditions.

Although not a statutorily defined purpose of National Forest System management, forests provide a valuable ecosystem service by removing carbon from the atmosphere and storing it in biomass. The Gallatin National Forest currently stores an estimated 68 million metric (Mt) of carbon (Carbon On-Line Estimator, ncasi.uml.edu/Cole). This represents about 0.0016 of the total of approximately 41,385 Mt of carbon in forests of the coterminous United States (USDA News Release 2010).

The long-term ability of forests to sequester carbon depends in part on their resilience to multiple stresses, including increasing probability of drought stress, high severity fires and large scale insect outbreaks associated with projected climate change. Management actions such as those in the Bozeman Municipal Watershed project maintain the vigor and long-term productivity of forests, reduce the likelihood of high severity fires and insect outbreaks and store carbon in harvested wood products which helps increase the capacity of the forest to sequester carbon in the long term. Thus, even though some management actions may in the near-term reduce total carbon stored below current levels, in the long-term they improve the overall capacity of the forest to sequester carbon while also contributing other multiple-use goods and services.

Weeds

My decision was influenced by consideration of the noxious weeds which could be established or spread by disturbances associated with the project activities. Compared to Alternative 5, Alternative 6 will result in fewer total acres of activities occurring on those sites most conducive to weed establishment. The overall cost of weed treatments in Alternative 6 is also predicted to be less than in Alternative 5(FEIS p 3-316).

The action alternatives vary in their potential for weed spread. Alternative 4 treats the most acres and has the second highest cost for weed treatment because of the high level of prescribed burning. However, Alternative 4 results in less soil disturbance than Alternative 2, 3, 5 or 6 again, because of the large number of acres being treated with prescribed burning. Tractor logging and associated road construction, and soil disturbance from landings and skid trails in Alternatives 2, 3, 5 and 6 have a higher likelihood of new weed establishment than Alternative 1 or 4. Alternatives 2 and 3 are unacceptable from the standpoint of water quality. Alternatives 1 and 4 do not effectively meet the purpose and need for action. Alternative 5 was not selected for reasons other than weed considerations.

The additional temporary roads needed to use cable and tractor logging systems in Alternatives 2, 3, 5 and 6 have the potential to create pathways for weed establishment and dispersal. While activities associated with the action alternatives increase the potential for weed establishment, there are several mitigation measures such as washing equipment, identifying and treating weed infested areas, and maintaining weed free equipment parking areas that are included in my decision to minimize potential impacts. Based on experience with implementing timber projects in more recent decades with these practices, the weed experts on the Forest have observed lower spread and establishment of invasive weeds when these practices are implemented (FEIS p 3-316, personal communication Susan Lamont). The Soil BMPs in Appendix A further minimize weed establishment concerns because of requirements for timely revegetation post disturbance. While these practices are not 100% effective, they will help to lower weed spread and introduction rates.

The Weed Best Management Practices were indentified in the FSM 2080, R1 2000-2001-1 Noxious Weed Management Supplement and provide the foundation for generally accepted management practices to reduce weed spread. A majority of the practices included in my decision are implemented as part of project preparation or in contract provisions so they do not require additional funding. The need for longer term monitoring and weed treatment is unknown until it is determined if weeds become established but there are different funding options such as stewardship receipts, prioritization in the annual integrated weed program of work with appropriated dollars or grant funding. This area is a reasonable candidate for outside funding because of the heavy recreation use and municipal water supply needs. The weed practices are generally effective at limiting spread and establishment, but due to the existing weed presence they are unlikely to be 100 % effective at eradication weed presence. The effects of potential weed spread were presented in the FEIS (FEIS pp 3-291 to 3-316). I am committed to application of these practices because the most effective means of treating weeds is to avoid infestation. With the inclusion of these practices to minimize weed spread and establishment, my decision complies with Forest Plan direction and other requirements (FEIS p. 3-310).

E. Other Alternatives Studied in Detail

The DEIS which was published for public review in August of 2007 analyzed five alternatives, including the No Action and Proposed Action alternatives, in response to issues raised by the public and agency specialists during the scoping period. The FEIS added a sixth alternative to respond to changed conditions and to public comment on the DEIS. I believe these alternatives sharply define the issues for me to consider, address comments and suggestions provided by the public, and provide a reasonable range of options to the proposal. These alternatives and my reasons for not selecting them are briefly described below.

Alternative 1, No Action

Under the No Action Alternative, current management plans would continue to guide management of the project area. No fuels reduction activities would be implemented, which would ignore the risk posed to the municipal watershed. I did not select this alternative because the purpose and need for action would not be met, nor would it move the area closer to meeting the purpose and need. Additionally, the indirect effects over time of taking no action could result in devastating watershed effects in these municipal watersheds if and when a wildfire begins in the vicinity. With implementation of Alternative 6, the potential extent of future wildland fires in the Bozeman and Hyalite watershed could be reduced by 54% from the current condition in Alternative 1. This potential impact was too big for me to select Alternative 1 and take no action in these watersheds.

Alternative 2, The Proposed Action

This alternative is a more detailed version of the proposed action presented to the public during scoping. An interdisciplinary team with specialties in hydrology, fisheries, wildlife, silviculture, ecology and wildland fuels convened and developed the Proposed Action presented in the DEIS using technical expertise, existing data, fire behavior and landscape dynamic models, and spatial analysis. The proposed action alternative reflects the priority treatment areas and one treatment scenario that would address the purpose and need for actions. The approximate duration of the proposed activities would be a 5-12 year timeframe**.** A more detailed description of the treatment prescription and implementation methods is located in the FEIS, Appendix A.

I did not select this alternative because it would not meet water quality standards established in the Forest Plan or fisheries habitat needs in Leverich Creek, which are unacceptable trade-offs for this project. Also, I wanted my decision to be very effective in meeting the purpose and need while balancing potential impacts of treatments. This alternative included fewer acres of treatment than most other alternatives so it was not as effective while still having unacceptable impacts to water quality and fisheries habitat.

Alternative 3

This alternative was designed to meet the purpose and need for action and to achieve the desired conditions more quickly and more aggressively than Alternative 2. Given the extent of and current condition of fuel loading in the municipal watershed, an issue was raised by agency specialists that the proposed action was not extensive enough to be effective toward meeting the purpose and need for action. Treating additional acres would more effectively reduce the potential extent of future crown fires resulting in less severe fires and fire behavior. This alternative was developed to explore the option of moving more quickly to remove more fuels from the watersheds and to evaluate what the other resource effects would be of such an alternative.

I did not select this alternative because it would not meet Forest Plan standards for water quality protection or fisheries habitat needs in Leverich Creek, which is an unacceptable trade-off for this project. The team was able to develop other alternatives that could effectively treat fuel conditions without building the amount of temporary roads planned in Alternative 3. The watershed effects of the treatment units and temporary roads were unacceptable in a municipal watershed where the objectives were specifically focused on the protection of water quality. This alternative also thinned many more acres in the Gallatin Fringe IRA than the selected alternative, Alternative 6, 738 acres versus 200 acres. I asked the team to identify in Alternative 6 only the highest priority treatment acres in the IRA and to evaluate the effects of those acres. This analysis led me to select Alternative 6 as an effective choice for meeting the purpose and need while still protecting the integrity of the IRA.

Alternative 4

In this alternative, treatments would be limited to prescribed burning, small tree removal and no construction of additional roads. This alternative combines an effort to meet the purpose and need for action without thinning large trees using logging methods. This alternative is also the agency response to the request during scoping to consider an alternative limited only to prescribed burning and to consider an alternative with no additional road construction. The stands identified for mechanical cutting and piling of young trees were logged in recent decades and are generally small trees. This alternative is the environmentally preferable alternative.

I did not select this alternative because it does not meet the purpose and need effectively. This alternative includes treatment of the fewest acres by far of any of the alternatives. When considering all parameters for changed fire behavior and effectiveness toward meeting project objectives, Alternative 4 is the least effective of the alternatives (FEIS pp 3-29 through 3-30). In conversations with the fuels specialist, I learned that some of the units that are included for prescribed burn treatment in Alternative 4 have higher fuel levels than are desirable for prescribed burning conditions. There are possible negative consequences of trying to implement Alternative 4. Specifically, the challenge is related to existing heavy fuel loading because pretreatment is not planned. Prescribed burning prescription parameters would be difficult to meet, which could result in unacceptable fire effects such as excessive amounts of fire-killed trees, increased sediment delivery, or escaped fires that would be costly to suppress. The risk of devastating fire effects in the municipal watersheds was not a risk I am willing to take here.

In consideration of prescribed fire impacts, minimizing the implementation concerns by spring burning or burning when moistures are high would lower fire intensities too much, resulting in areas that are burned with minimal results. Meeting prescription parameters in some of the units would be very challenging. For all of these reasons, this alternative is the least effective of the action alternatives in meeting the purpose and need for the project.

Alternative 5 - DEIS Preferred

Alternative 5 is designed to improve the effectiveness of the project in meeting the purpose and need for action while mitigating unacceptable impacts to scenery, water quality, and westslope cutthroat trout. This alternative incorporates treatment areas in and near the wildland urban interface that were left out of

other alternatives and areas that through additional analysis were determined to be strategically important with respect to fire spread. This alternative makes refinements in treatment prescriptions and/or methods as contrasted with the original proposed action. These refinements are based on more accurate information which allowed specialists to make more specific and accurate treatment recommendations.

I did not select this alternative because the cost of implementation due to the extensive helicopter yarding was unacceptable. When the alternative was developed the timber market was stable and helicopter yarding was a fairly common method in this part of the United States (i.e., the cost of helicopter logging was lower than it is now). I must consider the feasibility of an alternative ultimately being implemented when I make my decision, otherwise the progress in meeting the purpose and need would be overstated. Although Alternative 5 as written meets the purpose and need, it is less realistic that the actions will be entirely implemented due to cost. Alternative 5 also thins more acres in the Gallatin Fringe IRA than my decision, which is a consideration in this project and a concern that I heard through comments from the public.

Table 3. Comparison of Alternatives 2 – 6.

	Alternative 2	**Alternative 3**	**Alternative 4**	**Alternative 5**	**Alternative 6**
Prescribed burning – no pre thinning	850 acres	1,100 acres	2,046 acres	950 acres	1,512 acres
Mechanical and hand cutting, thinning and piling of young trees	1,150 acres	1,150 acres	1,250 acres	1,156 acres	1,117 acres
Partial harvest (percentage by harvest system)	1,926 acres Ground based (23%) Skyline (32%) Helicopter (45%)	3,621 acres Ground based (19%) Skyline (35%) Helicopter (46%)	0	3,708 acres Ground based (21%) Skyline (12%) Helicopter (67%)	2,045 acres Ground based (37%) Skyline (24%) Helicopter (39%)
Forest Plan Amendment for Visuals	Yes	Yes	No	Yes	Yes
Temporary Road Construction	7.2 miles	13.5 miles	0	6.9 miles	7.1 miles
Re-opening and Closing Existing Roads	3 miles	5.4 miles	0	1.7 miles	1.7 miles

	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Activities within Gallatin Fringe IRA	• 468 acres helicopter thinning • 681 acres prescribed burning	• 738 acres helicopter thinning • 895 acres prescribed burning	• 0 acres helicopter thinning • 1,147 acres prescribed burning	• 666 acres helicopter thinning • 941 acres prescribed burning	• 200 acres helicopter thinning • 1,329 acres prescribed burning

F. Alternatives Considered but Not Studied in Detail

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives were viewed as outside the scope of the Bozeman Municipal Watershed Project, duplicative of the alternatives considered in detail, or determined to have components that would cause unnecessary environmental harm. Therefore, four alternatives were considered, but dismissed from detailed study for the reasons summarized below.

Scoping Alternative

This alternative was the original proposal presented by the Forest Service for the initial scoping effort in 2005. It was developed to achieve the purpose and need outlined in Chapter 1 of the DEIS and FEIS. Fuel reduction activities being considered included treating up to 6,000 total acres, including a small portion of the Gallatin Fringe IRA in the Bozeman Creek watershed, and treating up to 3,000 acres in the Hyalite Creek watershed with a combination of prescribed burning, thinning, brush cutting, and commercial tree harvest. This proposal was a broad description for the area proposed for treatment and the types of treatments. It was the starting point from which Alternatives 2-5 were developed. Alternative 2, as discussed in detail in the DEIS, FEIS and SFEIS represent this conceptual alternative.

Water Treatment Facility Improvements Alternative

During scoping, comments were submitted that asked the Forest Service to consider an alternative that improved water treatment facilities such as building sediment traps, upgrades to treatment plant, and wells. The intent was to focus mitigation on the City facilities to address the purpose and need rather than on National Forest System lands. The recommendations were shared with the City of Bozeman for consideration. These options are not within the decision authority for the Forest Service so this alternative is not within the scope of my decision. The City of Bozeman is planning upgrades to water management system and the suggestions provided by the public were forwarded to the City staff.

The City commissioned a facility plan evaluation of the treatment plant with the long term potential to convert from direct filtration to conventional or membrane filtration. The City of Bozeman Water Facility Master Plan (City of Bozeman, 2006) located online at: http://www.bozeman.net/bozeman/engineering/documents/Water_Facility_Plan.pdf contains an extensive analysis of potential water treatment upgrade alternatives. The potential impacts of the upgrades considered in the Master Plan are incorporated into the FEIS discussion on water quality (SFEIS, pp 135, 144-145).

While the City of Bozeman and the Forest Service are working together, each entity has a unique role. The Gallatin National Forest does not have jurisdiction over City of Bozeman water system operations. However, high intensity wildfire within these drainages on National Forest System lands would affect

water quantity and quality, and could impact the City's ability to provide a necessary water supply to meet the resident's needs even with treatment facility improvements.

