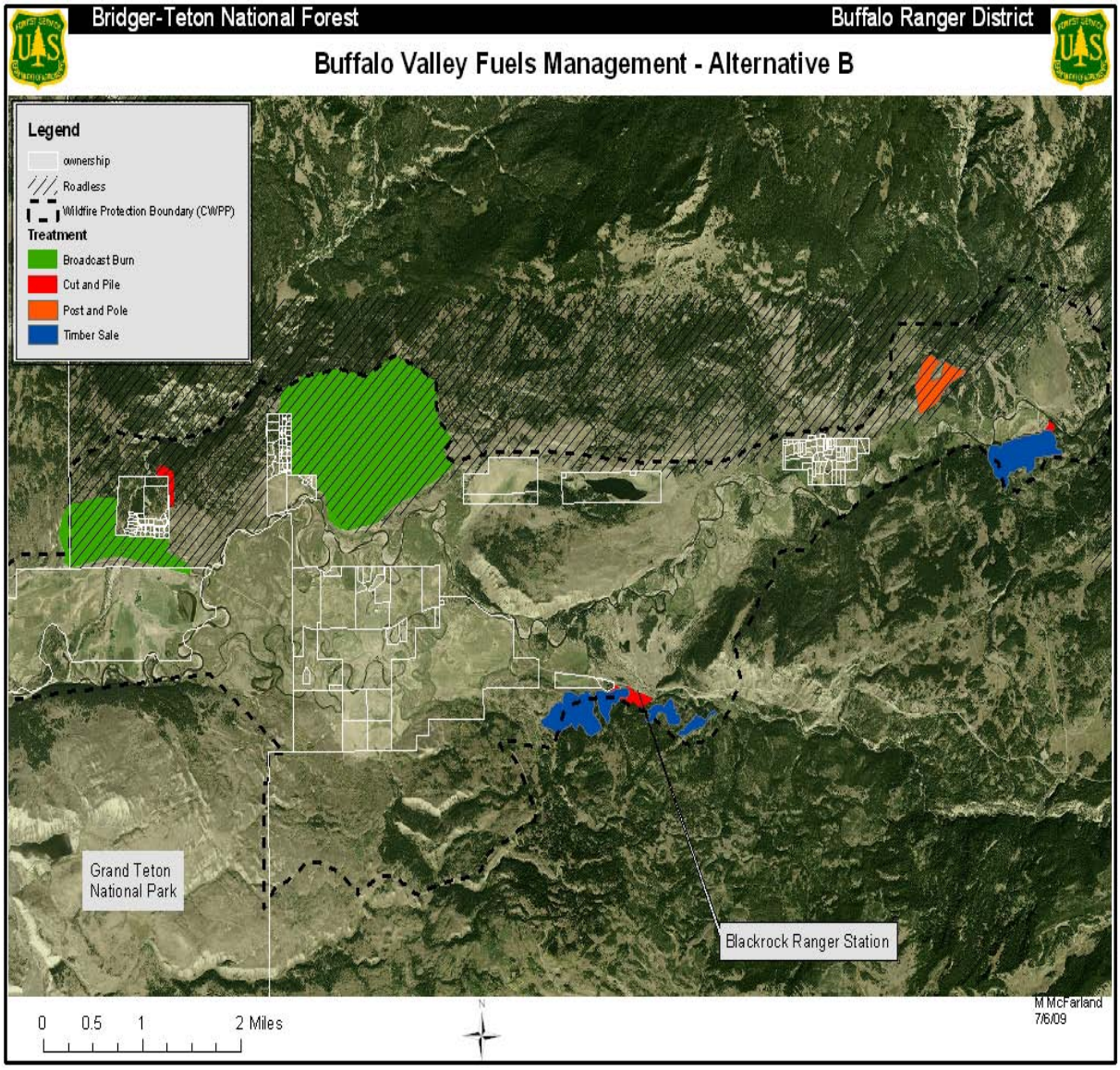
Buffalo Valley Fuels Reduction Project
Draft Environmental Assessment



USDA Forest Service, Region 4
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Table of Contents

			Page
Chapter 1		1.1 - Introduction	5
		1.2 - Background Information	5
		1.3 - Applicable Forest Plan Direction	6
		1.4 - Project Area	7
		1.5 - Purpose and Need	7
		1.6 - Issues Identified	8
		1.7 - Proposed Action	9
		1.8 - Decisions to be Made	9
Chapter 2		2.1 - Alternative A (No Action)	10
		2.2 - Alternative B (Proposed Action)	10
		2.3 - Environmental Justice	12
Chapter 3			
		3.1.1 - Recreation and Wilderness	13
		3.1.2 - Wildlife	15
		3.1.3 - Hydrology	59
		3.1.4 - Soils	67
		3.1.5 - Fisheries and Amphibians	70
		3.1.6 - Roadless and Wild/Scenic Rivers	72
		3.1.7 - Cultural Resources	74
		3.1.8 - Wild and Scenic Rivers	75
		3.1.9 - Forested Vegetation	78
		3.1.10 - Noxious Weeds	82
		3.1.11 - Fire/Fuels	86
Chapter 4		4.1 - List of Preparers	91
Chapter 5		5.1 - Literature Cited	93

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Chapter One – Introduction and Overview

1.1 Introduction

The Buffalo Ranger District of the Bridger-Teton National Forest has undertaken an analysis process under the National Environmental Policy Act of 1969 ("NEPA"). The purpose is to re-analyze and implement hazard fuels reduction treatments along National Forest and private land boundaries within the community of Moran (Buffalo Valley area) in Teton County, Wyoming. NEPA requires that the potential effects of federal actions and alternatives to those actions be disclosed to the public and that interested parties be given an opportunity and encouraged to participate in the process.

The deciding official for this project is the District Ranger for the Buffalo Ranger District, who will base his decision on interdisciplinary team analysis and public input.

1.2 Background Information

On December 5, 2007, the U.S. Ninth Circuit Court of Appeals declared the Hazardous Fuels Reduction Categorical Exclusion (CE-10) developed under the Healthy Forests Initiative invalid and issued an injunction against further use of the CE-10. The USFS responded to this ruling by applying the injunction nationwide. This has resulted in many projects being halted in various phases of completion, including the projects outlined in this document. Categorical Exclusions are a category of actions that are excluded from the requirement to prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS), which require more rigorous analysis.

The three CE-10 decisions affected by this injunction include: Blackrock Hatchet (signed 12/13/2004), Buffalo Valley Defensible Space (signed 7/28/2005) and Randolph Mountain (signed 4/6/2007). Work has been initiated and some phases of these projects have been completed. The repeal of the CE-10 authority has given the Buffalo District the opportunity to review the three decisions and combine them into a single Environmental Analysis. The basis for these projects is described below and is still valid.

The community of Buffalo Valley has been designated as a community-at-risk to wildland fire due to the proximity of numerous residences to National Forest boundaries (2001 USDA-FS and USDOI report, Teton County Community Wildfire Protection Plan). Beetle and disease infestations starting in the late 1990's have caused tree mortality to reach high levels within the mature conifer stands in the area. This combined with abundant ladder and ground fuel accumulations in and around these stands creates conditions favorable to large fire growth and resistance to control by fire crews during the typical fire season. Examples of this type of fire behavior have been seen on the Shoshone and Bridger-Teton National Forests in recent years (Little Venus Fire, 2006 WY-SHF, Hardscrabble Fire, 2007 WY-BTF). Once established, fires occurring in these types of fuels have the ability to endanger life and cause damage to property. These fuel accumulations may have been accelerated by the disturbance of natural fire cycles due to effective suppression of fires within and adjacent to the Buffalo Valley.

The need for vegetation management in this area has previously been identified and documented in the current Bridger-Teton National Forest Land and Resource Management Plan (Forest Plan) and the Teton Division Landscape Scale Assessment

(Teton LSA) of 2003. Each effort included extensive public and Forest Service interdisciplinary input and use of the best data available on forest resources. Management opportunities, practices, standards, guidelines, and mitigations have been developed to achieve desired resource conditions.

Current and historic uses of the project area are quantified in the Teton LSA and Forest Plan and include past timber harvest activities. Many old roads associated with past timber activities have been closed by rehabilitation actions, but some roads require additional work to bring them into Elimination Condition 3 or 4 (obliteration or restoration). This would improve watershed health and improve grizzly bear habitat by reducing road density.

1.3 Applicable Forest Plan Direction

The project must be consistent with the Bridger-Teton National Forest Land and Resource Management Plan of 1990.

The proposed project lies within Management Area 61 (Blackrock) as described in the 1990 Bridger-Teton National Forest Land and Resource Management Plan (pp 262-263). Additional direction regarding fire and fuels management comes from the 2004 Fire Amendment EA.