This alternative was not analyzed in detail because the City will proceed with the array of improvements that best meet their management needs on City land and at the treatment plant. The Bozeman Municipal Watershed analysis takes in to account potential disturbances associated with facility upgrades that the city indicated would proceed. Lastly, even with treatment plant improvements, excessive ash and sediment from wildfire would reduce the ability to treat water effectively and efficiently. Even with improvements to the water treatment facility, the cleanest long term source of water is preferred.

Wildland Fire Use Alternative

During scoping the Forest Service was asked to consider an alternative focused on natural fire ignitions to achieve this project's purpose and need. Currently the project area is within Fire Management Unit #3 Gallatin Protection in the Gallatin National Forest Fire Management Plan. This FMU is designated Interface/Intermix, meaning it applies to WUI, Municipal Watersheds, campgrounds, dispersed recreation areas and areas of heavy public use.

According to the current Gallatin National Forest Plan (1987) the Management Areas (MAs) in the project area identifies fire suppression as the Appropriate Management Response. The Forest can utilize "contain" and "confine" strategies relative to wildland fire before and after fire season (May 1 to September 30). Otherwise, during fire season the response is to control (or suppress) the fire. Although the Forest is considering amending the Forest Plan to allow additional fire management options, managing fire for resource benefits in this area would likely be outweighed by the risks posed by having fire in a municipal watershed that is bordered by subdivisions and receives very heavy recreation use. This alternative was not analyzed in detail because allowing a natural fire regime to be established in a municipal watershed adjacent to private lands without appropriate pre-treatment would likely cause unacceptable sediment and human safety impacts. Human caused ignitions would require a control strategy, unless safety to firefighters or values at risk allow for other tactics. That is not the case in these watersheds. Planned ignition (prescribed fire) is an option under the Forest Plan and is included within the alternatives in the DEIS and FEIS.

Wildland Urban Interface/Homes Alternative

During scoping the Forest Service was asked to consider fuel reduction treatments only in the Wildland Urban Interface immediately around homes. Treatment near homes could be considered in a stand alone decision tiered to the current analysis so there is no need to have a separate alternative. However, the purpose and need for this project is reducing fire risk to the Municipal Watershed and protection of the Bozeman municipal water treatment facilities. Treatment of fuels only adjacent to private homes would not meet the purpose and need in the watershed as defined for this effort. The Gallatin County Community Wildfire Protection Plan has identified the entire analysis area as the wildland urban interface for municipal watershed protection.
Structures exposed to wildland fire are a potential fuel source and can be ignited by direct flame impingement, radiant heat, or by airborne firebrands Cohen 1999). The 100 foot zone around a home is the critical "survival" zone relative to a crown fire. The public agencies have no authority to regulate the fuels in this zone, but sustaining our ecosystems and ecosystem benefits by protecting homes is always a goal. By thinning the forests, we are reducing the potential for crown fires, which reduces the fire brands that typically burn down homes during wildland fire events.

V. Public Involvement

Overview of the Public Involvement Process

Prior to the DEIS

The Notice of Intent (NOI) for the Bozeman Municipal Watershed project was published in the Federal Register on October 18, 2005. The NOI asked for public comment on the proposal. In addition, as part of the public involvement process, the agency asked that initial comments on the project be submitted by November 11, 2005.

A public scoping document was sent to agencies and interested individuals on September 19, 2005. The scoping document described the project area, laid out the purpose and need for the project, and identified some preliminary issues associated with the project. The list of individuals, agencies, and interest groups who were sent the scoping document are part of the project record.

Because the two drainages involved, Bozeman Creek and Hyalite Creek, encompass the City of Bozeman Municipal Watershed, the Forest Service worked closely with the City of Bozeman in development of the purpose and need. The City and the Forest Service signed a Memorandum of Understanding concerning our mutual goals and objectives. This MOU is a part of the project record (MOU 2005).

The Bozeman Watershed Council, a local interest group concerned about the management of the watershed, had been meeting periodically with the Forest Service. They produced an assessment of Bozeman Creek in 2004 outlining the management needs for the drainage (Sourdough Creek Watershed Assessment, 2004).

Other interest groups, concerned citizens, and the local rural fire districts had collaborative discussions with the Forest Service on the specific needs of the watershed prior to the initiation of the project.

The following public participation, summarized below, occurred after the announcement of the project:

- During the public comment period we received detailed letters from 18 individuals and 11 interest groups. These are part of the project record. The comments that were received in these letters were addressed in the DEIS and FEIS.
- On May 3, 2006, we had a meeting with several individuals and groups for a briefing on the issues that had been raised during scoping and afterward.
- We had numerous meetings with the City of Bozeman staff members to coordinate our efforts.
- On June 12, 2006, we briefed the Bozeman City Commission on the progress of the project.
- On August 3, 2006, we sent a letter to all those on our mailing list briefing them on the project's progress.
- On August 8, 2006, there was a field trip to the project area for congressional staffers and others.
- On September 13, 2006, an open house was held to bring the public up to date on the alternatives that were being developed for the DEIS.
- During the month of May 2007, the Bozeman District Ranger sent invitations and issued a press release that he was having four "morning coffee" meetings for people to come, visit, and get an update on the project. These were held at the Eagle Mount conference room.
- On August 30, 2007, the Draft Environmental Impact Statement for the Bozeman Municipal Watershed Fuels Reduction Project was released for public review and comment. A 45 day comment period was provided. See Appendix C of the FEIS for a summary of the public comments and the Forest Service response to the comments.

Following the release of the DEIS

- The Forest Service and the City of Bozeman held an open house on September 25, 2007, for a public review of the project and an opportunity for people to get their questions about the project answered. Two public tours of the project area were conducted in October.
- The Forest Service received seven substantive letters commenting on the DEIS from agencies and organizations and 36 letters from groups and individuals.
- The Forest Service briefed the Bozeman City Commissioners on the BMW project and discussed what additional environmental review would take place before a decision was made.
- On August 27, 2008, the Forest Service met with City of Bozeman staff to discuss how the project would be implemented.
- On August 26, 2009, a field trip to the BMW was conducted with Jack Cohen, Forest Service researcher, accompanied by city staff and interested public participants to discuss the scientific background of the project including research on wildfire effects in the wildland/urban interface.

Following the Release of the FEIS

The project was appealed by two groups in May 2010. In addition to the public involvement noted above during the development of alternatives and review of the DEIS, the team had the opportunity to spend time between June 2010 and the present to talk further with the public about the project and to hear additional feedback about the proposed project. The Bozeman Ranger District staff took many members of the public to the field to visit the treatment areas and view the initial layout on the ground. Some of those who participated were the local fire department staff and a board member, a conservation associate with the Greater Yellowstone Coalition, the City of Bozeman's contract forester and staff engineer, an appellant representing the Native Ecosystem Council and partners from Montana DEQ.

Several of our partner agencies also weighed in with letters of support for the project and the objectives to be met. The State Forester, Bob Harrington, representing the Department of Natural Resources and Conservation, sent a letter to me expressing his "complete support for the selected alternative." The Forest also received a letter of support for the project and its purpose and need from the U.S. Environmental Protection Agency. The District Ranger and staff shared information and had additional discussions with the Bozeman City Commission, the Board of the Sourdough Fire Department, an adjacent homeowners group in Hyalite Creek, other local land owners and user groups. The Bozeman Chronicle also published a guest editorial in support of the project. Mark Bostrom, Bureau Chief Water Quality Planning Bureau, Montana DEQ, sent a letter affirming the BMW water quality BMPs and concluded that the BMW Project is consistent with water quality regulations (MT DEQ 2010).

The Interdisciplinary team reviewed the two appeals to the original Record of Decision. The team used the information presented in these appeals to validate their analysis and findings and as a chance to ensure that they had considered any new, previously undisclosed scientific information or arguments. The informal appeal resolution meeting allowed me to better understand the issues of the appellants. The wildlife biologist involved one of the appellants in a review of the wildlife field work and analysis methods to determine big game hiding cover. I had a conversation with Mr. Garrity of the Alliance for the Wild Rockies, also an appellant, after the decision was remanded, again to better understand the issues that he raised during the appeal period. These were all helpful conversations that contributed to the entire process of involving and listening to the public.

VI. Determination of Non-Significant Forest Plan Amendment

My decision amends the Gallatin Forest Plan to modify visual quality standards of the Forest Plan specifically as they relate to this project in units 16C, 22I, 36D, and 38.

The need for this amendment, to achieve the purpose and need of the project was first disclosed in the DEIS and is further analyzed in the FEIS (p 3-111) for this project. Forest Service Manual Section 1926.51 gives guidance for determining what constitutes a "significant amendment" under the National Forest Management Act. I have determined, based on this guidance, that this site-specific Forest Plan amendment is not significant because it will not individually or cumulatively significantly alter the long-term relationship between levels of multiple-use goods and services originally projected; and, it will not have an important effect on the entire land management plan or affect land and resources throughout a large portion of the planning area during the planning period. This amendment modifies standards only for this time and place. Therefore, it is not a long term change in the Forest Plan. It will only affect the municipal watershed area specifically and only for this project. The public has been notified of this amendment throughout the NEPA process.

The following sections describe:

- Amendment element
- Purpose and the need for the amendment
- Direct, indirect and cumulative impact of the amendment
- Criteria for assessing whether or not the amendment is significant, and
- My conclusion on significance or non significance.

Scenic Quality Standard

The Forest Plan (p. II-16) contains the following visual quality standards for which I am making an exemption for four areas of the project. The standards read:

1. The Gallatin National Forest has developed visual quality objectives (VQOs) which provide guidance for all landscape altering activities. Reference maps of VQOs are at the Supervisor's Office and each Ranger District for use in designing projects and for public inspection.
2. Environmental analysis and project designs will detail how the range of visual quality objectives identified for each Management Area in Chapter 3 will be utilized. If the VQO cannot be met the Forest Supervisor must approve the exemption in the decision document.

Exemption Proposed for this Standard

My decision (Alternative 6) includes a project-specific Forest Plan amendment to exempt the fuel reduction treatment from meeting the Forest Plan visual quality standard in four separate units:

- Unit #36 D
- Unit #16 C
- Unit #38
- Unit #22I

The locations of these units are on slopes that are highly visible from the Gallatin Valley, some as close as 1 mile from the Valley. Cable drag corridors tend to be unnatural appearing (except near avalanche corridors, etc), especially when some snow is on the ground but not on the trees. This situation exists especially when those cable corridors face directly toward viewers. In addition, the cable drag corridors tend to accentuate the road along the top of them, due to the necessary removal of more trees below the equipment set-up points to facilitate unimpeded dragging. I have determined that the only way to economically treat these units is to cable log them and this is necessary to help meet the purpose and need of the project.

Amendment Purpose and Need

This site specific visual quality exemption is needed in order to treat the vegetation in the four units listed above. The thinning will be accomplished by cable logging systems, some of which will be visible from parts of the Gallatin Valley south of Bozeman. These areas are designated for Partial Retention because of their location and potential sensitivity to ground disturbing activities such as logging. These stands were proposed to be logged by helicopter in Alternative 5, the DEIS Preferred Alternative. Helicopter logging would meet the standard of Partial Retention because there would be no cable yarding corridors which are associated with cable logging. However, as stated in my reasons for the decision, I chose not to select the alternative that helicopter logged these stands because of the cost and the high possibility that it could not be implemented.

Direct, Indirect, and Cumulative Effects of the Amendment

The locations of these units are on slopes that are highly visible from the Gallatin Valley, as close as one mile for some. As described in the FEIS on page 3-111, cable drag corridors tend to be sufficiently unnatural-appearing so that they visually dominate, especially when some snow is on the ground but not on the trees. This situation exists especially when those cable corridors face directly toward viewers. In addition, the cable drag corridors tend to accentuate the road along the top of them, due to the necessary removal of more trees below the equipment set-up points to facilitate unimpeded dragging. While the ground-based and helicopter units, along with the associated temporary roads will cause these hillsides to appear whiter in winter by allowing more snow on the ground to show and most likely small portions of new road prisms, the overall visual result of the entire project will still be predominantly natural-appearing and cause no negative cumulative effects to the scenery. Only the four cable thinning units addressed in this Amendment combined with associated temporary access roads and other existing cabled units outside the project area that are still visually dominant would result in negative cumulative effects to scenery. These scenery impacts are temporary. (FEIS p. 3-113)

Application of FSM 1926.51 Directives Not Significant Criteria

My determination of whether or not this amendment is significant was conducted using the process in the Forest Service Planning Manual, 1926.51. The manual states that changes to the land management plan [Forest Plan] that are not significant can result from four specific situations. This site specific amendment to exempt these four units is compared to those situations below:

1. Actions that do not significantly alter the multiple use goals and objectives for long-term land and resource management.

The amendment to exempt the visual quality standard for four units does not alter the multiple-use goals and objectives for long-term land and resource management. The amendment will allow the project to better meet the longer term protection of municipal watershed through fuels reduction, which is a Forest management goal and Agency priority. The amendment affects 300 acres, a very small portion of the Forest. It is a short term, site-specific and project-specific amendment that will have no effect on Forest Plan objectives or outputs.

2. Adjustments of management area boundaries or management prescriptions resulting from further onsite analysis when the adjustments do not cause significant changes in the multiple-use goals and objectives for long-term land and resource management.

The visual quality exemption does not adjust management area boundaries or management prescriptions. It does provide for more site-specific application by allowing thinning of these timber stands by cable systems because it is the only economically feasible means to achieve the desired objective.

3. Minor changes in standards and guidelines.

The amendment is a minor change to the overall standards for visual quality for the entire watershed. Only four of the 47 stands in the project area are affected by this amendment.

4. Opportunities for additional projects or activities that will contribute to achievement of the management prescription.

Future projects and activities which contribute to management prescriptions may or may not be affected by visual quality standards but will not be affected by the site specific amendment.

Conclusion – Significance/Non-significance

Based on consideration of the four factors identified in the Forest Service Planning Manual, 1926.51, and considering the Forest Plan in its entirety, I have determined that the amendment to exempt certain stands from visual quality standards is not significant.