Applicable prescription standards and guidelines within Management Area 61 include:

- **Fisheries and Wildlife Prescription** – Groups of species are emphasized, such as early – or late-successional-dependent species, in order to increase species richness and diversity. Habitat is managed to achieve the game and fish populations, harvest levels, success and recreation-day objectives identified by the Wyoming Game and Fish Department and agreed to by the Forest Service.
- **Vegetation: Range Prescription** – Range is managed to maintain and enhance range and watershed conditions while providing forage for livestock and wildlife.
- **Vegetation: Timber Prescription** – Silvicultural practices including scheduled timber harvest emphasize achieving desired wildlife habitat conditions while developing long-term, overall big-game hiding cover. Utilization of firewood and other products is encouraged in ways compatible with maintaining wildlife values.
- **Access: Road Prescription**: Management of the area requires a moderate road system to provide commodity and public access. Most travel is limited to arterial and collector roads with seasonal or long-term closure of many local roads for wildlife security.
- **Protection: Fire Prescription** – Fire is managed as a tool to accomplish resource objectives while protecting identified values within acceptable levels of risk.
- **Fire Protection Standard** – A Fire Protection Program will be developed and coordinated with local, State and other federal agencies. A program for reducing fuel loadings adjacent to or on private in-holdings will be included.
- **Prescribed Fire Guidelines** – Prescribed fire may be used to accomplish resource management objectives that include reducing fuel loading to acceptable levels.

Management Area 61 is further divided into Desired Future Condition (DFC) areas that have specific management direction to accomplish Forest goals and objectives. There are seven DFC areas represented within this proposed project area. Applicable standards and guidelines will be reviewed during IDT meetings and included in the project design criteria. Management themes for the DFC's are summarized as follows:

DFC 2A – **Non Motorized Recreation Areas** – An unroaded area managed to give a quiet, almost primitive recreation experience.

DFC 3 – **River Recreation** – An area managed for river-recreation and scenery.

DFC 7A - **Grizzly Bear Habitat Recovery Through Scheduled Timber Harvest** – An area managed to provide forage and security for the recovery of grizzly bears allowing for some resource development and roads.

DFC 9A – **Developed and Administrative Sites** – An area managed for campgrounds, other noncommercial areas, and Forest Service administrative sites, including related roads and sites.

DFC 9B - **Special Use Recreation Areas** – An area managed for permitted, private recreation homes, permittees, and others offering services to the public, including related roads and sites.

DFC 10 - **Simultaneous Development of Resources, Opportunities for Human Experiences, and Support for Big-Game and a Wide Variety of Wildlife Species** – An area managed to allow for some resource development and roads while having no adverse and some beneficial effects on wildlife.

DFC 12 – **Backcountry Big Game Hunting, Dispersed Recreation, and Wildlife Security Areas** -An area managed for high-quality habitat and escape cover, big-game hunting opportunities and dispersed recreation activities.

Additional applicable Forest Plan Direction, as well as other laws and regulations that comprise the management framework pertaining to each resource topic were considered to assure compliance by each member of the interdisciplinary team. These analyses are included in each specialist report in the project file and are not included in this document for the sake of brevity.

1.4 Project Area

The project area includes the Buffalo Valley described as the Wilderness Ranch, Evergreen Estates, Buffalo Valley Estates, Heart 6, Turpin Meadows, Hatchet and Blackrock Ranger Station. The project area is spread out from west to east across approximately 10 miles stretching from the Grand Teton National Park boundary to just across Forest Service Road 30050 (Four Mile Meadow Road over Rosies Ridge). The project area extends from about ½ mile south of the Teton Wilderness Boundary to ½ mile south of the Blackrock Ranger Station. The project area includes 8 treatment polygons totaling approximately 1700 acres all located within or adjacent to Teton County Community Wildfire Protection Plan (CWPP) boundaries established in 2005.

1.5 Purpose and Need

Based on evaluation of fuels, fire event probabilities, and access, there is a need to reduce existing hazardous fuel loadings, remove beetle killed snags and reduce ladder fuels within and adjacent to Buffalo Valley residential developments including the Teton Wilderness Ranches, Evergreen Estates, Buffalo Valley Estates, Heart 6 Ranch, Fir

Creek Ranch, Rosie's Ridge Subdivision, Turpin Meadows area, Hatchet Ranch area, and Blackrock Ranger Station.

Fuel reduction treatments consider crown fire events moving towards the area or initiating within the wildland urban interface and are designed to minimize crown fire spread and maximize the effectiveness of suppression resources. Additionally, fuel reduction treatments within the wildland urban interface aid in decision making to allow fire to play its natural role as much as possible in the adjacent Teton Wilderness. Important wildlife habitats also exist in these areas. Enhancement of elk, moose and other habitats in concert with fuel reduction is part of the purpose and need of this analysis. Management of unplanned fire ignitions within the Teton Wilderness creates unique challenges when considering the location of private property throughout the nearby Buffalo Valley, and the proposed hazard fuel reduction projects will reduce the risk of property damage or loss of human life while allowing fire to play its natural role within the ecosystem.

The Buffalo Ranger District proposes to reduce fire risk on National Forest Lands in the Buffalo Valley by using the following vegetation treatments:

- Thinning of dead and live standing trees, removal of dead logs and other forest fuels on the ground, and pruning of lower branches on remaining live trees to minimize crown fire initiation and spotting.
- Removing conifer and mature aspen to promote aspen regeneration as a buffer to fire spread and to reduce fire behavior.
- The use of prescribed fire, mechanical removal, and/or herbicide to reduce fuel continuity and burning intensity of sagebrush and grass fuels near private lands.
- Broadcast burning to modify existing fuel models to reduce flame lengths, and/or for maintenance of mechanical or chemical treatments in all fuels and to promote aspen stands as fuel breaks.

1.6 Issues Identified

The Forest Service interdisciplinary team identified the following issues, reaffirmed by comments received during field trips and public comment received during the scoping period.

1. The interaction between beetles and wildland fire is difficult to quantify and changes from site to site depending on amount of beetle activity, size class of vegetation affected by beetles, and timing of fire event during the beetle outbreak.
2. A combination of standing dead, standing red needled, accumulated dead and down, attacked green trees, and healthy green trees across the landscape creates difficulty in modeling fire behavior and resistance to control.
3. A wide variety of wildlife utilize this area for all or part of their life cycle. Changes to forest structure could lead to changes in wildlife use or wildlife preferences in the area.
4. Soil disturbances create conditions that favor non-native plant species. Control of exotic plant species must be considered in project design and implementation.

5. There is a concern that exposing and disturbing soil with timber harvest and prescribed burning may lead to increased sediment delivery to streams and adverse impacts to water quality.
6. There is a concern that timber harvest and prescribed burning may adversely impact wetlands and floodplains.
7. Risk of escaped prescribed fire could damage the values in areas identified for protection under this analysis.
8. Prescribed fire may contribute to poor air quality in the area during the burn.
9. Commercial timber removal may create the potential for nonsystem roads and increased unauthorized motorized forest access.

1.7 Public Involvement

Because of the loss of the CE-10 authority in 2008, the USFS has re-initiated the public involvement portion of this analysis with special emphasis on clarifying results from scoping 3 separate CE-10 projects beginning in 2004, each with similar purpose and need. Based on internal and external feedback a new Project Initiation Letter (PIL) for the Buffalo Valley Fuels Project was mailed to over 200 addresses on March 19, 2009; the letter and corresponding map and PIL posted in the USFS Correspondence database. At that time, a Statement of Proposed Action was forwarded to the Jackson Hole News and Guide, Planet Jackson Hole and the local radio and television stations. This public involvement effort requested to have comments back to the Buffalo District Office by April 30, 2009. By May 10 the Inter-Disciplinary Team Leader had received six letters regarding the project.

On August 4, 2009 Jackson Hole Fire-EMS sponsored a public meeting at the Moran Fire Station (Station 4) to discuss “Firesmart Communities” and invited the team leader to attend to talk about the proposed project. Eight community members and some employees of the Bridger-Teton National Forest and the Grand Teton National Park attended the meeting.

1.8 Decision to be Made

At this time, based on scoping and interdisciplinary team analysis, the Responsible Official (the Buffalo District Ranger) has decided that a Decision Notice and Finding of No Significant Impact (FONSI) is appropriate. Based upon additional analysis and public/partner input received during the comment period, a final alternative will be selected for implementation.

Chapter Two – Alternatives

A no action alternative and a proposed action, were developed by the ID Team from identification of issues and scoping and were analyzed in this Predecisional (often referred to as "Draft") EA.

2.1 Alternative A (No Action)

Alternative A is the No Action Alternative. Under this alternative forest fuels would remain in their current condition with additional overstory tree mortality occurring due to heavy bark beetle infestations currently affecting the area. Forest models indicate dead and down fuel loading will continue to increase especially in areas dominated by Douglas Fir due to pre-existing rot and susceptibility to wind throw. Similarly, additional light reaching the forest floor may increase forest surface fuels (shrubs and grasses) in some areas and conifer regeneration in others. The forest canopy will open with remaining live overstory trees mixed with standing dead trees and red needle trees from recent beetle mortality.

Fire behavior modeling indicates fire spread similar to current forest structure with higher windspeeds needed to maintain crown fires due to more open stand conditions. Higher dead and down fuel loads increase the potential for embers to land on receptive fuel beds (dead and down logs) and increase the amount of spots likely to come from a single torching tree.

With Alternative A, forest fuels will accumulate, surface fuels will be exposed to higher wind speeds, and remaining trees will be subjected to higher fireline intensities in the event of a fire burning into the area. This translates into higher resistance to control of fires in areas with intact forest canopy; and, more suppression resources necessary to control or divert fire spread. Wildfires moving out of the Teton Wilderness would experience no change in vegetation other than naturally occurring fuels variations associated with beetle disturbance, soils, and topography.

2.2 Alternative B (Proposed action)

Alternative B is the originally-scoped proposed action. Under this alternative targeted fuel reduction and prescribed fire will create or maintain an open understory. This alternative has multiple treatment polygons designed to protect private property from wildland fire. This alternative has been developed in coordination with Jackson Hole Fire/EMS and the Teton County Community Wildfire Protection Plan (CWPP). The following table outlines the proposed treatments:

Table 1. *Summary of acreage treatments by alternative.*

Buffalo Valley Fuels Project Units	A: No Action Alternative	B: Prescribed Fire & Mechanical Treatment Alternative
Lava Creek RX Burn		259 acres

Heart Six Rx Burn		1072 acres
Turpin Lodge Timber Sale		110 acres
Blackrock-Hatchet Timber Sale		158 acres
Turpin Cut and Pile		7 acres
Blackrock-Hatchet Cut and Pile		29 acres
Wilderness Ranch Mechanical Cut & Pile		17 acres
Box Creek Post & Pole Sale		41 acres
	Acreage Summary No new acres treated	**Acreage Summary** Cut & Pile: 53 ac Timber Sale: 268 ac Prescribed Fire: 1331 ac Post & Pole Sale: 41 ac

2.2.1 Prescribed Fire Treatment

Lava Creek Prescribed Burn: This site consists of 259 acres of sagebrush/grass, mountain shrub, mixed conifer, and aspen. Objectives for the treatment include breaking up the continuity of brush fields, and maintaining or increasing the coverage of aspen stands in the area. This will reduce the potential for high intensity fires, allowing firefighters to safely and efficiently suppress fires. Under all but the most severe fire weather conditions, fire spread will be limited to a low intensity ground fire that can be attacked by firefighters on the ground. Torching of trees and the potential for a fire to develop into a crown fire will be reduced. It is expected that successful completion of this prescribed fire will increase chances for controlling wildfire before it reaches private structures.

Heart 6 Prescribed Burn: This site consists of 1072 acres of sagebrush/grass, mixed conifer and aspen. Targeted burn areas include the understory of Douglas fir and lodgepole pine stands where reintroduction of fire would aid in creating fire resistant Douglas fir trees in the smaller size classes not currently affected by direct beetle attack. This “light burn” approach will re-establish the natural fire return interval to these stands making them better able to withstand future natural fire events.

2.2.2 Commercial Timber Sale

Turpin Lodge Timber Sale and Blackrock Hatchet Timber Sale: These commercial timber sales are designed to create open forest stands adjacent to values at risk while providing merchantable timber products. While beetle activity will eventually create open stands, it will also greatly increase dead and down fuel loading over time. These timber sales will remove dead, infected and live trees in order to promote more healthy stands with much lower fire behavior in the event of a fire burning into the areas.

2.2.3 Mechanical Cut and Pile

Turpin, Blackrock-Hatchet, and Wilderness Ranches Mechanical Cut and Pile: These small scale projects target boundaries between National Forest System lands and private property to create defensible space by removing dead and down fuels, ladder fuels and thinning overstory trees. This prescription has proven effective in slowing fire spread and crown fire initiation.

2.2.4 Post and Pole Sale

Box Creek Post and Pole Sale: This public sale of marked green post and poles along the Box Creek Trailhead and Campground access road has been designed to reduce canopy closure and ladder fuels to aid in minimizing fire spread away from the campground area and to create a fuel break along the Buffalo Valley Road to allow management of more naturally occurring fires adjacent to or in the Teton Wilderness. It also addresses a demonstrated need in the area for a source of green post and poles.

2.2 Environmental Justice

Based on interdisciplinary team analysis and scoping results, the proposed action and the no action alternatives do not pose a disproportionately high and adverse environmental, human health, or social effect on the counties impacted, and there are no known community-identified environmental justice-related issues.

Chapter 3 – Affected Environment and Environmental Effects

3.1 Affected Environment and Effects by Discipline

3.1.1 Recreation

Affected Environment

The Bridger-Teton Forest niche emphasizes a variety of quality recreation opportunities and maintaining a healthy and vibrant ecosystem (considered the largest intact ecosystem in the lower 48 states). The Buffalo Valley provides recreation opportunities for fishing, hunting, photography, hiking, and a substantial number of stock based activities. Five resorts and outfitter-guide operations in the Buffalo Valley provide day rides, wagon rides, hunting, and are the base of operations for summer progressive travel trips primarily in the Teton Wilderness.

The Buffalo Valley provides habitat and prey for a number of economically important big game, T&E, and sensitive species including elk, moose, grizzly bear, bald eagles, peregrine falcon, sage grouse, Canada Lynx, and the Gray Wolf. Not only are these species critical ecosystem components, but in addition, the hunting, photographic, and sightseeing opportunities provided by these species draw millions of tourists to the Greater Yellowstone Ecosystem (GYE) every year.

The predominant recreation activities potentially affected by the proposed projects in Alternative B are as follows:

1. Wilderness Ranches: The Davis Hill parking area provides an access point for private and outfitted Day Use hunting opportunities on Randolf Mountain, Davis Hill, Lava Creek, and Grand Teton National Park (GTNP). There is a very minor amount of private day ride activity that initiates from the Davis Hill parking area.
2. Randolf Mountain: Heart Six Dude Ranch and Box K have a number of outfitted Day Ride routes present in the prescribed burn area. The day ride activity consists of a maximum 2260 service days. A minor amount of outfitted fall Day Use hunting may occur in the project area. However, proximity to the inhabited areas precludes much big-game activity during the hunting season.
3. Turpin Meadows-Box Creek: Outfitted day rides are a primary recreation activity in the project areas. Wagons West and Turpin Meadows Ranch have a maximum of 6500 service days in the project areas. The Box Creek campground provides overnight campsites and trailhead access to the Teton Wilderness.
4. Blackrock: Day hiking and hunting activity may occasionally occur in this small project area.

The primary recreation activity affected by the preferred Alternative B is outfitter sponsored day rides, and to a much lesser extent private day rides. The predominant portals for private day rides within the Buffalo Valley are Turpin Meadows and Box Creek Trailheads, and to a substantially lesser extent, Lava Creek and Davis Hill Trailheads. For the most part, these trailheads fall outside or on the periphery of the proposed

Alternative B projects. Consequently, only the Wilderness Ranches prescribed burn in the vicinity of Davis Hill will potentially affect private day ride activities.

In contrast, the Randolf Mountain prescribed burn and the Turpin Meadows-Box Creek timber sale, post-and-pole sales, and the cut-and-pile activities under Alternative B will have a direct influence on outfitter-guide sponsored day ride activities. The affected outfitter-guide operations, i.e. Heart Six Dude Ranch, Wagons West, and Turpin Meadows Ranch, were contacted to collect information on day ride routes and gain their perspective on Alternative B and how to mitigate concerns.

Direct and Indirect Effects - described by location within the project area.