VII. Findings Required by Other Laws, Regulations, and Policies

Based on the issues addressed in Chapter 3 of the FEIS, principal Federal Laws applicable to this decision include the National Forest Management Act of 1976, National Environmental Policy Act (NEPA) as amended (1969), Endangered Species Act of 1973, Migratory Bird Treaty Act (16 USC 703-711), Heritage Protection Laws such as National Historic Preservation Act (as amended 1992), the Federal Caves Protection Act and Executive Order 11988 for the Protection of Floodplains and Wetlands, the Clean Air Act, and the Clean Water Act. The State of Montana Water Quality Act (1969, 1975, 1993 and 1996) is discussed below under *State Laws*. Compliance with these laws is discussed below. References to the FEIS and SFEIS are noted.

National Forest Management Act of 1976(NFMA) / Gallatin Forest Plan

NFMA consistency requirements:

Project specific findings related to NFMA:

Suitability for Timber Production: No timber harvest, other than salvage sales or sales to protect other multiple-use values, shall occur on lands not suited for timber production (16 USC 1604(k)).

Finding: The project includes Management Areas (MAs) 5, 7, 8, and 9 which have been designated in the Gallatin Forest Plan as suitable for timber production. MA 12 is designated as not suitable for timber production. For the Bozeman Municipal Watershed project, timber harvest is planned for the purpose of thinning stands to reduce the severity and extent of potential wildfire occurring in all the management areas in the municipal watershed (FEIS pp 1-13). Protection of the municipal watershed and wildland urban interface is the purpose of the project, not timber production.

The National Forest System Land Management Planning; Final Rule at 36 CFR Part 219 states:

Lands where timber may be harvested for multiple use values. Except for lands identified in paragraph (a)[2], timber may be harvested from land where timber production is not established as a plan objective if, based on a site specific analysis, the responsible official determines and documents that such timber harvest would contribute to achievement of desired conditions and ecological sustainability, and is necessary to protect multiple use values other than timber production.

[2] [(a) includes lands withdrawn, lands where technology is limited so irreversible damage would occur and lands that cannot be restocked in 5 years after regeneration harvest]

Finding: Harvest in MA 12 is designed to reduce wildland fuels for multiple resource objectives including reduction of fuels for the protection of the municipal watershed and wildland urban interface. The analysis documents that this activity contributes to the achievement of desired conditions and is needed to protect multiple use values other than timber production.

Timber Harvest on National Forest Lands (16 USC 1604(g)(3)(E)): A Responsible Official may authorize site-specific projects and activities to harvest timber on National Forest System lands only where:

a. Soil, slope, or other watershed conditions will not be irreversibly damaged (16 USC 1604(g)(3)(E)(i)).

Finding: Soil, slope and watershed conditions will be adequately protected. My decision includes design features and mitigation that ensure protection (pp 14-15, Appendix A)(SFEIS pp 132-133, 177-178, Appendix A).

b. There is assurance that the lands can be adequately restocked within five years after final regeneration harvest (16 USC 1604(g)(3)(E)(ii)).

Finding: There are no regeneration harvests planned (pp 8-9)(FEIS pp 1-15 through 1-17, A-25 through A-30). There is no intent to create conditions for tree regeneration in these areas.

c. Protection is provided for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat (16 USC 1604(g)(3)(E)(iii)).

Finding: No riparian harvest is included in my decision. Protection is provided for streams, stream banks, wetlands and other bodies of water from detrimental changes. Stream, riparian and fish habitat protection will be assured through best management practices, streamside protection rules and project specific mitigation incorporated in my decision (pp 7, 12, 15, 25-28 and Appendix A)(SFEIS pp 33, 41, 60-69,135,140 and Appendix A).

d. The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber (16 USC 1604(g)(3)(E)(iv)).

Finding: The harvesting system in my decision meets the purpose and need most effectively and provides adequate protection of forest resources.(p. 21)

Clearcutting and Even-aged Management (16 USC 1604(g)(3)(F)): Insure that clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even aged stand of timber will be used as a cutting method on National Forest System lands only where certain situations exist:

Finding: This consideration is not applicable. No clearcuts or cuts designed to regenerate even ages stands are in my decision. The thinning prescribed is an intermediate harvest (pp 8-9)(FEIS pp 1-15 through 1-17, A -25 through A-30)

Construction of temporary roadways in connection with timber contracts, and other permits or leases: Unless the necessity for a permanent road is set forth in the forest development road system plan, any road constructed on land of the National Forest System in connection with a timber contract or other permit or lease shall be designed with the goal of reestablishing vegetative cover on the roadway and areas where the vegetative cover has been disturbed by the construction of the road, within ten years after the termination of the contract, permit, or lease either through artificial or natural means (16 USC 1608(b)).

Standards of roadway construction: Roads constructed on National Forest System lands shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources (16 USC 1608(c)).

Finding: The Gallatin National Forest Travel Plan analysis and decision rigorously determined the management objectives of the entire road system throughout the Forest, including this area. A project specific roads analysis process was completed for this project (USFS 2010). This fulfills the Roads Analysis requirements for project level analysis. No additional system roads will be constructed as part of this project. Temporary roads will be constructed and used for the life of the project and will be restored to surrounding area vegetation management objectives as part of the project closeout and will not be added to the Forest road system (p. 9, Appendix A)(USFS 2010).

Consideration of best available science:

The effects analysis and conclusions are based on a thorough review of relevant scientific information, consideration of responsible opposing views and the acknowledgement of incomplete or unavailable information, scientific uncertainty, and risk. When appropriate, specialists discussed the use of science in their analysis (FEIS, Chapter 3 and SFEIS).

The interdisciplinary team spent considerable time in the field becoming knowledgeable about specific resource conditions and conflicts. Where needed, field surveys were conducted to develop conclusions, for example, timber stand exams, archeological surveys, sensitive plant surveys, soil monitoring transects and goshawk surveys. Much work has been done at the Regional level to develop habitat guidelines for numerous wildlife species such as the northern goshawk (USDA FS 2007a) and black-backed woodpecker (USDA FS 2007). At larger scales involving multiple regions, Canada lynx guidance was developed (USDA FS LRMD 2007). The guidance was developed after exhaustive literature searches, data assessments at various scales and peer review to develop recommendations.

During scoping for this project several articles were presented by the public for consideration relative to this project. The literature was incorporated in the analysis considerations, primarily in wildlife and fuels discussions. A summary of the review of references cited in scoping letters was completed for the record (USFS 2011a). During the administrative appeal process, and later, in January 2011, additional science was presented to me by groups involved with the project. These references were reviewed and their relevance was summarized in this section. Many references that were presented acknowledge potential issues or methods that were already considered in the analysis based on other sources. These articles, while relevant, duplicate information already considered, and they did not provide new perspectives or data. The interdisciplinary team considered all science presented during the NEPA process that was available for review.

I would like to acknowledge that there are many opinions and considerable research relevant to wildfire and wildland fuel treatments. In the FEIS the fire and fuels specialist report was summarized and cited as Brickell 2007. As a result of editing and summarizing, many of the original citations in this report were not carried forward into the FEIS. Although there are different views about effectiveness of fuel treatment in the landscape in the project area, peer reviewed, solid scientific research supports the conclusion that the treatments in my decision are indeed effective in changing fire behavior, which in the end is how the purpose and need will be met. We do not claim to be able stop or control fire on the landscape. The project goals are modest in that they are limited to changing fire behavior within the units in key locations and where modeling shows a cumulative benefit in terms of lower fire probability on the landscape.

During the administrative appeal one appellant questioned the basis for the fuel reduction treatments and presented another source, "Fire Ecology in Rocky Mountain Landscapes" by William Baker that has since been evaluated to determine if the science presented is applicable to this analysis and decision. The appellant claimed that, based on Baker's book, the agency is overstating fire frequency, that "All we can do is have the good sense to get our homes and infrastructure protected or out of fire prone settings, as fire will eventually come. This project attempts to tame wildfire which is impossible." The discussion of fire regimes and condition class found in the FEIS (p. 3-7 to 3-9) is based on research by Hann and Bunnell (1999), Schmidt et al. (2002), Hann (2003), and the long-standing historical fire ecology findings

by Fischer and Clayton (1983). These documents, along with others cited in the FEIS fire/fuels analysis and the specialist report found in the project file, have been thoroughly peer-reviewed by fire behavior analysts and researchers, and continue to be sound references for use by fire and fuel resource managers. They provide the basis for the fire frequency assumptions

The fire and fuels analysis and purpose and need provided in the BMW FEIS and ROD do not make the claim that prescribed burning will ".. control wildfire.." The primary purpose and need is to create vegetative conditions and fuel conditions that would reduce the risk of excess sediment and ash reaching the municipal water treatment plant in the event of a wildfire (p. 5-6)(FEIS, p. 3-3). The FEIS discloses that this would be achieved for each alternative, by reducing surface and ladder fuels or essentially breaking up the fuel continuity across the drainage, where appropriate (FEIS, pp 3-19, 23-30).

As mentioned above, the reference documents, guides and research cited in the FEIS to support the fire and fuels analysis are sound, reliable and current information that has been thoroughly reviewed by fellow researchers and practitioners in the field of fire behavior, fire ecology and fire management. This includes modeling research, such as those used throughout the fire and fuels analysis in the FEIS (pp 3-311-312). The FARSITE (v. 4.1.005, 2008), Behave Plus (2010), and SIMPPLLE (v. 2.3, 2004) models have extensive peer-reviewed scientific publications, for which the validity of these models are brought into question and then tested in the laboratory and field settings.

Fire Ecology in Rocky Mountain Landscapes (2009), presented as conflicting science, has not undergone a formal scientific peer review. Baker states that his book attempts to "..(build) a case for increasing landscape-scale approach to fire" (p. 1). Yet, he also admits, "(The) book …omits treatment of the effects of fire on the physical environment, as well as soils, microbial ecology, nutrient cycling, and energy flows, and largely ignores fire's impact on aquatic ecosystems, focusing instead on the terrestrial" (p. xxi). The professional expertise, supporting literature and models used for the BMW fire and fuels analysis considers the effects of fire on the physical environment, vegetation, soils, nutrient cycling, energy flows and aquatic ecosystems. The perspective presented in Mr. Baker's book does not alter the conclusion and foundation for analysis for this project.

There is considerable disagreement on the philosophy, need for and effectiveness of fuel treatment; however, I find that the science used to support the various resource related conclusions in the analysis for the Bozeman Municipal Watershed project is well founded. Therefore, I conclude that my decision is based on sound science.

Between release of the FEIS and issuance of this new decision with this SFEIS, we received a letter from Native Ecosystems Council (NEC), a group that appealed the original decision, requesting consideration of new science regarding grizzly bear survival. The new science presented was a paper published in the Journal of Wildlife Management 74(4):654-667 titled "Hazards affecting grizzly bear survival in the Greater Yellowstone Ecosystem" (Schwartz et al. 2010). NEC states this new study emphasizes the importance of providing secure habitat in areas outside the grizzly bear recovery zone in order to ensure long-term survival of bears in such areas. We generally concur with this observation. We also agree that the new research is indeed relevant and applicable to the BMW project area landscape. Because the grizzly bear is currently listed as a threatened species under the ESA, and since the BMW project is within an area that may be occupied by grizzly bears, I carefully considered the findings presented by Schwartz and others (2010) with respect to our land management responsibilities and potential impacts to

grizzly bears and their habitat. Based upon a review of the new science as it relates to the BMW decision, I have concluded that the new information presented contains nothing contrary to our effects assessment for grizzly bears in the FEIS, and that my decision to implement the selected alternative, with mitigation measures as stipulated in this ROD, is in full compliance with the statutory requirements of the ESA. The reasons for my conclusion are summarized below.

As required by NEPA, we acknowledged and fully disclosed the potential for our decision to have adverse effects on grizzly bears and/or their habitat. As required under the ESA, we initiated formal consultation with the U.S. Fish and Wildlife Service, and received a Biological Opinion (BO), which concluded that "the effects of the Bozeman Municipal Watershed Fuels Reduction Project as proposed in my decision are not likely to jeopardize the continued existence of the grizzly bear." The BO included an Incidental Take Statement and set forth terms and conditions to minimize adverse effects of the proposed action in my decision. My decision incorporates these terms and conditions as mandatory mitigation measures for the project (p. 15).

In the analysis and assessment for grizzly bears, we indicated that the BMW project area is well outside of the Greater Yellowstone Area (GYA) grizzly bear recovery zone, but in an area that may be occupied by grizzly bears. It should be further noted that most (perhaps all) of the treatment units are outside the current distribution of grizzly bears in the GYA as presented by Schwartz et al. (2010:655). Even though the project is outside the distribution area, where no grizzly bear presence has been documented in recent decades, we concluded that project actions could still have adverse effects, and prescribed mitigation measures to limit potential adverse effects. Mitigation measures include: enforcement of Food Storage Order requirements, limits on helicopter logging in the Inventoried Roadless Area (no new roads would be constructed within the IRA), and following Gallatin Forest Travel Management Plan direction for temporary road construction (i.e., consider applying temporary localized restrictions to prevent conflicts with threatened and endangered species, and roads constructed for project activity should be designed with minimum standards necessary to accomplish the task, be temporary in nature, and be effectively gated to restrict public motorized use. Once the activity is complete, these roads should be permanently and effectively closed and re-vegetated (p. 15-16). In addition to these specific mitigation measures, the stewardship contract will contain a provision similar to this: "when the purchaser's operations are in areas otherwise closed to motorized vehicles, purchaser shall not be permitted to hunt, transport hunters, discharge firearms or transport big game animals with vehicles within the closed area." This provision is a standard provision.

In conclusion, while it's true that the project will occur in an area with relatively high human disturbance levels, disturbance effects of the fuel reduction actions will be temporary in nature and have no long term impacts on habitat security for grizzly bears. We have addressed the major factors identified as concerns for grizzly bear survival by Schwartz et al. (2010).