1. Wilderness Ranches: Both Alternative A and B will have little effect on recreation hunting and day riding activities. The proximity of the project area to private habitations and major roads limit hunting opportunities. The proposed projects will not hinder access to the heavily used hunting areas beyond the project area in GTNP and the Teton Wilderness. The prescribed burns potentially could open up high quality viewing opportunities by removing dense stands of conifers. Aspen clones, prized for aesthetics, are intended to be regenerated under Alternative B. The effectiveness of aspen regeneration will be dependent on ungulate browsing intensity.
2. Randolf Mountain: The prescribed burns proposed in Alternative B potentially could have an undesired affect on day ride activities. However, there are several mitigation measures that can be employed to reduce the impact to the commercial day ride activities. The target stands for burning are predominantly dense timber on west and northwest aspects. The day ride trails typically are located in open sagebrush and willow-sedge areas and along open ridgelines where views are maximized (see photos in Appendix A). Therefore the majority of trails will not be directly affected by the target stand burns. In addition, the outfitter operations have several alternate routes to day ride and it will be advisable to contact the outfitter prior to burning in order to suggest an alternate route be used if necessary. Even more effective will be timing the prescribed burns to avoid the operating period and tourist season. The operating period runs from June 1 through September 15th with the majority of use during mid-summer. Prescribed burning outside this operating season would effectively mitigate visual and smoke influence on the day ride operations. The proposed Alternative B is intended to help meet the Forest Plan recreation management objectives of “maintaining a desired vegetative mix and character”. The prescribed burns are intended to regenerate aesthetic aspen stands as prescribed in the Forest Plan. The outfitter-guide operations also acknowledge the importance that reducing fuel loading adjacent to their resorts and permitted operations has toward safety and protection of their operations. Any short term inconvenience caused by the fuel reduction activities will be offset by the long term goal of managing potential wildfire fuels and risk to private and special use operations.
3. Turpin Meadows-Box Creek: Box Creek - The post and pole sales in this area will affect recreation in two primary ways, public visitors using the Box Creek campgrounds and the outfitter day ride trail that ties into the FS Box Creek system trail from Wagons West. The post and pole sales under Alternative B will open up the Forest understory and increase tree spacing, and thus, improve the visual aesthetics for day ride activities as compared to the existing denser forest growth. Forest resource users with post and pole sales that occur during the operating season must use care to contact and work with the outfitter in order to prevent

hazards to clients from tree felling. It is recommended that the post and pole permits be issued outside the operating season of June 1 through September 15th. Likewise, post and pole cutting near the Box Creek campground must be attentive to the safety of campground guests. However, when completed the post and pole sales and cut and pile fuels reduction will help reduce hazard trees near the campground and resort. The Turpin Meadows timber sale will most likely render the day ride trails through the proposed timber sale area unusable for several years. The trail should be closed during logging operations. It would help mitigate impacts to the recreation experience by timing the logging activity after the day ride season on September 15th. In addition, the trail will most likely not be desirable to use until slash piles are burned and the understory vegetation has an opportunity for regrowth to occur. Fortunately, there are a number of alternate trails north and east of the project area available to the resort.

4. Blackrock: The proposed cut and pile area near the Hatchet resort is relatively small. Little formal recreation activities occur within the affected area. There are no outfitter sponsored day riding or hunting activities in the project area. There is a relatively small amount of day hiking and fall hunting out of the Blackrock parking lot and Hatchet resort, but the hikers and hunters quickly traverse through and out of the proposed project area. The proposed cut and pile or timber sale project will open up access and the views by thinning and removing ladder fuels. Removal of ladder fuels will help protect the resort property and recreation activities generated by the private resort.

Conclusion – Recreation Effects

The fuel reduction projects as proposed in Alternative B will have an effect on recreation activities within the Buffalo Valley. The primary recreation activity affected is outfitter-guide sponsored day rides, and to a minor extent, private day riding and hiking activities. Hunting activities will largely be unaffected due to the proximity of the project areas to developed or inhabited areas precluding big game use during the hunting season. Some of the affects to the day use activities will be beneficial including fuel reduction around private and special use operations, opening up views, promoting aesthetically valued aspen clone regeneration, and managing for a mix of vegetation types. The detrimental effects will be short lived and can be mitigated by timing of the fuel reduction activities, using alternate trail routes, and maintaining communications with the outfitter operations.

Most of the day ride and system trails are located in open areas or along ridgelines and will be unaffected by the proposed activities. Whereas the proposed activity will target ladder fuels and localized dense conifer stands.

In summary, Alternative B is considered to have an overall beneficial effect on the recreational activities within the project areas and Buffalo Valley cumulatively. Detrimental effects will be minor, easily mitigated, and of short duration.

3.1.2 Wildlife

Affected Environment - Wildlife Species Analyzed

Species considered in this analysis include Endangered Species Act (ESA) Threatened, Endangered, Experimental, and Candidate Species, Forest Service Sensitive Species, and Forest Plan Management Indicator Species (MIS) (USDA Forest Service 1990). Tables of all the species in these categories that are known or suspected of occurring on the Forest, including their status, habitat preference, whether the habitat or species are present in the analysis area, and whether the habitat or species will be impacted by proposed treatments are found within this document.

THREATENED, ENDANGERED, EXPERIMENTAL, AND CANDIDATE SPECIES

Canada Lynx *(Lynx Canadensis)*

Description of Species Habitat Needs

Canada lynx are solitary carnivores, generally occurring at low densities in boreal forest habitats. In most of their range, Canada lynx densities and population dynamics are strongly tied to the distribution and abundance of snowshoe hare *(lepus americanus)*, their primary prey. Foraging habitat for lynx is typically described in terms of suitability for their primary prey; snowshoe hares. Hares use both young even-aged and older multi-storied conifer stands that are densely stocked with seedlings or saplings, tall enough to provide cover and browse for snowshoe hares above winter snow depth (Koehler and Brittel 1990, Zimmer et al. 2009, Berg 2009 unpublished data). Buskirk et al. (1999) suggested that snowshoe hare abundance should be high in sapling and old, “gap phase” forests, where tree mortality and snag loss create gaps in the mature forest canopy allowing increased understory production.

Status of Species in Proposed Project Area and Vicinity

Project areas contain patches of mapped “suitable” lynx habitat according to the BTNF GIS database; project areas are included in designated Critical Habitat for lynx. Snow track surveys conducted by Endeavor Wildlife Research Foundation (EWR) over the past several years on the Buffalo Ranger District have verified lynx presence during the winters of 2004/05, 2005/06, 2006/07, 2007/08, and 2008/09 (Berg et al. 2005, Berg et al. 2008, Berg et al. 2009, and Smith et al. 2006). Approximately 50 sets of lynx tracks and multiple individual lynx have been uniquely (DNA) identified using portions of the Buffalo RD at higher elevations, primarily in the vicinity of Fourmile Meadow/Lily Lake on the west, Teton Wilderness on the north, Split Rock Creek/Squaw Basin on the east, and Grouse Mountain/Upper South Fork Spread Creek on the south (Figure 1 below). No known lynx detections have been made within the project units. The nearest recent lynx track detection was made by EWR during winter 2006/07 approximately 1 mile SE of the Turpin Timber Sale unit.