Forest Plan consistency:

The NFMA requires that all projects and activities be consistent with the Forest Plan (16 USC 1604(i)). The Gallatin Forest Plan was approved in 1987. Implementation of the action alternatives complies with the Gallatin Forest Plan, as amended. This project incorporates all applicable Forest Plan forest-wide standards and guidelines and management area prescriptions as they apply to the project area, and complies with Forest Plan goals and objectives with the exception of the amendment to visual quality objectives discussed earlier. This includes additional direction contained in applicable Forest Plan amendments (USFS 2011). The Gallatin Forest Plan and amendments made part of the Plan were developed to provide for a diversity of plant and animal species. As a result, my decision provides for diversity of plant and animal communities based on the suitability and capability identified in the Gallatin Forest Plan for the Bozeman Municipal Watershed land area in accordance with 16 USC 1604 (g)(3)(B).

All required interagency review and coordination has been accomplished, and new or revised measures resulting from the reviews have been incorporated. The following analysis and supporting discussion explains how the alternatives are consistent with the various management area goals, standards and guidelines.

Discussion

Forest wide objectives are concise time specific statement of measurable planned results that respond to pre-established goals. They are the basis for further planning to define steps to be taken and resources to be used in achieving goals (FP VI-23). Objectives include outputs, which are goods or services that are produced from forest and rangeland resources (FP VI-23).

Forest wide standards apply to all National Forest System lands on the Gallatin National Forest (FP III-1). They are intended to supplement, not replace, National and Regional policies, manual and handbook direction. Standards are designed to meet the goals of the Forest Plan (FP II-14).

The Gallatin Forest Plan embodies the provisions of the NFMA, its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Gallatin National Forest.

Standards and guidelines established in the Forest Plan that are pertinent to the various resources potentially affected by the alternatives are in the BMW FEIS (pp 1-17 to 1-19, 2-11, 3-10, 25, 196, 215-216, 252-253, 258, 281, 299, 310, 349, 357, 376, 383, 392), SFEIS (pp 29-30, 40, 41,62, 66-67, 132-133, 177-178) and Forest Plan Summary (USFS 2011). My decision directly addresses the following Forest-wide goals, objectives and standards.

Forest Wide Goals and Objectives

Goal:

Provide a fire protection and use program, which is responsive to land, and resource management goals and objectives.(FP p. II-2)

Use prescribed fire to accomplish vegetative management objectives.(FP p. II-2)

Objective:

Vegetative manipulation projects, such as prescribed fire and timber harvest, will be used to maintain or improve habitat conditions.(FP p II-4)

Timber harvest will be used as a tool to carry out vegetative management activities (FP p. II-5).

Prescribed fire will be used as a tool to carry out vegetative management activities (FP p. II-6).

Forest Wide Standards

Forest lands and other vegetative communities such as grassland, aspen, willow, sagebrush, and whitebark pine will be managed by prescribed fire and other methods to produce and maintain the desired vegetative condition (FP p. II-19).

Treatment of natural fuel accumulations to support hazard reduction and management area goals will be continued (FP p. II-19).

Existing wild stands may be harvested or thinned for posts, poles, or other unregulated products in all management areas where timber product removal is allowed (FP p. II-23).

Prescribed fire (planned and unplanned ignitions) may be used to support management area goals (FP p. II-28.)

In municipal watersheds, such as Bozeman, Hyalite and Lyman Creek drainages, all project activities will be implemented to ensure State water quality standards are met. Coordination with City of Bozeman officials and the State Water Quality Bureau will be done throughout project planning (FP p. II-24).

Forest Plan Management Areas:
Management Area Direction establishes different management goals, resource potentials and limitations for the 26 different Management Area Prescriptions on the Gallatin National Forest (FP III-1). Approximate delineations of the management areas are depicted on maps in the project record, which are available for review. In the management areas, the recreation standards and facilities standards were mostly amended, removed from the Forest Plan and replaced with Travel Plan standards (GNF 2006).

The Bozeman Municipal Watershed Project Area includes the following Management Areas:

MA 1 includes the Langhor Campground. Although this campground is within the project area, it is not affected by the treatments because no treatments are located in or immediately adjacent to this area. The project has no effect on this MA.

MA 5 includes travel corridors that receive heavy recreation use. The goal is to maintain and improve the wildlife habitat values and the natural attractiveness of these areas to provide opportunities for public enjoyment and safety; timber harvest is allowable when it is consistent with these goals. MA 5 lands are on the Hyalite Face and along the east side of the Hyalite Road. The project purpose addresses MA goals by improving public safety through fuel reduction. The MA standards have been met through project design and mitigation except that a site specific Forest Plan amendment is incorporated in my decision to exempt four units from the visual quality objective for the area. Two of the units, 38 and 22I, are in MA5. The Forest Plan allows for amendments or exceptions, "If it is determined during project design that the best way to meet the management area goals of the Forest Plan conflicts with a Forest Plan standard, the Forest Supervisor may approve an exception to the standard for that project" (FP 11-14). My decision (p. 18) includes a site specific Forest Plan amendment to exempt these units from the visual quality objective. The treatments in MA 5 areas are intended to provide a safer environment for firefighters and the public, among other things, which is consistent with MA 5 goals and standards.

MA 7 includes riparian management areas. Much of this area is not mapped because it is often a narrow zone and therefore, not practical to map (FP III-19). The goal is to manage riparian resources to protect soil, water, vegetation, fish and wildlife dependent upon then. These lands are suitable for timber production (FP III-19-22). The MA 7 areas are along Bozeman Creek and throughout the project area. No riparian timber harvest is included in my decision (SFEIS p. 33) The project design includes extensive practices to ensure protection of riparian areas including streamside buffers, incorporation of best management practices and streamside management zone protections. Appendix A of the Record of Decision and the description of my decision list all practices incorporated to protect riparian areas (pp 12, 15). The Forest hydrologist and fisheries biologist both determined that the decision effectively meets MA7 direction (SFEIS pp 66-67, 177-178).

MA 8 includes lands that are suitable for timber management. The goal is to provide for productive timber stands and optimize growing potential (FP, III-24). MA 8 lands make up the area between Hyalite Divide east toward Bozeman Creek. The project goals and design are consistent with standards and guidelines for MA8 because prescriptions for tree removal promote growth while meeting other objectives.

MA 9 includes suitable timber lands that have high dispersed recreation values and are visually sensitive. The goal is to provide for a variety of dispersed recreation activities in a roaded setting and harvest timber consistent with the first goal (FP III-27, 28). MA 9 lands are on the west side of Bozeman Creek and the west side of Hyalite Creek. The project design is consistent with the specific standards for this MA. The project goals are compatible the MA goals.

MA 12 includes important summer and winter habitat for wildlife and offers dispersed recreation opportunities. The goal is to maintain and improve the vegetative condition to provide habitat for a

diversity of wildlife species and provide for a variety of dispersed recreation opportunities. The MA 12 lands are on the South Cottonwood divide between Hyalite and South Cottonwood, on the east side of Bozeman Creek and a small area in Bozeman Creek close to city of Bozeman lands.

Under the "resource element" or operating program for timber these lands are classified as unsuitable for timber production. The category of timber as a resource element relates to timber production as an output of the regulated timber program. "Timber production is growing, tending, harvesting … of rotational crops of trees … for industrial or consumer use. For purposes of forest planning, timber production does not include production of fuelwood or harvest from unsuitable lands" (FP VI-41). "Unregulated harvest includes harvest not charged against the allowable sale quantity. It also includes all volume removed from unsuitable areas. Harvests from unsuitable areas will be programmed as needed to meet multiple use objectives other than timber production and for improvement of administrative sites."

The purpose of the Bozeman Municipal Watershed Project is to reduce fuel to protect the municipal water supply from excessive ash and sediment and reduce risk in the wildland urban interface and evacuation routes, which are multiple use objectives, not timber production objectives. When the purpose is timber production, harvest of post and poles along existing roads is allowed; harvest elsewhere (not adjacent to existing roads) in this MA must meet multiple resource objectives other than timber production.

Does this then create a conflict when temporary roads are included to implement the BMW project in MA 12? According to the FEIS for the Forest Plan, it clearly does not. The construction of project roads (temporary or system) are governed by the facilities standards in the Forest Plan (FP, III-38), which were amended and removed from the Forest Plan with the passage of the Travel Plan and replaced with Travel Plan guidance for access and travel related management. Administrative roads are allowable under the travel plan (GNF 2006 p. I-10, 11). The remaining standards are either generic or discuss an activity that is not part of my decision. My decision is consistent with goals and standards for MA12.

MA 17 The FEIS improperly stated that MA 17 was included in the project area because a Forest Plan Amendment in 1990 (FP Amendment #3 – Hyalite MA Amendment) changed the management area designations on 1,473 acres of NFS land from MA8, 11, 12, and 17 to a single Management Area designation which is now MA 5. The area is referred to as the Hyalite Face and includes the land between Hyalite and Bozeman Creek in the Hodgeman and Leverich drainages (FP 1990 – Amendment #3). There are no activities in MA 17 areas so the project will have no effect on lands in those areas.

Applicable GNF Forest Plan Amendments:

#3 Hyalite MA Amendment (3/20/1990) - already discussed in the MA 5 description.

#14 Big Game Cover Amendment (2/1993) This amendment added to and modified existing Forest Plan definitions of cover and security in the glossary of the Forest Plan. Discussion of consistency is incorporated in the Elk and Other Big Game Analysis in the SFEIS.

#15 Wildlife Snag Amendment (2/1993) This amendment changed the existing definition of "snag" in the Forest Plan pg. VI-39 and replaced the direction for snag management and down woody debris In Amendment #15 on page A-13. My decision includes these standards (p.16).

#46 Northern Rockies Lynx Amendment (3/2007) This amendment incorporated goals, objectives and standards for lynx habitat. My decision is consistent with this direction because it fits within an exception for fuel treatment in the wildland urban interface (FEIS p. 3-191, D-32). Consistency is discussed in the Lynx Analysis and the Biological Assessment (FEIS pp 3-173-175, Appendix D).

#45 Gallatin National Forest Travel Management Plan Amendment (12/2006) This amendment removed all prior Forest Plan direction related to access and travel management, including Recreation Opportunity Spectrum (ROS) standards listed for each management area. The Gallatin Travel Management Plan (10/2006) also established new goals, objectives, standards, and guidelines for access and travel management but this direction was not amended into the Gallatin Forest Plan as originally proposed. The decision not to incorporate this direction into the Forest Plan was based on a change in agency thinking about Forest Plans that culminated in the revision of the regulations for implementing the National Forest Management Act (NFMA) at 36 CFR 219 (January, 2005). Nevertheless, most of the recreation, access and travel management direction in the Gallatin Forest Plan has been removed and the Gallatin Forest Travel Plan contains the applicable direction for access and travel management.

In general, administrative uses or access for the implementation of administrative and project activities for resource management activities is a goal and objective of the Travel Plan (GNF 2006, ROD p. 29). The temporary roads included in my decision for administrative access for the Bozeman Municipal Watershed Project are consistent with this direction. Planned use of existing roads is also consistent with travel planning area direction. Administrative use is allowable on all of the access routes. Temporary road closure standards that were incorporated in my decision are consistent with Guideline D-7 on page I-11(ibid pp 9, 16). Water Quality, Riparian and Aquatic Life direction and consistency is on p. I-11-12 and is discussed in the SFEIS on p. 64, 177-178. Wildlife related direction I-13 in the Travel Plan is discussed in the BMW FEIS on p. 3-361 and SFEIS pp 29-30.

National Environmental Policy Act (NEPA) of 1969 (as amended)

NEPA has been followed as required under 40 CFR 1500 in the development of this project. The FEIS analyzed a reasonable and acceptable range of alternatives on pages 39-43, including alternatives not considered in detail. The analysis in FEIS (2010) and SFEIS (2011) discloses the expected impacts of each alternative and various issues and concerns raised by interdisciplinary team members, the public and other agencies. NEPA requires public involvement and consideration of potential environmental effects but does not specify beyond public scoping and a comment period on a Draft EIS when to solicit public comments. The entirety of documentation for this analysis supports compliance with this Act.

Although additional information and data is presented in the SFEIS (2011), the conclusions reached and compliance determinations did not change and no new alternatives were considered. The SFEIS analysis disclosed a reduction in potential impacts to resources based on supplemental analysis. I found nothing in this additional data that was contrary to the analysis and conclusions made in the FEIS or that would lead the Agency to think that the alternatives or decision were not well founded. These are the reasons we prepared a SFEIS instead of A Draft SFEIS. In 40 CFR 1502.9, the agency is directed to prepare Environmental Impact Statements in two stages and then they may be supplemented. One of the reasons a supplement can be prepared is to further the purpose of NEPA to consider and disclose the effects of the federal actions. I determined that publication of a SFEIS would inform the public of the supplemental analysis and findings that affirm the conclusions in the FEIS (2010), an additional comment period was not warranted under NEPA.

Endangered Species Act of 1973

Under Section 7 of the Endangered Species Act, each Federal agency must ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species. If a threatened or endangered species, or species proposed for listing occurs in an area where a project is proposed, a Biological Assessment (BA) must be prepared.

I have found this analysis to comply with the ESA, Section 7. Biological Assesments for the Selected Alternative were submitted to the U.S Fish & Wildlife Service for review (FEIS, Appendix D). The FWS reviewed the BAs for Canada lynx and lynx critical habitat, and concurred with the findings of the

Bozeman Ranger District wildlife biologist. The FWS concluded that the effects of the Selected Alternative 6 were adequately analyzed in a first-tier Biological Opinion and that the project conforms to the incidental take statement issued for the Northern Rockies Lynx Management Direction (FEIS, Appendix D). In addition, the FWS concluded that the effects of the project are not likely to result in the destruction or adverse modification of lynx critical habitat (project record).

On September 21, 2009, between publication of the BMW DEIS and FEIS, a court order vacated the delisting of the Greater Yellowstone Area grizzly population segment, thus re-establishing the Yellowstone grizzly bear as a threatened species. In compliance with the ESA, a BA was prepared and the Forest entered into consultation with the US Fish and Wildlife Service. The Biological Opinion issued by the FWS found that the effects of the BMW project are not likely to jeopardize the continued existence of the grizzly bear. Through the consultation process, terms and conditions were issued and have been incorporated into my decision for this project (p. 15). The FWS also offered conservation recommendations in their Biological Opinion. Recommendation #1 suggests that the Forest Service leave untreated post-harvest slash instead of piling and burning. Given that this treatment is contrary to the fuels reduction objectives of the project, it will not be incorporated into the project prescriptions. The second recommendation, to continue to manage across the Forest to achieve lower road densities, will be followed to the extent that it is consistent with the Gallatin National Forest Travel Plan (2006).

The gray wolf has been listed as an endangered species since 1974, but had long been absent from the Gallatin National Forest. Wolves were reintroduced into the Greater Yellowstone Ecosystem in 1995 and 1996. Outside of Yellowstone National Park, the reintroduced wolves carried the status of a non-essential, experimental population. In May 2009, the Northern Rockies Mountain (NRM) Distinct Population Segment (DPS) of the gray wolf was established and removed (delisted) from federal protection. On August 5, 2010, the Federal District Court in Montana relisted the NRM wolf population. With the status of the gray wolf uncertain, the effects determination for wolves was made under two scenarios; with the wolf as endangered, but with non-essential, experimental status on Gallatin National Forest lands, and alternatively as a Forest Service Sensitive species (upon delisting). Either way, the wildlife analysis concluded that fuel reduction in the project area would have no impact and no effect on gray wolves.

Federal Cave Resources Protection Act

This Act is to secure, protect, preserve and maintain significant caves to the extent practical. Site features and field review substantiate that no caves are in the area. No known cave resources will be affected by this proposal.

Migratory Bird Treaty Act (16 USC 703-711)

Migratory bird species are protected from harm under the Migratory Bird Treaty Act (MBTA). A January 2001 Executive Order requires federal agencies to ensure that environmental analyses of federal actions evaluate the effects of actions and agency plans on migratory birds, with an emphasis on species of concern.

Species of concern identified (Brewer's sparrow, grasshopper sparrow, great gray owl, olive-sided flycatcher, and Swainson's hawk) are generally associated with open forest, including burned forest, and grass/shrub types. Brewer's sparrow and grasshopper sparrow are shrub (sage) and grassland nesting species respectively (USDA 1991:466, 476). Nesting habitat for these species generally occurs on warm, dry, south and west-facing slopes at lower elevations in the project area. Great gray owls typically nest in the more open structure associated with relatively dry, montane coniferous or deciduous forest. Nest sites are generally located in close proximity to open areas used for hunting (Duncan and Hayward 1994:164). Foraging habitat consists of relatively open, grassy areas including natural meadows, logged areas and open forest (Nero 1980, Mikkola 1983, Winter 1986). Olive-sided flycatchers are strongly associated

with recently burned forest, but are also relatively common in logged areas, including clear-cuts and partial harvest treatments (Hutto and Young 1999:25). Swainson's hawks typically nest in lowland river bottoms (MFWP 2006), habitat that is not generally found on National Forest System lands but occurs in the rural and agricultural land adjacent to the project area. Swainson's hawks feed on small mammals, birds and insects. They commonly hunt in agricultural fields, and might occasionally enter the project area in search of prey.

The treatments for this project will affect a relatively small proportion of habitat in the analysis area that provides forage for migratory birds and may result in habitats that provide differing, but valuable foraging habitats for these and other species in the future. The implementation of my decision is not expected to have adverse impacts notable at the population level for any of the migratory bird species of concern addressed in the wildlife analysis (FEIS, Ch 3 – 387).

National Historic Preservation Act

The Forest Service is mandated to comply with the National Historic Preservation Act (NHPA as amended 1993) [Public Law 89-665]. Section 106 of the NHPA requires that federal agencies with direct or indirect jurisdiction over undertakings afford the Advisory Council on Historic Preservation (ACHP) reasonable opportunity for comment on such undertakings that affect properties included in or eligible for inclusion to the National Register of Historic Places (NRHP) prior to the agency's approval of any such undertaking (36CFR800.1). Historic properties are identified by a heritage resource inventory and are determined as either eligible or not eligible properties for the National Register. Eligibility is reviewed, and concurrence given by the Montana Historic Preservation Office (MTSHPO). Sites that are determined eligible are then either protected in-place or adverse impacts must be mitigated. This process has been completed for the BMW project and there will be no impacts on the identified sites. Evaluation of the alternatives was done in full compliance with direction from the Gallatin Forest Plan (parts II-3, II-17), the National Historic Preservation Act (Section 106 - 36CFR800.1) and the American Indian Religious Freedom Act. There will be no impacts to cultural resources. Native American communities have been contacted and public comment encouraged. No tribal concerns were identified for this project. My decision complies with the cited acts.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations, directs Federal agencies to integrate environmental justice considerations into federal programs and activities. Environmental justice means that, to the greatest extent practical and permitted by the law, all populations are provided the opportunity to comment before decisions are rendered or are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment (RO 13898 and Departmental Regulation).

My decision regarding the Selected Alternative sought out and incorporated public involvement through scoping, the DEIS 45-day public comment period, and numerous public meetings and field trips to the project area. My decision will not have a discernible effect on minorities, American Indians, or women, or the civil rights of any United States citizen, nor will it have a disproportionate adverse impact on minorities or low-income individuals.

Effects of Alternatives on Floodplains and Wetlands - Executive Order 11988

No riparian timber harvest is included in my decision . I incorporated project design features which provide for the protection of floodplains, and wetlands from either direct or indirect effects from project activities.(p. 12, 15, 25-28, Appendix A)(SFEIS pp. 33, 41, 135, 140-141).

Clean Air Act

Congress passed the Clean Air Act in 1963, and amended it in 1972, 1977, and 1990. The purpose of the Act is to protect and enhance air quality while ensuring the protection of public health and welfare. The act established National Ambient Air Quality Standards (NAAQS), which must be met by state and federal agencies, and private industry. States are given primary responsibility for air quality management. Section 110 of the Clean Air Act requires States to develop State Implementation Plans (SIPs) that identify how the State will attain and maintain NAAQS, which are identical to the Montana standards for PM_{10} (particulate matter less than 10 microns). The SIP is promulgated through the Montana Clean Air Act and implementing regulations. The regulations provide specific guidance on maintenance of air quality, including restrictions on open burning (ARM 16.8.1300). The Act created the Montana Air Quality Bureau (now under DEQ) and the regulatory authority to implement and enforce the codified regulations.

The NAAQS have been established for carbon monoxide, nitrogen oxide, sulfur dioxide, lead, ozone, and PM_{10}. There are numerous types of pollution that could be controlled, but particulate matter is the primary pollutant of concern. The $PM_{2.5}$ standard requires concentrations of $PM_{2.5}$ not to exceed a 24-hour average of 65 ug/m^3 (micrograms per cubic meter). Average annual arithmetic $PM_{2.5}$ concentrations are not to exceed 15 ug/m^3.

The August 1977 Clean Air Act amendments designated areas into Prevention of Signification Deterioration (PSD) classes. Class 1 airsheds are given the most protection from human caused air pollution in order to protect their pristine character. Class II airsheds allow for a greater amount of human caused pollution. The EPA has not yet identified any Class III airsheds.

I incorporated guidelines for air quality in my decision, therefore, the project will comply with all of the laws, policies, and guidelines that are discussed above.

Clean Water Act

The Clean Water Act (CWA) provides the overall direction for the protection of the nations waters from both point and non-point source of water pollution. The Montana Water Quality Act (MWQA) establishes general guidelines for water quality protection. It requires the protection of the state's water as well as the full protection of existing and future beneficial uses. All of the streams within the analysis area for the Bozeman Municipal Watershed Fuels Reduction Project are classified as A-1 or A-Closed streams under the Montana Water Classification system.

My decision is consistent with all of the CWA and MWQA. These laws will be strictly adhered to upon implementation of the decision with the protective mitigation that has been established for the project (p. 7, 15, Appendix A). The Montana DEQ Water Quality Planning Bureau stated that in their judgment, the plans for the BMW project are consistent with Montana water quality regulations and therefore, they expect that project activities would be in accordance with Montana nonpoint water quality regulations (MT DEQ 12/2010).

Available Information

There is less than complete knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs and communities. The ecology, including inventory and management, of a large forest area is a complex and developing science. The biology of wildlife species prompts questions about population dynamics and habitat relationships. The interaction of resource supply, the economy, and communities is the subject matter of an inexact science. However, the basic data and central relationships are sufficiently well established in the respective sciences for me to make a reasoned choice between the alternatives, and to adequately assess and disclose the possible adverse environmental consequences.

VIII. Implementation

The implementation of the Bozeman Municipal Watershed project is expected to begin in 2011. Once work begins, it is expected to continue over the next 5-7 years.

If no appeals to my decision are filed within the 45-day time period, implementation of the decision may occur on, but not before, 5 business days from the close of the appeal filing period. When appeals are filed, implementation may occur on, but not before, the 15th business day following the date of the last appeal disposition.

IX. Administrative Review or Appeal Opportunities

This decision is subject to appeal pursuant to 36 CFR 215.11. Only individuals or organizations that submitted substantive comments during the comment period for the DEIS may appeal. A written appeal must be submitted within 45 days following the publication date of the notice of this decision in the Bozeman Daily Chronicle, Bozeman, Montana. It is the responsibility of the appellant to ensure their appeal is received in a timely manner. The publication date of the legal notice of the decision in the newspaper of record (Bozeman Daily Chronicle) is the *exclusive* means for calculating the time to file an appeal. Appellants should not rely on date or timeframe information provided by any other source.

Paper appeals must be submitted to: USDA Forest Service, Northern Region, ATTN: Appeal Deciding Officer, P.O. Box 7669, Missoula, MT 59807; or USDA Forest Service, Northern Region, ATTN: Appeal Deciding Officer, 200 East Broadway, Missoula, MT 59802. Office hours: 7:30 a.m. to 4:00 p.m. Fax (406) 329- 3411.

Electronic appeals must be submitted to: <appeals-northern-regional-office@fs.fed.us>. In electronic appeals, the subject line should contain the name of the project being appealed. An automated response will confirm your electronic appeal has been received. Electronic appeals must be submitted in MS Word, Word Perfect, or Rich Text Format (RTF).

It is the appellant's responsibility to provide sufficient project- or activity-specific evidence and rationale, focusing on the decision, to show why the decision should be reversed. The appeal must be filed with the Appeal Deciding Officer in writing. At a minimum, the appeal must meet the content requirements of 36 CFR 215.14, and include the following information: the appellant's name and address, with a telephone number, if available; a signature, or other verification of authorship upon request (a scanned signature for electronic mail may be filed with the appeal); when multiple names are listed on an appeal, identification of the lead appellant and verification of the identity of the lead appellant upon request; the name of the project or activity for which the decision was made, the name and title of the Responsible Official, and the date of the decision; the regulation under which the appeal is being filed, when there is an option to appeal under either 36 CFR 215 or 36 CFR 251, subpart C; any specific change(s) in the decision that the appellant seeks and rationale for those changes; any portion(s) of the decision with which the appellant disagrees, and explanation for the disagreement; why the appellant believes the Responsible Official's

decision failed to consider the substantive comments; and, how the appellant believes the decision specifically violates law, regulation, or policy.

If no appeal is received, implementation of this decision may occur on, but not before, five business days from the close of the appeal filing period. If an appeal is received, implementation may not occur for 15 days following the date of appeal disposition.

Offer to Meet. If an appeal is received on this project there may be informal resolution meetings and/or conference calls between the Responsible Official and the appellant. These discussions would take place within 15 days after the closing date for filing an appeal. All such meetings are open to the public. If you are interested in attending any informal resolution discussions, please contact the Responsible Official or monitor the following website for postings about current appeals in the Northern Region of the Forest Service: eal-meetings"http://www.fs.usda.gov/goto/r1/appeal-meetings.

X. Contact Person

For additional information concerning this decision or the Forest Service appeal process, contact Teri Seth, NEPA Team Leader, Gallatin National Forest Bozeman Ranger District, 3710 Fallon St., Ste. C, Bozeman, MT 59718, (406) 522-2520.

_/s/ MARY C. ERICKSON *February 14, 2011*

Mary C. Erickson
Forest Supervisor
Gallatin National Forest

Date:

XI. References Cited

Andrews, Patricia L., Bevins, Collin D., Seli, Robert C, 2005. BehavePlus fire modeling system version 3.0 Users Guide, RMRS-GTR 106WWW. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. *(Behave Plus)*

Baker, William. Fire Ecology in the Ricky Mountain Landscapes. 2009. Island Press. http://books.google.com/books?id=QHISkC37Ot4C&lpg=PP1&ots=hjfpGCcnKM&dq=Fire%20Ecology%20in%20the%20Rocky%20Mountain%20Landscapes%2C%20by%20Baker&pg=PP1#v=onepage&q&f=false

Brickell, Tim 2007. Fire and Fuels Specialist Report. 5/07/2007. USDA, Forest Service, Gallatin national Forest, Bozeman Ranger District, Bozeman, MT.

Brickell, Tim 2010. [Personal Communication]. December 6. Bozeman, MT: Gallatin National Forest, Bozeman Ranger District, Fuels Specialists. (Brickell*, personal communication)*

City of Bozeman, 2006. City of Bozeman Water Facility Master Plan http://www.bozeman.net/bozeman/engineering/documents/Water_Facility_Plan.pdf

City of Bozeman Forest Management Plan. 2009. Peck Forest, Inc. [Prepared by Gary Peck]. Bozeman, MT. [Available from the Public Works Department, Bozeman, MT.] *(COB Forest Plan 2009)*

Cohen, Jack 1999. Reducing the Wildland Fire Threat to homes: where and how much? Jack D. Cohen, RMRS. Paper presented at the Fire Economics Symposium, San Diego CA April 12, 1999. *(Cohen 1999)*

Cohen, Jack 2010. [Personal Communication]. August 26, 2009 Field Trip to the Project Area with Agency Representatives and members of the Public near Bozeman, MT. Jack is a researcher and author from the Rocky Mountain Research Station, Forest Service, Missoula, MT.