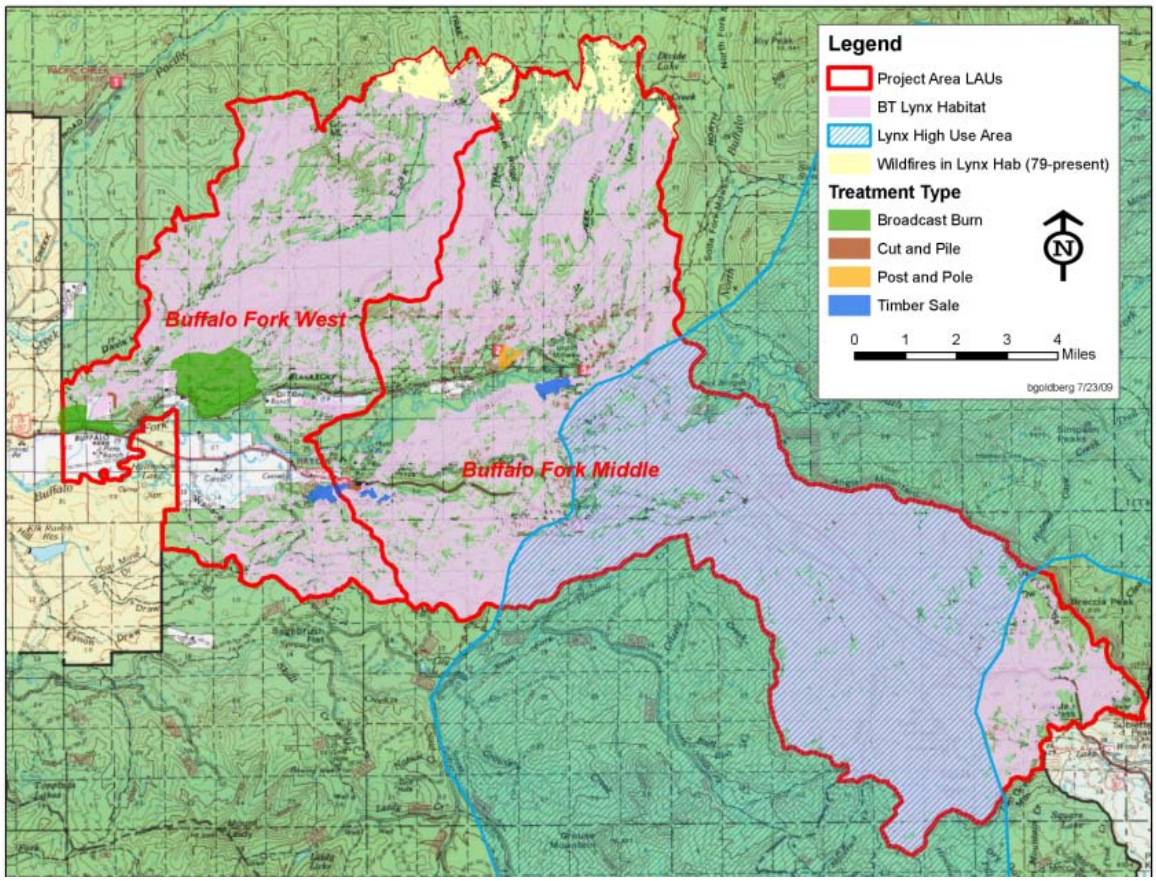

Figure 1. *Units by treatment type, Lynx Analysis Units with associated habitat conditions in the Buffalo Valley Fuels Management Project Area, and documented Lynx High Use Area on the Buffalo Ranger District.*

Lynx on the Buffalo Ranger District and elsewhere in the Greater Yellowstone Ecosystem (GYE) comprise the southern most natural lynx population in the Continental United States (Squires et al. 2003). Lynx in the GYE make up the only non-introduced population in the United States that is not immediately adjacent to the Canadian border. In addition to lynx on the Buffalo Ranger District, resident lynx have been documented on the Big Piney, Greys River, and Kemmerer Ranger Districts in the Wyoming and Salt River Ranges to the south (Squires et al. 2003), and to the north on the east side of Yellowstone Lake in Yellowstone National Park (Murphy et al. 2006); in both cases multiple adults and kittens were documented. One individual lynx first identified in the Wyoming Range to the south and a separate individual lynx first identified in Yellowstone National Park to the north have been documented traveling through and residing for multiple years respectively on the Buffalo Ranger District (Squires et al. 2003, Murphy et al. 2006). Additionally, lynx from the recent reintroduction effort in the state of Colorado have resided on the Buffalo Ranger District for consecutive years until the present. Due to historic harvest records it is believed that lynx were fairly common in certain portions of the BTNF until the early 1980s (Wyoming Natural Diversity Database 2003). Since that time the number of animals has declined, and at present, only a very low-density population remains (Squires et al 2003, Berg et al. 2008).

Based on a collaborative USFS study conducted on the BTNF, which included the Buffalo Ranger District, from 2006 to 2008 it is understood that both young even-aged and older multi-storied forest types with dense understory horizontal cover can support

abundant snowshoe hare densities (0.5-5.0 hares per hectare) on this forest (Berg 2009 unpublished data); these densities meet and/or surpass requirements thought necessary for successful recruitment of lynx kittens (Ruggiero et al. 2000). Even though hare densities can be high on the BTNF, lynx home ranges in the southern part of their range are large, likely indicating that appropriate habitats containing abundant populations of snowshoe hares are uncommon in the broader landscape matrix and often only found in isolated patches thus requiring individual lynx to incorporate several of these "good" patches into their home ranges in order to persist. Snowshoe hares in Wyoming are not believed to exhibit the dramatic population cycles that they do in Canada and Alaska (Hodges et al. 2000). Where snowshoe hares are limited Canada lynx at the southern end of their range may opportunistically hunt alternate prey species such as red squirrels and forest grouse; which are most abundant in multi-storied boreal forests on the BTNF (Berg 2009 unpublished data). However, it is not believed that lynx can successfully recruit their young into the population on a diet composed primarily of alternate prey species.

Two radio-collared lynx in the Wyoming and Salt River Ranges in the southern portion of the BTNF appeared to avoid clearcuts and pure aspen stands, and most use was concentrated in high elevation conifer stands (Squires et al. 2003). Likewise backtracking data from lynx snow trails on the Buffalo Ranger District indicated that lynx utilized high snowshoe hare densities in both older multi-storied forests and dense young 30-70 year old even-aged lodgepole pine forests regenerating after a natural or mechanical disturbance and tended to avoid sparsely regenerating stands and other large openings (Berg et al. 2005, Berg et al. 2008, Smith et al. 2006).

Lynx Habitat Status in the Project Area

Most forest stands in project area units are low elevation, contain relatively sparse stem densities with low horizontal cover in the understory, and are found at the valley-foothill interface. Horizontal cover measurements recorded according to standard protocol (Bertram and Claar, 2008) in treatment units were well below critical thresholds in all survey locations and no snowshoe hare fecal pellets were observed on associated pellet plots (Berg 2009 unpublished data) (Table 2). The project area units do not currently support good foraging habitat for lynx, and historically their value to lynx and snowshoe hares was likely limited also. Historically, wildfire may have improved habitat conditions for lynx and hares in some isolated locations within the project area by promoting dense natural regeneration. However, in most instances wildfires at these lower and drier locations likely opened up forested sites and promoted the expansion of grass/forb and sagebrush communities.

Table 2. *Summary of snowshoe hare horizontal cover measurements and fecal pellet counts, with associated habitat photos and description, for the proposed treatment units within the Buffalo Valley Fuels Project Area, July 10, 2009.*

Treatment Unit and # of plots	Horizontal Cover Reading (%)	Snowshoe Hare Pellet Count	Photos (#)	Notes
Lava Creek (2)	No cover measurement recorded due to lack of habitat.	0	4	No lynx habitat present; just open sage, aspen, and a couple Douglas fir.
Blackrock/Hatchet A	20.63%	0	8	Mostly Douglas

(2)				fir and lodgepole pine.
Blackrock/Hatchet B (1)	18.13%	0	4	Mostly Douglas fir, lodgepole pine, with limited sub-alpine fir and spruce.
Blackrock/Hatchet C (1)	26.88%	0	4	Mostly Douglas fir, lodgepole pine, with limited sub-alpine fir and spruce.

*All plots were located outside of the Wildland Urban Interface (WUI).

In accordance with the Lynx Conservation Assessment and Strategy (LCAS; Ruediger et al. 2000), Lynx Analysis Units (LAUs) have been delineated across the BTNF and provide the fundamental scale with which to evaluate and monitor the effects of management actions on lynx habitat. The project area occurs in two LAUs (Buffalo Fork West and Buffalo Fork Middle), which total about 90,614 acres. Potential lynx habitat has been mapped following criteria in the LCAS. The LAUs encompass both lynx habitat (potential denning and foraging habitat which may, or may not, currently be in suitable condition) and non-lynx habitat, such as lakes and rock talus. About 727 acres within the treatment units have been identified and mapped as lynx habitat. Table 3 depicts the acreage of lynx habitat and the present condition of that habitat in the project area.

Table 3. *Canada Lynx Habitat in the Buffalo Valley Fuels Project Area.*

Lynx Analysis Unit (LAU)	Total LAU (Acres)	Lynx Habitat (Acres)	Lynx Habitat Treated (Acres)	Total Acres Burned by Wildfire (1979-present)	Lynx Habitat Burned by Wildfire (1979-present)	Acres of Prescribed Fire (1979-present)	Timber Harvest Acres (1989-present)
Buffalo Fork West	30,226	17,128	504	957	759	1,094	469
Buffalo Fork Middle	60,388	46,275	223	2,599	1,243	539	70
Totals	90,614	63,403	727	3,556	2,002	1,633	539

*Most acres proposed for treatment are within the Community Wildfire Protection Plan (CWPP) and Wildland Urban Interface (WUI) boundary.

During 1988 wildfires north of the project area reduced the availability of lynx habitat in and adjacent to Buffalo Fork West and Buffalo Fork Middle LAUs, especially within the Teton Wilderness and Yellowstone National Park. Timber Harvest and use of prescribed fire has been minimal within the project area.