Community Wildfire Protection Plan 2008. A draft of the publication was referenced in the DEIS but the publication was finalized in 2008. Map of Wildland Urban Interface areas in Gallatin County MT. Prepared by Gallatin County and recorded 1/2009. Bozeman, MT. *(CWPP 2008)*

DNRC, 2006. SMZ rules. Guide to the Streamside Management Zone Rules 2006. Montana Division of Natural Resources and Conservation - Forestry Division, Missoula, MT. *(DNRC 2006)*

DNRC 2010. Letter from Bob Harrington, State Forester for Montana Department of Natural Resources and Conservation supporting the BMW Project Decision 7/1/2010. Helena, MT.

Dixon Bev. 12/2010. Issue # 20 Elk and Other Big Game, Specialist Report for Elk and Other Big Game Specialist report for the Bozeman Municipal Watershed Project. Gallatin National Forest, Bozeman Ranger District, Bozeman, MT. Bev is the Wildlife Biologist for the Bozeman Ranger District.

Draft Environmental Impact Statement, (DEIS) Bozeman Municipal Watershed. September 2005. USDA. 2005. Bozeman Ranger District, Gallatin National Forest, Bozeman, MT. *(USFS-GNF 2010)*

Duncan, J.R. and P.H. Hayward. 1994. Review of Technical Knowledge: Great Gray Owls. Chapter 14 In: Hayward, G. D. and J. Verner, tech. eds.1994. Flammulated, boreal and great gray owls in the United States: A technical conservation assessment. USDA Forest Service Gen. Tech. Rep. RM-253. Rocky Mountain Forest and Range Experiment Station. Fort Collins, CO. Hejl, S. J. 1994. Human-induced changes in bird populations in coniferous forests in western North America during the past 100 years. Cited in: Hutto and Young 1999.

Elliott D.L., C.G. Holladay, W.R. Barchet, H.P. Foote, and W.F. Sandusky, 1986. Wind Energy Resource Atlas of the United States. US Department of Energy. p. 50.

FARSITE (v. 4.1.005, 2008) Finney, M.A. 1998. FARSITE: Fire Area Simulator, Version 4.1.052 - Model Development and Evaluation. USDA Forest Service, RMRS-RP-4.

Final Environmental Impact Statement, (FEIS) Bozeman Municipal Watershed . March 2010. USDA. 2010. Gallatin National Forest, Bozeman, MT. (*FEIS)*

Fischer, W.C., and B.D. Clayton. 1983. Fire ecology of Montana forest habitat types east of the Continental Divide. Gen. Tech. Rep. INT-141. Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station; 83 p. *(Fischer and Clayton 1983)*

Forest Service Manual 2080 - Noxious Weed Management, Supplement R1 2000-2001-1. USDA Forest Service 2006. AHYPERLINK "C:\\My Documents\\BMW\\ROD\\at"C:\My Documents\BMW\ROD\at *(FSM 2080)*

Forest Service Manual 2670 - Sensitive Species. USDA Forest Service Directive. AHYPERLINK "C:\\My Documents\\BMW\\ROD\\at"C:\My Documents\BMW\ROD\at *(FSM 2670)*

Gallatin National Forest Plan (1987). USDA, US Forest Service, Gallatin National Forest, Bozeman, MT. (FP 1987)

#3 Hyalite MA Amendment (3/20/1990) .

#14 Big Game Cover Amendment (2/1993)

#15 Wildlife Snag Amendment (2/1993)

#46 Northern Rockies Lynx Amendment(3/2007) Gallatin National Forest. 2005. Bozeman Municipal Watershed Initial Scoping letter and project mailing List. [Available in the project file at Bozeman ranger District, Bozeman MT. (GNF 9/2005)

Gallatin National Forest Travel Management Plan Final Environmental Impact Statement, Detailed Description of the Decision. October 2006. USDA, Gallatin National Forest, Bozeman, MT. *(GNF 2006)*

Gallatin National Forest 2010. Distribution and Status of Gallatin National Forest Aquatic Management Indicator Species. U.S. Department of Agricultural, Forest Service, Northern Region, Gallatin National Forest, Bozeman, Montana. *(GNF 2010)*

Graham, Russell T., et al. 2004. Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity. USDA Forest Service, Rocky Mountain Research Station. General Technical Report RMRS-GTR-120. (Graham 2004)

Greater Yellowstone Bald Eagle Working Group. 1996. Greater Yellowstone bald eagle management plan: 1995 update. Wyoming Game and Fish Department, Lander, WY

Hann, W.J., and D.L. Bunnell. 1999. Fire and land management planning and implementation across multiple scales. International Journal of Wildland Fire. 27 p. *(Hann and Bunnell 1999)*

Hann, W. J. 2003. Mapping fire regime condition class: a method for watershed and project-scale analysis. 24 p. *(Hann 2003)*

Healthy Forests Initiative and Healthy Forests Restoration Act- Interim Field Guide. February 2004. USDA Forest Service, USDI Bureau of Land Management, FS-799. *(HFI or HFRA)*

Heaston, Brian 2010. [Personal Communication]. October 13. Bozeman, MT: City of Bozeman, Public Works Department, Engineer. *(Heaston, personal communication)*

Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service. Gen. Tech. Rep. RMRS-GTR-32. Rocky Mountain Research Station, Fort Collins, Colorado.

Keck, Tom. 12/16/2010. Soils Specialist report for the Bozeman Municipal Watershed Project. USDA. Tom is the Forest Soil Scientist. Gallatin National Forest, Supervisors Office, Bozeman, MT.

Lamont, Susan 2011. [Personal Communication]. February 4, 2011. Communication regarding effectiveness of Weed Protection Practices [BMPs] Bozeman, MT: Gallatin National Forest, Bozeman Ranger District, Vegetation Program Manager. (Lamont*, personal communication)*

Memorandum of Understanding (MOU) concerning the City of Bozeman and Gallatin National Forest mutual goals and objectives for the Bozeman Municipal Watershed. 2005. FS Agreement No. 05-MU-1101100-010). Bozeman Ranger District, Gallatin National Forest, Bozeman, MT. *(MOU 2005)*

Mikkola, H. 1983. Owls of Europe. Buteo Books, Vermillion, South Dakota. Cited in: Duncan and Hayward 1994:165

Montana Department of Environmental Quality Planning Bureau. 12/9/2010. Mark Bostrom Bureau Chief letter to Gallatin National Forest regarding BMW Compliance with Water Quality regulations. [Available Bozeman RangerDistrict, Bozeman MT. Project File] *(MT DEQ 12/2010)*

MFWP 2006. Montana Department of Fish Wildlife and Parks Swainson's Hawk Field Guide. http://fieldguide.mt.gov/detail_ABNKC19070.aspx

Montana Natural Heritage Program website 2011. Listing of species of concern in Montana. Available at the following website address. http://mtnhp.org/

National Fire Plan (NFP) 2000. "Managing the Impacts of Wildfires on Communities and the Environment – A Report to the President in Response to the Wildfires of 2000"; September 8, 2000. *(NFP 2000)*

Nero, R.W. 1980. The Great Gray Owl - phantom of the northern forest. Smithsonian Institution Press, Washington, DC. Cited in: Duncan and Hayward 1994:165

Omi, Philip N., Martinson, Erik J. 2002. Effect of Fuels Treatment on Wildfire Severity. Page 1, 25. Western Forest Fire Research Center, Colorado State University.

Powell, B. 2002. Implementation of the 1999 Westslope Cutthroat Trout Conservation Agreement Memorandeum of Understanding within the Upper Missouri River Basin. January 16, 2002. United States Department of Agriculture, Forest Service, Northern Region. Missoula, MT.

Raymond, Crystal L. and David L. Peterson, 2005. Fuel treatments alter the effects of wildfire in a mixed-evergreen forest, Oregon, USA. pg 2982 and 2992.

Roadless Conservation rule 2001. AHYPERLINK "C:\\My Documents\\BMW\\ROD\\at"C:\My Documents\BMW\ROD\at then search ' Roadless Conservation Areas'

Roberts, Bruce 11/2010. Final Fisheries Effects Report - Bozeman Municipal Watershed . 11/19/2010. Bruce is the West Zone Fisheries Biologist. USDA, Forest Service, Gallatin National Forest, Bozeman Ranger District, Bozeman, MT.

SIMPPLLE (v. 2.3, 2004) SIMPPLLE is an acronym for SIMulating Patterns and Processes at Landscape scales (Chew et al. 2004). Developed by the Forest Service in Region 1, the model helps land managers understand the dynamics of landscapes. Chew, J.D., Stalling, C., Moeller, K. 2004. Integrating Knowledge for Simulating Vegetation Change at Landscape Scales. Western Journal American Forests 19(2), 102-108.

Schmidt, K.M.; J.P. Menakis; C.C. Hardy; W.J. Hann; and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station. 41 p. (*Schmidt et al. 2002)*

Schwartz, C, Haroldson, M, White, G. 2010. *Hazards Affecting Grizzly Bear Survival in the Greater Yellowstone Ecosystem.* USGS, Northern Rocky Mountain Science Center, Interagency Grizzly Bear Study Team, Forestry Sciences Laboratory, Montana State University, Bozeman, MT. Published in the Journal of Wildlife Management 74(4):654-667. (*Schwartz et al. 2010*).

Sourdough Creek Watershed Assessment. 2004. Prepared by the Bozeman Watershed Council. 2004. Bozeman, Montana. 70pp. [Available at the Bozeman Ranger District in the Project Record]

Source Water Protection Plan. Prepared for the City of Bozeman, MT. 2004. 27p. Bozeman, Montana. [Available from the Public Works Department, Bozeman, MT.] *(Source Water Plan 2004)*

Story, Mark 12/2010. Water Quality Specialist Report for the Bozeman Municipal Watershed Project. 12/15/2010. USDA. Gallatin National Forest, Supervisors Office, Bozeman, MT. Mark is the Forest Hydrologist.

Supplemental Final Environmental Impact Statement (SFEIS) Bozeman Municipal Watershed. February 2011. USDA. 2011. Bozeman Ranger District, Gallatin National Forest, Bozeman, MT.

Tri-Data Corporation. October 1996. Wildland Firefighter Safety Awareness Study. Pg 181. (Tri Data 1996)

US EPA April 2010. Letter from Julie DalSoglio Director of Montana Office of the Environmental Protection Agency supporting BMW Project. April 20, 2010. US Environmental Protection Agency, Region 8, Helena MT.

USDA Forest Service, 1991. Forest and Rangeland Birds of the United States. Natural History and Habitat Use. Agriculture Handbook 688. USDA 1991:466, 476

USDA 2000. Protecting People and Sustaining Resources in Fire-Adapted Ecosystems – A Cohesive Strategy. 2000. United States Department of Agriculture, Forest Service. The Forest Service Management Response to the General Accounting Office Report GAO/RCED-99-65 (Oct. 13, 2000).

USDA, 2009. Letter from the Secretary of Agriculture delegating Authority for Certain Activities in the Inventoried Roadless Areas to Regional Foresters. 10/2/2009. United States Department of Agriculture, Washington D.C.

USDA, 2009a. Letter from the Regional Forester to forest Supervisors Delegating Authority for Certain Activities in the Inventoried Roadless Areas to Forest Supervisors. 11/10/2009. United States Department of Agriculture, Northern region of the Forest Service, Missoula, MT.

USDA 2011. Action Plan for the Nation's Forest and Grasslands. January 3, 2011. Secretary of Agriculture, Tom Vilsack Vision for the Agency. Presented in a speech in Seattle in August 2009 and converted to and Action plan. Available at Bozeman Ranger District Office, Bozeman, MT. (USDA January 2011)

USDA Forest Service. 2007. Black-backed Woodpecker Northern Region Overview. Unpublished Report on file at USDA Forest Service Northern Region Office, Missoula, MT.*(USDA FS 2007)*

USDA Forest Service. 2007a. Northern Goshawk overview and multi-level analysis for the Northern Region. DRAFT: Version 1.0, February 1, 2007. Unpublished report on file. USDA Forest Service, Northern Region, Missoula, Montana. *(USDA FS 2007a)*

USDA FS LRMD 2007. United States Department of Agriculture, Forest Service, Northern Region. Northern Rockies Lynx Management Direction Record of Decision. March 2007. Available at http://www.fs.fed.us/r1/planning/lynx/documents.htm

USDA, GNF 2008. The Gallatin Forest Plan Monitoring Report for the years 2005-2007. Forest Service, Gallatin National Forest, Bozeman, MT. Available on the Gallatin Forest Webpage under land and resource Planning in the Planning Folder.

USDA, GNF 2011. Gallatin Forest Plan Management Indicator Species Assessment. Population and habitat Trends. February 11 2011. Prepared by Jodie Canfield, Gallatin Forest Wildlife Biologist. Gallatin National Forest, Bozeman, MT.