Vegetation disturbance, in the form of grazing by cattle and stock, has occurred on some sites within the project area; however, areas grazed by cattle and stock for the most part do not overlap with preferred lynx and snowshoe hare habitat. Disturbance in the form of beetle-killed Douglas fir and lodgepole pine trees has occurred recently, and continues to occur within the project area. The entire BTNF is currently experiencing a pine beetle epidemic and thousands and thousands of trees are dying as a result. Little is known as to what affect this pine beetle epidemic will have on lynx and snowshoe

hares and their habitat in the short-term; in the long-term (30 years post disturbance) increased large woody debris, dense young trees and other vegetation in the understories of affected forests may improve habitat conditions for lynx and hares.

Canada Lynx Critical Habitat

The US Fish and Wildlife Service (Service) published a Rule (74 FR 8616) on February 25, 2009 designating revised critical habitat for the contiguous United States distinct population segment of Canada lynx. Much of the BTNF is included in the Unit 5-Greater Yellowstone Area (GYA) portion of the designated critical habitat, which encompasses approximately 10,590 square miles or 6.08 million acres.

Section 7(a)(4) of the Act, as amended, requires Federal agencies to confer with the Service on any action that is likely to result in destruction or adverse modification of designated critical habitat. Federal action agencies may also request a conference on any action that may affect designated critical habitat. The Service can then assist the action agency in determining effects to designated critical habitat through an informal conference process.

The Service considers the physical and biological features to be the primary constituent elements (PCEs) laid out in the appropriate quantity and spatial arrangement for the conservation of the species. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, we have determined that the primary constituent element for lynx critical habitat is: (1) boreal forest landscapes supporting a mosaic of differing successional forest stages and containing: (a) presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface; (b) winter snow conditions that are generally deep and fluffy for extended periods of time; (c) sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and (d) matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

Gray Wolf *(Canis lupus irremotus)*
Population and Habitat Status

Gray wolves were originally classified as Endangered in 1967 under the Endangered Species Preservation Act of 1966. In 1973, the northern Rocky Mountain wolf subspecies was listed as Endangered under the ESA of 1973. The USFWS began reintroducing the gray wolf into Yellowstone National Park in 1994, and classified this population as "nonessential experimental wolves," according to section 10 (j) of the Endangered Species Act of 1973, as amended (U.S. Fish and Wildlife Service, 1994). Although wolves in Wyoming remain listed and protected under the ESA, additional flexibility is provided for their management under the provisions of the final rule and special regulations promulgated for the nonessential experimental population of introduced wolves.

Gray wolves were historically found throughout Wyoming, but were virtually exterminated from the western United States by the 1940s. Wolf reintroduction efforts in Yellowstone occurred in 1995 and 1996, and a total of 31 wolves were released over this

period. Populations became established within two years of reintroduction, instead of taking the three to five years that had initially been projected. In 2004, at least 121 wolves comprising 16 packs were present in Yellowstone National Park (YNP). Outside YNP, at least 89 wolves made up 10 packs (USFWS 2005). While recovery goals have been surpassed, a State management plan has not been approved to date by the USFWS. Therefore, management authority of wolf populations occurring in the state of Wyoming still falls to the USFWS.

Status of the Gray Wolf in the Proposed Project Area

Since 1999, several wolf packs have utilized the general area in which the Buffalo Valley Fuels Management Project is located, and multiple den sites have been located in the Buffalo Valley and Jackson Hole area but none within the proposed treatment units. In 1999, the Teton and Gros Ventre became the first known established packs in the Jackson Hole area. Since at least 2003, wolves have been yearlong residents on the Buffalo Ranger District. By 2006, the Buffalo Fork and Pacific Creek Packs were well established on the Buffalo Ranger District, including the general project area, and both packs produced litters. From 2006 to present, pack dynamics have remained similar with the Pacific Creek Pack generally utilizing areas north of the Buffalo Fork River and the Buffalo Fork Pack generally utilizing areas south of the Buffalo Fork River. In 2005, the Pacific Creek Pack was composed of 11 wolves (number of adults and pups unknown). In 2006, the Pacific Creek Pack had 9 members (5 adults and 4 pups) and the Buffalo Fork Pack had 13 members (6 adults and 7 pups). In 2007, the Pacific Creek Pack had 13 members (9 adults and 4 pups) and the Buffalo Fork Pack had 13 members (7 adults and 6 pups). In 2008, the Pacific Creek Pack had 13 members (9 adults and 4 pups) and the Buffalo Fork Pack had 9 members (7 adults, and 2 pups). Pack numbers have not been released yet for 2009. Other packs in the vicinity include the Teton Pack which is generally located west of the Buffalo Valley Fuels project area and the Togwotee Pack which is generally located east of the project area. Additional sightings of single wolves have also been documented in the Buffalo Valley area for several years post reintroduction and wolf activity is considered common in the project area, year-round.

Yellow-billed Cuckoo (*Coccyzuz americanus*)

Population and Habitat Status

Yellow-billed cuckoos are found in the Nearctic and Neotropical regions. They breed throughout eastern North America, in southeast Canada, northern Mexico and the Greater Antilles. They winter primarily in South America (Peru, Bolivia and northern Argentina). In this region yellow-billed cuckoos prefer open woodlands with clearings and a dense riparian shrub layer. They are often found in woodlands near streams, rivers or lakes. In North America, their preferred habitats include abandoned farmland, old fruit orchards, successional shrubland and cottonwood groves with dense riparian thickets. In winter, yellow-billed cuckoos can be found in tropical habitats with similar structure, such as scrub forest and mangroves.

There have been no yellow-billed cuckoos documented in the project area; however, no surveys have been conducted for the species in the Buffalo Valley area. In 2006 one carcass of a yellow-billed cuckoo was observed along the Snake River a few miles south of Jackson, Wyoming during fall migration (S. Patla, Personal Communication 2009). The nearest known nesting pair of cuckoos is near Heise, Idaho along the South Fork of

the Snake River (S. Patla, Personal Communication 2009). The occurrence of yellow-billed cuckoos is considered rare in nearby Grand Teton National Park during the spring, summer, and fall months.

SENSITIVE AND MANAGEMENT INDICATOR SPECIES

Species Relevancy Screen

The National Environmental Policy Act directs the Forest Service to focus on a full and fair discussion of significant issues, and identify and eliminate from detailed study the issues that are not significant. Some elements of wildlife habitat require a detailed analysis and discussion to determine potential effects. Other elements may not be affected; may be affected at a level that does not influence use, occurrence, or the decision to be made; or can be adequately addressed through design of the project. These elements then do not necessarily require detailed analysis.

Sensitive species known to occur on the Bridger-Teton National Forest were reviewed for their relevancy to the proposed action and the wildlife analysis area. Relevancy was determined if there is evidence of species occurrence, capable and/or suitable habitat present, or potential for the proposed action to affect a species or its habitat. Some species or habitats do not occur in the wildlife analysis area and no further analysis is necessary. Other wildlife species or habitats may occur in the wildlife analysis area, but are not measurably affected because they would not be affected by the proposed action, the impacts would not influence species use or occurrence, or the design of the project adequately addresses the concerns.

The assessments of the potential for effects made in this screen consider the scope and nature of the activities associated with the proposed action, the potential risks for adverse impacts, and the ability to determine potential effects based on available information at the time of this phase of the analysis. If the potential for effects cannot be determined with a reasonable degree of confidence in this process, then additional analysis was conducted.

Table 4 and Table 5 display the results of the relevancy screening process and provide an explanation of the rationale. Species with a determination of No Impact (NI) are not discussed further in this document.

Table 4. Screening Process and Results – Sensitive Species

Species	Species or habitat present in project area Species / Habitat[1]		Determination of effects[2, 3]	Habitat Rationale/Comments
Birds				
Bald eagle (*Haliaeetus leucocephalus*)	Y	Y	NI	This species requires nesting trees/platforms near large rivers or lakes and available fish and water bird species prey. Nesting habitat not present in project area. The project area does contain some potential secondary foraging habitat in the form of smaller streams, meadows and ungulate winter range. It is possible that bald eagles forage for winter-killed ungulates and gut piles left by hunters. The proposed vegetative management activities would not influence the ability of the area to provide secondary foraging habitat. No further analysis is necessary.
American Peregrine Falcon (*Falco peregrinus anatum*)	N	N	NI	Peregrines have relatively strict nesting requirements: vertical cliff habitat with large potholes or ledges that are inaccessible to land predators and are preferentially located near habitat that has a high avian prey population such as wetlands, large bodies of water, or rivers. Cliff nesting/roosting habitat is not present in project area. There is one known eyrie (i.e., nest-sites) in the analysis area. Existing habitat capability and suitability, and the nature and scope of the project preclude the potential for impacts on habitat or the species. No further analysis is necessary.
Boreal Owl (*Aegolius funereus*)	UKN	N	NI	This species inhabits large expanses of contiguous forest. Boreal Owls are found in structurally complex Engelmann spruce/subalpine fir (*Picea engelmannii*/*Abie lasiocarpa*) habitats and adjacent transition forest; with the mean stand size of 538 ha. Although such forest types may occur in the general vicinity at higher elevations, the proposed project is predominately in Douglas fir, lodgepole pine, and aspen, with only a few small inclusions of spruce/fir. The association of the species with forest types other than spruce/fir is relatively weak. Any impacts of the proposed project will not be important at the population level. No further analysis is necessary.
Great Gray Owl (*Strix nebulosa*)	UKN	Y	MIIH	This species has been found to prefer mature or old growth Douglas fir forest on flat ground for nesting, but it is generally associated with the lodgepole pine/Douglas fir/aspen forest zone. Clearcuts and natural meadows, used for foraging, are always associated with nest sites. Proposed silvicultural and fuels treatments will result in stand structure more favorable for foraging. Stands to be treated are mixed Douglas fir, lodgepole pine and aspen, with only small inclusions of sub-alpine fir and spruce. Some residual trees in the thinned stands will likely be broken off by wind damage. Larger snags broken off high above ground level are favored nest sites for great gray owls.
Flammulated owl (*Otus flammeolus*)	UKN	UKN	NI	Species not known or suspected in the project area. The species is not known to nest in western Wyoming. There is potential habitat in project area. The species is most commonly associated with ponderosa pine forests, but is sometimes found in

				Douglas fir stands mixed with aspen. Flammulated owls prefer to forage in open and semi-open forest, small openings, and the edges of meadows. Thinning of conifers may provide stand structural characteristics preferred by the species for foraging. No further analysis is necessary.
Three-toed Woodpecker (*Picoides tridactylus*)	Y	Y	MIIH	Habitats consisting of recent beetle-killed conifers are present in the project area. Prescribed burn treatments may create additional habitat preferred by the species. The species is known to be present in the area of effect of the proposed project. However, beetle-killed dead trees are becoming so abundant at the landscape scale that any impact on individuals within the project area would not be of any consequence to the population.
Harlequin duck (*Histronicus histronicus*)	N	N	NI	Low gradient, meandering mountain streams not present in project area. No further analysis is necessary.
Trumpeter Swan (*Cyngnus buccinator*)	N	N	NI	Documented at Arizona Lake, Tracy Lake, and other Buffalo Valley lakes/wetlands on the Buffalo RD. Swan nesting/foraging habitat not present in project area. No further analysis is necessary.
Northern Goshawk (*Accipiter gentilis*)	Y	Y	MIIH	Mature forests with large trees, relatively closed canopies, and open understories for nesting, diverse habitat conditions for foraging. Habitat exists in project area. A historical nesting territory (Box K nest) also exists within the action area. An active nesting territory, with two fledglings, was located on June 24th 2009 and is located approximately 900 meters outside of the Turpin Timber Sale Treatment Unit. Nest buffers and seasonal restrictions are incorporated in the project design.
Common loon (*Gavia immer*)	N	N	NI	Rare summer resident on BTNF. Documented at Arizona, Two Ocean, and Tracy Lake on the Buffalo RD. No habitat in project area. No further analysis is necessary.
Greater Sage grouse (*Centrocercus urophasianus*)	N	N	NI	Sagebrush habitat is present in project area. Project area does not currently provide winter sage grouse habitat likely because of deep winter snow and lack of tall sagebrush. Sagebrush areas within the project area are likely too enclosed by forest for sage grouse to be present. Proposed treatments will improve decadent sagebrush communities that lack sagebrush vigor and understory forb and grass diversity and productivity. No further analysis is necessary.
Mammals				
Fisher (*Martes pennanti*)	N	N	NI	Extensive, mature/old-growth spruce/fir forests with high levels of canopy closure not present in project area. Species not known to occur on BTNF. No further analysis is necessary.
Grizzly Bear (*Ursos arctos horribilus*)	Y	N	NI	Project area is adjacent to high human use areas. There is no secure habitat in project area. Project areas are all adjacent to private lands/ranches accessed from the Buffalo Valley Road and Togwotee Highway and do not contain optimum grizzly bear habitat. Treatment areas will use existing Forest Service or Teton County roads for access, with temporary some skid trails and/or landings in the mechanical treatment units. Upon project completion all skid trails and landings will be closed and reclaimed, resulting in no net loss of secure habitats.

				The Greater Yellowstone Grizzly Bear Recovery Zone includes 9,209 square miles roughly centered on Yellowstone National Park and is divided into Management Situation Areas. Management Situation 1 (MS1) contains grizzly bear population centers and habitat components necessary for the survival and recovery of the grizzly bear population (IGBC 1986). Management Situation 2 (MS2) is composed of areas lacking distinct grizzly bear population centers or highly suitable habitat, although some habitat exists and grizzly bears may be present occasionally (IGBC 1986). Management Situation 3 (MS3) consists of areas of high human use where grizzly bear presence is likely to result in conflicts (IGBC 1986). Management direction for MS3 states that grizzly bear habitat maintenance and improvement are not considerations. Minimizing grizzly bear-human conflicts is a high management priority in MS3 and grizzly bear presence is actively discouraged. The project area falls within the Yellowstone Recovery Area in MS3. The Recovery Zone is also divided into 18 Bear Management Units (BMUs), which are further divided into subunits that approximate the size of a female grizzly bears home range. The project area falls within the Buffalo/Spread Creek BMU. Optimum habitat consists of large areas with diverse vegetation, free from human disturbance. The project area is roaded therefore it does not contain secure grizzly bear habitat (areas >10 acres and >500m from active roads (IGBC 1998)). No further analysis is necessary.
North American Wolverine (*Gulo gulo luscus*)	UKN	UKN	NI	Wolverines are low density, wide-ranging species that are restricted to boreal forests, tundra, and western mountains. Quality wolverine habitat has been characterized as areas with open road densities below one mile per square mile. Wolverines in this area may use somewhat lower elevations in the winter and higher elevations in summer, when these areas provide the greatest potential food supply. Wolverine habitat is generally described as possessing an adequate year-round food supply of carrion and small mammals in large, sparsely populated, remote areas. The availability of large mammal (i.e. ungulate) carrion as food is important for the distribution, survival, and reproductive success of wolverines. Wolverines have recently been documented at higher elevations in more typical habitat on the Buffalo R.D. The proposed action is located in low elevation marginal habitat for wolverine and contains high road densities and is near extensive human use areas. Units are located within ungulate winter range; however the proposed action is not expected to reduce the suitability of winter range for ungulates and therefore will not affect the prey-base of wolverine. No further analysis and discussion is warranted.
Spotted Bat (*Euderma maculatum*)	UKN	N	NI	Caves, cliff faces not present in project area. No further analysis is necessary.
Western Big-eared Bat (*Corynorhinus townsendii pallescens*)	UKN	N	NI	Caves, mine shafts, roosting habitat not known to be present in project area. No further analysis is necessary.

Amphibians				
Columbia Spotted Frog (*Rana luteiuentris*)	UKN	Y	MIIH	The species is known to occur near the project area in the oxbow ponds northwest of Rosies Ridge. The species may be present in the project area but was not observed by forest service personnel conducting amphibian surveys in 2009. Riparian buffers (100 feet both sides of waterways) will preclude adverse impacts to potential habitat.

(1) **N** = NO, **Y** = YES, **UKN** = UNKNOWN
(2) **NI** = No Impact
(3) **MIIH** = May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Loss Of Viability To The Population Or Species

Table 5. *Screening Process and Results – Management Indicator Species*

Species	**Species or habitat present in project area** Species / Habitat(1)		**Determination of effects(2)**	**MIS Type**	**Habitat Rationale/Comments**
Birds					
Bald Eagle (*Haliaeetus leucocephalus*)	Y	Y	NI	T&E(3)	The species is no longer listed under the ESA; see sensitive species table above.
Peregrine Falcon (*Falco peregrinus anatum*)	N	N	NI	T&E(3)	The species is no longer listed under the ESA; see sensitive species table above.
Whooping Crane (*Grus Americana*)	N	N	NI	T&E	Refer to Biological Assessment
Brewer's sparrow (*Spizella breweri*)	UKN	Y	MIIH	Ecological (sagebrush)	The species prefers lower elevation sagebrush shrublands; also breeds within large sagebrush dominated openings within coniferous forests. Nests are usually located in patches of sagebrush that are taller and denser, with more bare ground and less herbaceous cover, than the surrounding habitat. Proposed treatments will improve decadent sagebrush communities that lack sagebrush vigor and understory forb and grass diversity and productivity. Project area provides limited Brewer's sparrow habitat.
Mammals					
Grizzly Bear (*Ursos arctos horribilus*)	Y	N	NI	T&E(3)	The Yellowstone distinct population segment is no longer listed under the ESA; see sensitive species table above.
Elk (*Cervus elaphus nelsoni*)	Y	Y	MIIH	Harvest	This species is a habitat generalist. Summers throughout the BTNF and winters at and below the lowest elevations on the Buffalo R.D. Project area provides elk habitat.
Mule Deer (*Odecoileus hemionus*)	Y	Y	MIIH	Harvest	This species is a habitat generalist. Summers throughout the BTNF and winters at and below the lowest elevations on the Buffalo R.D. Project area currently provides habitat.