US Department of Interior; US Fish and Wildlife Service. National Bald Eagle Management Guidelines 2007. *(USDI 2007)*

U S Forest Service 1999. FSM 2500 - Watershed and Air Management, Chapter 2550 – Soil Management, Amendment No: 2500-2009-1. Washington, DC. 9 p. (USFS-R1 1999*)*

USFS 2003. Bozeman Municipal Watershed - a Forest Service risk assessment (Bozeman Creek Prototype Analysis) 6/2003. Gallatin National Forest, Bozeman Ranger District, Bozeman, MT. 19pp. (Bozeman Creek Prototype Analysis 2003)

USFS 2010. Roads Analysis for the Bozeman Municipal Watershed 12/2010. USDA, Forest Service, Gallatin National Forest, Bozeman, MT. 12/2/2010*. (USDA 2010)*

USFS, Gallatin National Forest. 2011. BMW Project Forest Plan Consistency Table. Summary prepared by GNF IDT. Bozeman Ranger District, Bozeman, MT. *(USFS 2011)*

USFS. 2011a. Gallatin National Forest. IDT summary of the review of references cited in scoping letters and appeal. Gallatin National Forest, Bozeman Ranger District, Bozeman, MT. *(USFS 2011a)*

Webster Meredith 2010. [personal communication] 9/22/10. Missoula MT. USFS Northern Region Office, Regional Soil Scientist. (Webster-personal communication)

Winter, J. 1986. Status, distribution and ecology of the Great Gray Owl (Strix nebulosa) in California. Thesis. San Francisco State University, San Francisco, CA. Cited in: Duncan and Hayward 1994:165

Appendix A – Soil and Water Best Managem3ent Practices[1]

Soil Protection Practices

Gallatin National Forest Soil Mitigations and Best Management Practices

Skid Trail Placement and Slope Limitations

Require a systematic skid trail pattern during logging. Mechanical ground-based skidding and harvesting equipment may be used off of skid trails only to the degree necessary to harvest the available timber and only when soil moisture conditions are favorable. (See below for details.)

Use ground-based harvest systems only on slopes having sustained grades less than 35 percent.

Maintain an average of at least 75 feet between skid trails in all tractor harvested partial cuts and an average of 100 feet in all tractor harvest clearcuts. Skid trails may be closer than this spacing where converging so long as the overall spacing averages 75 feet and 100 feet, respectively.

Lay out skid trails in a manner that minimizes or, where possible, eliminates sustained grades steeper than 15%. This recommendation is expanded to include grades steeper than 8% on the most erosion prone soils, i.e.: *coarse textured soils over shallow bedrock.*

Avoid placing skid trails or temporary roads over convex knobs or along narrow, rocky ridges (areas least able to recover from disturbance) to the extent possible.

Temporary Road Construction and Re-use of Existing Roads, Landings, and Skid Trails

Minimize the depth of blading in construction of temporary roads within the constraints of standard Forest Service practices for temporary road construction.

Re-use existing temporary roads, landings, and skid trails in previously harvested areas to the extent practical.

Use of Skidding and Harvesting Equipment Off Skid Trails (non-winter harvesting)

Ground based skidding equipment may travel off of the established skid trails but only to the extent reasonably necessary to harvest timber based on the sale administrator's judgment and only when the top 6 inches of soil will not form a ribbon between the thumb and forefinger.** (Criteria integrates the combined influence of soil texture and soil moisture – *see USDA*

[3] **Monitoring is planned for all BMP's as a standard practice on the Gallatin National Forest. When monitoring results indicate the need to revise Best Management Practices to improve effectiveness or to eliminate ineffective practices it is assumed that all project related BMP's will be updated to incorporate the most current knowledge and practices.

Technical Guide for Estimating Soil Moisture (USDA, NRCS 1998)) Repeat passes over the same ground should be minimized.

Feller/buncher/mechanical harvesters may be used off established skid trails to the extent reasonably necessary to harvest timber but only when the top six inches of soil will either not form a ball when squeezed in the palm of a hand or will only form a weak ball and at most will form a weak ribbon between the thumb and forefinger.** (*Criteria integrates soil texture and soil moisture effects and is slightly more restrictive than the criteria for skidding equipment – see USDA Estimating Soil Moisture Tech. Guide(USDA, NRCS 1998))* Repeat passes over the same ground should be minimized.

*** Soil scientist for the GNF will be involved in the implementation of these provisions.*

Winter Harvesting Restrictions – No winter harvesting is planned for BMW but winter logging is permissible.

Tractor harvesting over snow or frozen ground in the winter should be limited to periods when there is a minimum of 8 inches of settled snow covering the ground or, in the absence of sufficient snow, when the top four inches of mineral soil is either frozen or dry. Harvesting should not proceed if ponding occurs at the mineral soil surface due to partial thawing of a surface frost layer. Previously noted limitations to equipment use off skid trails based on soil texture and moisture conditions and the need for a systematic skid trail system do not apply to winter harvesting providing the settled snow depth or frozen ground criteria are met.

Landings, Temporary Roads, and Skid Trail Remediation

Landings --- Cut and fill slopes, if present, around the margins of landings may be re-contoured if soils are non-skeletal *(have less than 35% rock fragments in the subsoil)*. The landing base should be ripped to a depth of at least 6 inches subject to the following: 1) Scarification (ripping) of landings with burn piles only needs to be completed on exposed portions of the landing surrounding the burn pile, 2) The scarification (ripping) requirement may be waived on soils having abundant rock fragments in the top 6 inches of soil; defined as 20 percent or more 3 inch or larger rock fragments or more than 50 percent rock fragments overall.

Temporary Roads --- Cut and fill slopes, where present, may require re-contouring if soils are non-skeletal *(have less than 35% rock fragments in the subsoil)*. In all other areas, the road prism should be scarified (ripped) to a minimum depth of 6 inches into the mineral soil. This requirement may be waived on soils having abundant large rock fragments in the top 6 inches of soil; defined as 20 percent or more 3 inch or larger rock fragments or more than 50 percent rock fragments overall.

Skid Trails --- Scarification (ripping) will not be required on skid trails except in areas where the soil is detrimentally compacted and mineral soil is exposed at the surface or where wheel ruts have formed at least 2 inches deep on grades steeper than 15% or continuous to grades steeper than 15%. Detrimental compaction, as defined by the Detrimental Soil Disturbance Standards for the Gallatin National Forest, has a combined thickness of 2 inches of significant compaction in the top 4 inches of soil, 3 inches in the top 8 inches of soil, or 4 inches in the top 12 inches of soil.

Logging Slash and Other Woody Debris

Leave at least 15 tons per acre of coarse woody debris (3" inch or larger clearing or logging slash) behind in clearcut units and 10 tons per acre in partial cutting units (less than 60% canopy cover removed), when available. Coarse woody debris protect the soil surface, slow surface runoff, and return soil nutrients to the soil. The coarse woody debris requirement in specific instances of forest stands growing on dry, south facing slopes or on high organic matter soils may be reduced to 12 tons/acre for clearcuts and 8 tons/acre for partial cuts.

Slash at an approximate rate of 15 tons per acre should be placed across skid trails in areas of steeper (>15%) slopes at the completion of logging. Lopping off at least some of the branches to get better contact with the ground surface increases the soil remediation effectiveness of this treatment.

Leave some unmerchantable material standing adjacent to temporary roads and landings, where reasonable, during harvesting. This material will be used for slashing these areas by Forest Service personnel at the end of the project.

Finally, leave the logs and brush to be burned by the Forest Service at landings in more of a mounded pile than a steep sided, dozer pile if possible. This will facilitate Forest Service personnel pulling some material out of the pile prior to burning. Brush removed will be used for slashing the area of the burn pile at the completion of burning.

Water Quality - Best Management Practices and Streamside Management Zone Guidelines.

Best Management Practices for Forestry in the State of Montana (MDNRC)

January 2006

I. DEFINITIONS

1. "Hazardous or toxic material" means substances which by their nature are dangerous to handle or dispose of, or a potential environmental contaminant, and includes petroleum products, pesticides, herbicides, chemicals, and biological wastes.

2. "Stream," as defined in 77-5-302(7), MCA, means a natural water course of perceptible extent that has a generally sandy or rocky bottom or definite banks and that confines and conducts continuously or intermittently flowing water.

3. "Streamside Management Zone (SMZ)" or "zone" as defined at 77-5-302(8),

MCA means "the stream, lake, or other body of water and an adjacent area of varying width where management practices that might affect wildlife habitat or water quality, fish, or other aquatic resources need to be modified." The streamside management zone encompasses a strip at least 50 feet wide on each side of a stream, lake, or other body of water, measured from the ordinary high water mark, and extends beyond the high water mark to include wetlands and areas that provide additional protection in zones with steep slopes or erosive soils.

4. "Wetlands" mean those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, bogs, and similar areas.

5. Adjacent wetlands are wetlands within or adjoining the SMZ boundary. They are regulated under the SMZ law.

6. Isolated wetlands lie within the area of operation, outside of the SMZ boundary, and are not regulated under the SMZ law.

II. STREAMSIDE MANAGEMENT

The Streamside Management Law (77-5-301 through 307 MCA) provides minimum regulatory standards for forest practices in streamside management zones (SMZ). The "Montana Guide to the Streamside Management Zone & Rules" is an excellent information source describing management opportunities and limitations within SMZs.

III. ROADS

A. Planning and Location

1. Minimize the number of roads constructed in a watershed through comprehensive road planning, recognizing intermingled ownership and foreseeable future uses. Use existing roads, unless use of such roads would cause or aggravate an erosion problem.

2. Review available information and consult with professionals as necessary to help identify erodible soils and unstable areas, and to locate appropriate road surface materials.

3. Fit the road to the topography by locating roads on natural benches and following natural contours. Avoid long, steep road grades and narrow canyons.

4. Locate roads on stable geology, including well-drained soils and rock formations that tend to dip into the slope. Avoid slumps and slide prone areas characterized by steep slopes, highly weathered bedrock, clay beds, concave slopes, hummocky topography, and rock layers that dip parallel to the slope. Avoid wet areas, including moisture laden or unstable toe slopes, seeps, wetlands, wet meadows, and natural drainage channels.

5. Minimize the number of stream crossings and choose stable stream crossing sites.

6. Locate roads to provide access to suitable (relatively flat and well drained) log landing areas to reduce soil disturbance.

B. Design

1. Properly design roads and drainage facilities to prevent potential water quality problems from road construction.

2. Design roads to the minimum standard necessary to accommodate anticipated use and equipment. The need for higher engineering standards can be alleviated through proper road-use management.

3. Design roads to balance cuts and fills or use full bench construction (no fill slope) where stable fill construction is not possible.

4. Design roads to minimize disruption of natural drainage patterns. Vary road grades to reduce concentrated flow in road drainage ditches, culverts, and on fill slopes and road surfaces.

C. Road Drainage

Road Drainage is defined as all applied mechanisms for managing water in a non-stream crossing setting, road surface drainage, and overland flow; ditch relief, cross drains and drain dips).

1. Provide adequate drainage from the surface of all permanent and temporary roads. Use out sloped, in sloped or crowned roads, and install proper drainage features. Space road drainage features so peak flow on road surfaces or in ditches will not exceed capacity.

a. Outsloped roads provide a means of dispersing water in a low energy flow from the road surface. Outsloped roads are appropriate when fill slopes are stable, drainage will not flow directly into stream channels, and transportation safety can be met.

b. For in-sloped roads, plan ditch gradients steep enough, generally greater than 2% but less than 8%, to prevent sediment deposition and ditch erosion. The steeper gradients may be suitable for more stable soils; use the lower gradients for less stable soils.

c. Design and install road surface drainage features at adequate spacing to control erosion; steeper gradients require more frequent drainage features. Properly constructed drain dips can be an economical method of road surface drainage. Construct drain dips deep enough into the subgrade so that traffic will not obliterate them.

2. Design all ephemeral draw culverts with adequate length to allow for road fill width. Minimum culvert size is 15 inch. Install culverts to prevent erosion of fill, seepage and failure as described in V.C.4 and maintain cover for culverts as described in V.C.6.

3. Design all relief culverts with adequate length to allow for road fill width. Protect the inflow end of all relief culverts from plugging and armor if in erodible soil. When necessary construct catch basins with stable side slopes. Unless water flows from two directions, skew ditch relief culverts 20 to 30 degrees toward the inflow from the ditch to help maintain proper function.

4. Where possible, install culverts at the gradient of the original ground slope; otherwise, armor outlets with rock or anchor downspouts to carry water safely across the fill slope.

5. Provide energy dissipaters (rock piles, slash, log chunks, etc.) where necessary to reduce erosion at outlet of drainage features. Cross drains, culverts, water bars, dips, and other drainage structures should not discharge onto erodible soils or fill slopes without outfall protection.

6. Prevent downslope movement of sediment by using sediment catch basins, drop inlets, changes in road grade, headwalls, or recessed cut slopes.

7. Route road drainage through adequate filtration zones or other sediment-settling structures to ensure sediment doesn't reach surface water. Install road drainage features above stream crossings to route discharge into filtration zones before entering a stream.

D. Construction (see also Section V on stream crossings)

1. Keep slope stabilization, erosion and sediment control work current with road construction. Install drainage features as part of the construction process, ensuring that drainage structures are fully functional. Complete or stabilize road sections within same operating season.

2. Stabilize erodible, exposed soils by seeding, compacting, riprapping, benching, mulching, or other suitable means.

3. At the toe of potentially erodible fill slopes, particularly near stream channels, pile slash in a row parallel to the road to trap sediment (example, slash filter windrow). When done concurrently with road construction, this is one method that can effectively control sediment movement, and it can also provide an economical way of disposing of roadway slash. Limit the height, width and length of "slash filter windrows" so wildlife movement is not impeded. Sediment fabric fences or other methods may be used if effective.

4. Minimize earthmoving activities when soils appear excessively wet. Do not disturb roadside vegetation more than necessary to maintain slope stability and to serve traffic needs.

5. Construct cut and fill slopes at stable angles to prevent sloughing and other subsequent erosion.

6. Avoid incorporating potentially unstable woody debris in the fill portion of the road prism. Where possible, leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill.

7. Consider road surfacing to minimize erosion.

8. Place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road.

9. Minimize sediment production from borrow pits and gravel sources through proper location, development and reclamation.

10. When using existing roads, reconstruct only to the extent necessary to provide adequate drainage and safety; avoid disturbing stable road surfaces. Prior to reconstruction of existing roads within the SMZ, refer to the SMZ law. Consider abandoning existing roads when their use would aggravate erosion.

E. Maintenance

1. Grade road surfaces only as often as necessary to maintain a stable running surface and adequate surface drainage.

2. Maintain erosion control features through periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts.

3. Avoid cutting the toe of cut slopes when grading roads, pulling ditches, or plowing snow.

4. When plowing snow, provide breaks in snow berm to allow road drainage.

5. Haul all excess material removed by maintenance operations to safe disposal sites and stabilize these sites to prevent erosion. Avoid side casting in locations where erosion will carry materials into a stream.

6. Avoid using roads during wet periods if such use would likely damage the road drainage features. Consider gates, barricades or signs to limit use of roads during spring break up or other wet periods.

7. Upon completion of seasonal operations, ensure that drainage features are fully functional. The road surface should be crowned, outsloped, insloped, or water-barred. Remove berms from the outside edge where runoff is channeled.

8. Leave abandoned roads in a condition that provides adequate drainage without further maintenance. Close these roads to traffic; reseed and/or scarify; and, if necessary, recontour and provide water bars or drain dips.

IV. TIMBER HARVESTING, AND SITE PREPARATION

A. Harvest Design

1. Plan timber harvest in consideration of your management objectives and the following:

    a. Soils and erosion hazard identification.

    b. Rainfall.

    c. Topography.

    d. Silvicultural objectives.

    e. Critical components (aspect, water courses, landform, etc.).

    f. Habitat types.

    g. Potential effects on water quality and beneficial water uses.

h. Watershed condition and cumulative effects of multiple timber management activities on water yield and sediment production.

i. Wildlife habitat.

2. Use the logging system that best fits the topography, soil type, and season, while minimizing soil disturbance and economically accomplishing silvicultural objectives.

3. Use the economically feasible yarding system that will minimize road densities.

4. Design and locate skid trails and skidding operations to minimize soil disturbance. Using designated skid trails is one means of limiting site disturbance and soil compaction. Consider the potential for erosion and possible alternative yarding systems prior to planning tractor skidding on steep or unstable slopes.

5. Locate skid trails to avoid concentrating runoff and provide breaks in grade. Locate skid trails and landings away from natural drainage systems and divert runoff to stable areas. Limit the grade of constructed skid trails on geologically unstable, saturated, highly erosive, or easily compacted soils to a maximum of 30%. Use mitigating measures, such as water bars and grass seeding, to reduce erosion on skid trails.

6. Minimize the size and number of landings to accommodate safe, economical operation. Avoid locating landings that require skidding across drainage bottoms.

B. Other Harvesting Activities

1. Tractor skid where compaction, displacement, and erosion will be minimized. Avoid tractor or wheeled skidding on unstable, wet, or easily compacted soils and on slopes that exceed 40% unless operation can be conducted without causing excessive erosion. Avoid skidding with the blade lowered. Suspend leading ends of logs during skidding whenever possible.

2. Avoid operation of wheeled or tracked equipment within isolated wetlands, except when the ground is frozen (see Section VI on winter logging).

3. Use directional felling or alternative skidding systems for harvest operations in isolated wetlands.

4. For each landing, provide and maintain a drainage system to control the dispersal of water and to prevent sediment from entering streams.

5. Insure adequate drainage on skid trails to prevent erosion. On gentle slopes with slight disturbance, a light ground cover of slash, mulch or seed may be sufficient. Appropriate spacing between water bars is dependent on the soil type and slope of the skid trails. Timely implementation is important.

6. When existing vegetation is inadequate to prevent accelerated erosion, apply seed or construct water bars before the next growing season on skid trails, landings and fire trails. A light ground cover of slash or mulch will retard erosion.

C. Slash Treatment and Site Preparation

1. Rapid reforestation of harvested areas is encouraged to reestablish protective vegetation.

2. When treating slash, care should be taken to preserve the surface soil horizon by using appropriate techniques and equipment. Avoid use of dozers with angle blades.

3. Minimize or eliminate elongated exposure of soils up and down the slope during mechanical scarification.

4. Scarify the soil only to the extent necessary to meet the resource management objectives. Some slash and small brush should be left to slow surface runoff, return soil nutrients, and provide shade for seedlings.

5. Carry out brush piling and scarification when soils are frozen or dry enough to minimize compaction and displacement.

6. Carry out scarification on steep slopes in a manner that minimizes erosion. Prescribed burning and/or herbicide application is preferred means for site preparation, especially on slopes greater than 40%.

7. Remove all logging machinery debris to proper disposal site.

8. Limit water quality impacts of prescribed fire by constructing water bars in firelines; not placing slash in drainage features and avoiding intense fires unless needed to meet silvicultural goals. Avoid slash piles in the SMZ when using existing roads for landings.

V. STREAM CROSSINGS

A. Legal Requirements

1. Under the Natural Streambed and Land Preservation Act of 1975 (the "310 law"), any activity that would result in physical alteration or modification of a perennial stream, its bed or immediate banks must be approved in advance by the supervisors of the local conservation district. Permanent or temporary stream crossing structures, fords, rip rapping or other bank stabilization measures, and culvert installations on perennial streams are some of the forestry-related projects subject to 310 permits. Before beginning such a project, the operator must submit a permit application to the conservation district indicating the location, description, and project plans. The evaluation generally includes onsite review, and the permitting process may take up to 60 days.

2. Stream-crossing projects initiated by federal, state or local agencies are subject to approval under the "124 permit" process (administered by the Department of Fish, Wildlife and Parks), rather than the 310 permit.

3. A short-term exemption (3a authorization) from water quality standards is necessary unless waived by the Department of Fish, Wildlife and Parks as a condition of a 310 or 124 permit. Contact the Department of Environmental Quality in Helena at 444-2406 for additional information.

B. Design Considerations (Note: 310 permit required for perennial streams)

1. Cross streams at right angles to the main channel if practical. Adjust the road grade to avoid the concentration of road drainage to stream crossings. Direct drainage flows away from the stream crossing site or into an adequate filter.

2. Avoid unimproved stream crossings. Depending on location, culverts, bridges and stable/reinforced fords may be used.

C. Installation of Stream Crossings (Note: 310 permit required for perennial streams)

1. Minimize stream channel disturbances and related sediment problems during construction of road and installation of stream crossing structures. Do not place erodible material into stream channels. Remove stockpiled material from high water zones. Locate temporary construction bypass roads in locations where the stream course will have minimal disturbance. Time construction activities to protect fisheries and water quality.

2. Design stream-crossings for adequate passage of fish (if present) with minimum impact on water quality. When using culverts to cross small streams, install those culverts to conform to the natural stream bed and slope on all perennial streams and on intermittent streams that support fish or that provides seasonal fish passage. Ensure fish movement is not impeded. Place culverts slightly below normal stream grade to avoid outfall barriers.

3. Do not alter stream channels upstream from culverts, unless necessary to protect fill or to prevent culvert blockage. On stream crossings, design for, at a minimum, the 25-year frequency runoff. Consider oversized pipe when debris loading may pose problems.

Ensure sizing provides adequate length to allow for depth of road fill.

4. Install stream-crossing culverts to prevent erosion of fill. Compact the fill material to prevent seepage and failure. Armor the inlet and/or outlet with rock or other suitable material where feasible.

5. Consider dewatering stream crossing sites during culvert installation.

6. Maintain a 1-foot minimum cover for stream-crossing culverts 15 to 36 inches in diameter, and a cover of one-third diameter for larger culverts, to prevent crushing by traffic.

7. Use culverts with a minimum diameter of 15 inches for permanent stream crossings.

D. Existing Stream Crossings

1. Ensure stream crossing culverts have adequate length to allow for road fill width and are maintained to preserve their hydrologic capacity. To prevent erosion of fill, provide or maintain armoring at inlet and/or outlet with rock or other suitable material where feasible. Maintain fill over culvert as described in V.C. 6.

VI. WINTER LOGGING

A. General

1. Consider snow-road construction and winter harvesting in isolated wetlands and other areas with high water tables or soil erosion and compaction hazards.

2. Conduct winter logging operations when the ground is frozen or snow cover is adequate (generally more than one foot) to prevent rutting or displacement of soil. Be prepared to suspend operations if conditions change rapidly, and when the erosion hazard becomes high.

3. Consult with operators experienced in winter logging techniques.

B. Road Construction and Harvesting Considerations

1. For road systems across areas of poor bearing capacity, consider hauling only during frozen periods. During cold weather, plow any snow cover off of the roadway to facilitate deep freezing of the road grade prior to hauling.

2. Before logging, mark existing culvert locations. During and after logging, make sure that all culverts and ditches are open and functional.

3. Use compacted snow for road beds in unroaded, wet or sensitive sites. Construct snow roads for single-entry harvests or for temporary roads.

4. In wet, unfrozen soil areas, use tractors or skidders to compact the snow for skid road locations only when adequate snow depth exists. Avoid steeper areas where frozen skid trails may be subject to erosion the next spring.

5. Return the following summer and build erosion barriers on any trails that are steep enough to erode.

VII. HAZARDOUS SUBSTANCES

A. General

1. Know and comply with regulations governing the storage, handling, application (including licensing of applicators), and disposal of hazardous substances. Follow all label instructions.

2. Develop a contingency plan for hazardous substance spills, including cleanup procedures and notification of the State Department of Environmental Quality.

B. Pesticides and Herbicides

1. Use an integrated approach to weed and pest control, including manual, biological, mechanical, preventive and chemical means.
2. To enhance effectiveness and prevent transport into streams, apply chemicals during appropriate weather conditions (generally calm and dry) and during the optimum time for control of the target pest or weed.

Riparian Treatment Strategies for the Bozeman Municipal Watershed Project

Stream Class Definitions

Class 1 streams support fish or surface flow during six months of the year or more and contribute surface flow to another stream, lake, or other body of water.

Class 2 streams normally do not have surface flow six months of the year, but do contribute surface flow to another stream, lake or other bodies of water or streams that normally do have surface flow six months of the year, but do not contribute surface flow to another stream, lake or other bodies of water.

Class 3 streams rarely contribute surface flow to other streams or other bodies of water, and normally do not have surface flow six months of the year or more. These streams are typically not connected to other streams.

Riparian Treatment Strategies

Class 1 Fish Bearing Streams

Above Intakes and Leverich Creek

Helicopter Logging – 100 foot no cut buffer (See definition below)

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) - 100 foot no cut buffer

Broadcast Burning - 100 foot no ignition buffer

Below Intakes (None in Project area)

Helicopter Logging – Not Applicable

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) – Not Applicable

Broadcast Burning - Not Applicable

Class 1 Non-Fish Bearing Streams

Above Intakes and Leverich Creek

Helicopter Logging – Modified SMZ Guidelines (See definition below)

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) - 100 foot no cut buffer

Broadcast Burning - 100 foot no ignition buffer

Below Intakes

Helicopter Logging – Modified SMZ Guidelines

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) – Modified SMZ Guidelines

Broadcast Burning - 100 foot no ignition buffer

Class 2 Streams

Above Intakes and Leverich Creek

Helicopter Logging – Modified SMZ Guidelines

Ground Base Logging, Slashing or Piling (Tractor or Excavator) - 100 foot no cut buffer

Ground based logging (Cable) - Modified SMZ guidelines.

Broadcast Burning – No ignition buffer

Below Intakes

Helicopter Logging – Modified SMZ Guidelines

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) – Modified SMZ Guidelines

Broadcast Burning – No ignition buffer

Class 3 Streams

Above Intakes and Leverich Creek

Helicopter Logging – Not Applicable

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) – Not Applicable

Broadcast Burning – Not Applicable

Below Intakes

Helicopter Logging – Not Applicable

Ground Base Logging, Slashing or Piling (Cable, Tractor or Excavator) – SMZ Guidelines (See definition below)

Broadcast Burning – No buffer

No Cut or Treatment Buffers

No trees will be removed or fuels treated within designated buffers adjacent to stream channels as measured from the ordinary highwater marks. The width of these buffers will vary depending on proposed treatment and location.

Modified SMZ Guidelines

These protections were developed in coordination with The Gallatin Madison Chapter of Trout Unlimited to better meet the intent of the Trout Unlimited Settlement Agreement to the Gallatin Forest Plan 1987 and to ensure riparian protection.

No trees will be cut within 15 feet of the Ordinary High Water Mark (OHWM) along any fish bearing Class 1 or Class 2 stream segments in commercial and non-commercial treatment units. Removal of lower branches (or ladder fuels) of larger trees within this 15 foot no cut zone will be allowed if removal would not result in mortality to that tree. This mitigation measure is designed

to protect streambanks, provide thermal regulation overhead cover, augment debris recruitment, and reduce or prevent sediment delivery.

Retain all bank-edge trees maintaining stable stream banks and trees leaning toward streams that can provide large woody debris within commercial and non-commercial treatment units.

A fisheries biologist or trained fisheries technician will be present during the marking of all commercial or non-commercial treatment unit boundaries adjacent to streams and marking of leaning leave trees outside the 15 foot no cut zone.

A fisheries biologist or trained fisheries technician be given the discretion to widen the no cut buffers to protect stream channels and riparian resources if the no cut buffers (15, 50, or 100 feet) are deemed inadequate.

SMZ Guidelines

Equipment operation will be prohibited within the 50 foot wide SMZ's. SMZ boundaries will be clearly marked along on all stream segments.

Trees cut and removed within the 50 foot wide SMZ will be directionally fell and pulled out.

Bank-edge trees will be favored to leave.

Trees leaning toward streams will be favored to leave.

Sub-merchantable trees and shrubs will be retained and protected to the fullest extent possible.

Hardwoods and snags may be counted toward the retention tree requirements in approximately the same proportion as in the pre-harvest stand.

For Class 2 streams, retain at least 50% of trees greater than or equal to 8 inches DBH on each side of stream or 5 trees per 100 foot segment, whichever is greater. Note: Proposed buffers adjacent to fish bearing Class1 streams exceed what is required by SMZ compliance rules.

All trees that have fallen through natural processes, across or in a Class 1 or 2 stream must be retained.

A fisheries biologist or trained fisheries technician be given the discretion to widen the no cut buffers to protect stream channels and riparian resources if the no cut buffers (15, 50, or 100 feet) are deemed inadequate