Moose (*Alces alces shirasi*)	Y	Y	MIIH	Harvest	There is year-round habitat for this species on Buffalo R.D. Closely associated with riparian areas. Project area does contain habitat.
Bighorn Sheep (*Ovis canadensis canadensis*)	N	N	NI	Ecological (mtn. meadow)	This species prefers high-elevation alpine habitats with steep escape terrain adjacent to open foraging areas. No habitat in the project area. No further analysis is necessary.
Pronghorn Antelope (*Antilocarpa americana*)	UKN	Y	NI	Harvest	This species prefers lower elevation sagebrush and grassland habitats. Very limited habitat in project area. No further analysis is necessary.
American Marten (M*artes americana origines*)	Y	N	NI	Ecological (old-growth)	This species primarily inhabits old-growth coniferous forest dominated by spruce/fir with well developed understories and abundant coarse woody debris; this type of habitat is not present in the project area. No further analysis is necessary.
Amphibians					
Boreal Toad (*Bufo boreas boreas*)	Y	Y	MIIH	Ecological (wetland)	This species occupies montane forest habitats between 7,000' and 12,000' elevation. Requires breeding ponds, summer range, and winter refugia. Inhabits marshes, wet meadows, stream margins, beaver ponds, and glacial ponds. Boreal toads and tadpoles were observed on 7/10/09 within the Turpin treatment unit within the Project area. Project area currently provides boreal toad habitat.
Boreal Chorus Frog (*Pseudacris triseriata*)	Y	Y	MIIH	Ecological (wetland)	This species inhabits small streams and non-flowing bodies of water, such as marshes, ponds, and small lakes. Boreal chorus frogs were observed on 7/10/09 in the Turpin treatment unit within the project area. Project area currently provides boreal chorus frog habitat.

(1) **N** = NO, **Y** = YES, **UKN** = UNKNOWN
(2) **NI** = No Impact
(3) **MIIH** = May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Loss Of Viability To The Population Or Species

SENSITIVE SPECIES

Sensitive species are those for which population viability is a concern. They are managed under the authority of the National Forest Management Act (PL 94-588), and are administratively designated by the Regional Forester (FSM 2670). Table 3 shows the status of sensitive wildlife species that are known or suspected to occur in the Analysis Area (where the proposed action is located).

Sensitive species that are not known or suspected to occur within the described area are removed from further evaluation. Implementing this project would have *no impact* on those species. Species known or suspected to occur, because of suitable habitat or observations nearby, are further evaluated for effects. The public comments received in response to scoping were reviewed and considered in this analysis.

Three-toed Woodpecker *(Picoides tridactylus)*

Population and Habitat Status

These woodpeckers require snags in coniferous forests for nesting, feeding, perching, and roosting. In Wyoming forests, the three-toed woodpecker is found in large, unbroken conifer stands. This species forages on insects, mainly in dead trees, but will also feed in live trees. The three-toed woodpecker is primarily associated with recent coniferous forest burns and bark beetle infestations. They excavate a new cavity annually for nesting. One of the top three threats to three-toed woodpeckers identified by Wiggins (2004) is fire suppression. Both less aggressive fire suppression and more prescribed burning in suitable habitat have been identified as key conservation elements for this species (Wyoming Partners in Flight 2003, Wiggins 2004).

Three-toed woodpeckers inhabit recently burned and beetle-killed conifer stands. They tend to occupy recently burned stands 1-6 years after the initial fire. The BTNF, including the project area, has experienced, and continues to experience, high mountain pine beetle populations and associated mortality of pines (Figure 2).

Status of the Species in the Proposed Project Area

Surveys conducted during summer 2009 in the Buffalo Valley Fuels Reduction Management Project Area by the BTNF wildlife crew detected (audio and/or visual) three-toed woodpeckers within all proposed treatment units.

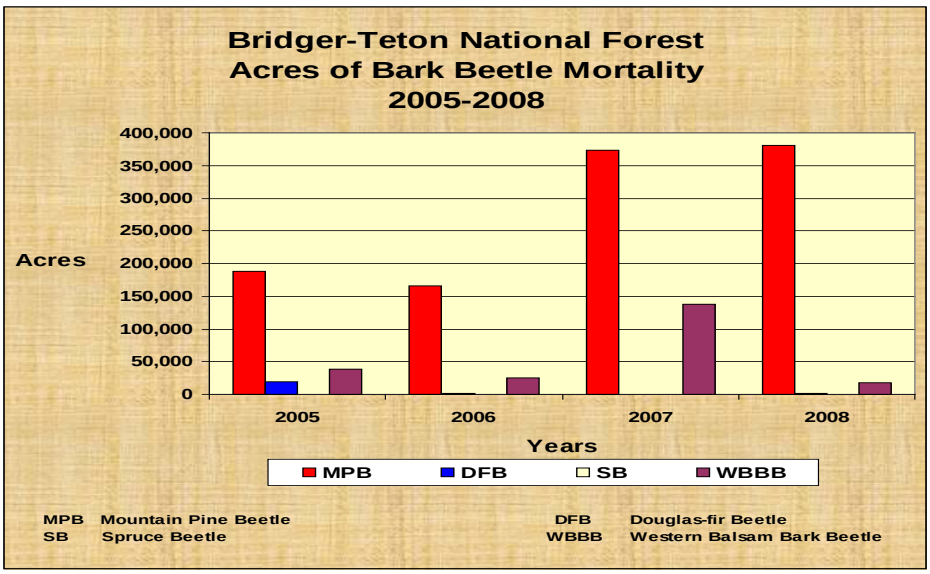

Figure 2. *Acres of bark beetle mortality on the BTNF. From: Wyoming 2008 Bark Beetles Conditions in the Intermountain Region (USFS 2008).*

Northern Goshawk *(Accipiter gentilis)*

Population and Habitat Status

The analysis area for goshawks is the Buffalo Ranger District. Analysis of goshawk habitat is often based on known nest locations with the nest stand serving as the center of the sampling unit. This analysis for goshawks focuses on impacts to habitat structure within suitable nesting habitat – effects to large trees and canopy closure and foraging area – understory stand density. Suitable nesting habitat for goshawks in the project area was defined as habitat that may currently have the habitat components necessary to meet the nesting needs of goshawks. Suitable nesting habitat includes forested stands dominated by Douglas-fir or lodgepole pine in larger size classes (e.g., greater than 10" DBH). The forest structure in typical nest stands is characterized by large trees, high canopy closures and relatively open understories (Reynolds, et al. 1992; Squires and Reynolds 1997; McGrath, et al. 2003; Squires and Kennedy 2006).

Suitable foraging habitat was defined as forested cover with trees greater than 10" DBH and canopy cover classes less than 60% and shrub/grass dominated areas. Areas with small trees (less than 10" DBH) and high canopy cover (greater than 60%) were considered not suitable for foraging due to the dense conditions present in these stands.

Status of the Species in the Proposed Project Area

Habitat is present in project areas. Surveys confirmed breeding presence within the project area at the Box K nest site in 2005. Goshawk feathers and whitewash were observed within the foraging area of the Box K nest site during 2006 but no sign of recent use was observed beneath the nest tree or the alternative nest tree in 2006. One northern goshawk was observed east of the Box K nest site in 2006. No goshawk activity was observed in the vicinity of the Box K nest site(s) during summer 2009. An active goshawk nest (UTM 0559678 4855152) was located approximately 900 meters outside of the Turpin Timber Sale treatment unit on June 26th 2009 (Figure 3 below); the nest was successful with two

fledglings observed. Appropriate nest buffers and seasonal restrictions are incorporated in the project design.

Conservation Measures/Design Criteria

Consult with district biologist to create no-use or limited-use buffer zones around known nest site (radius = 182- 400m). Depending on nesting status this may include seasonal restrictions on activities in the vicinity of buffer zone boundaries (March-August) (Kennedy 2003).

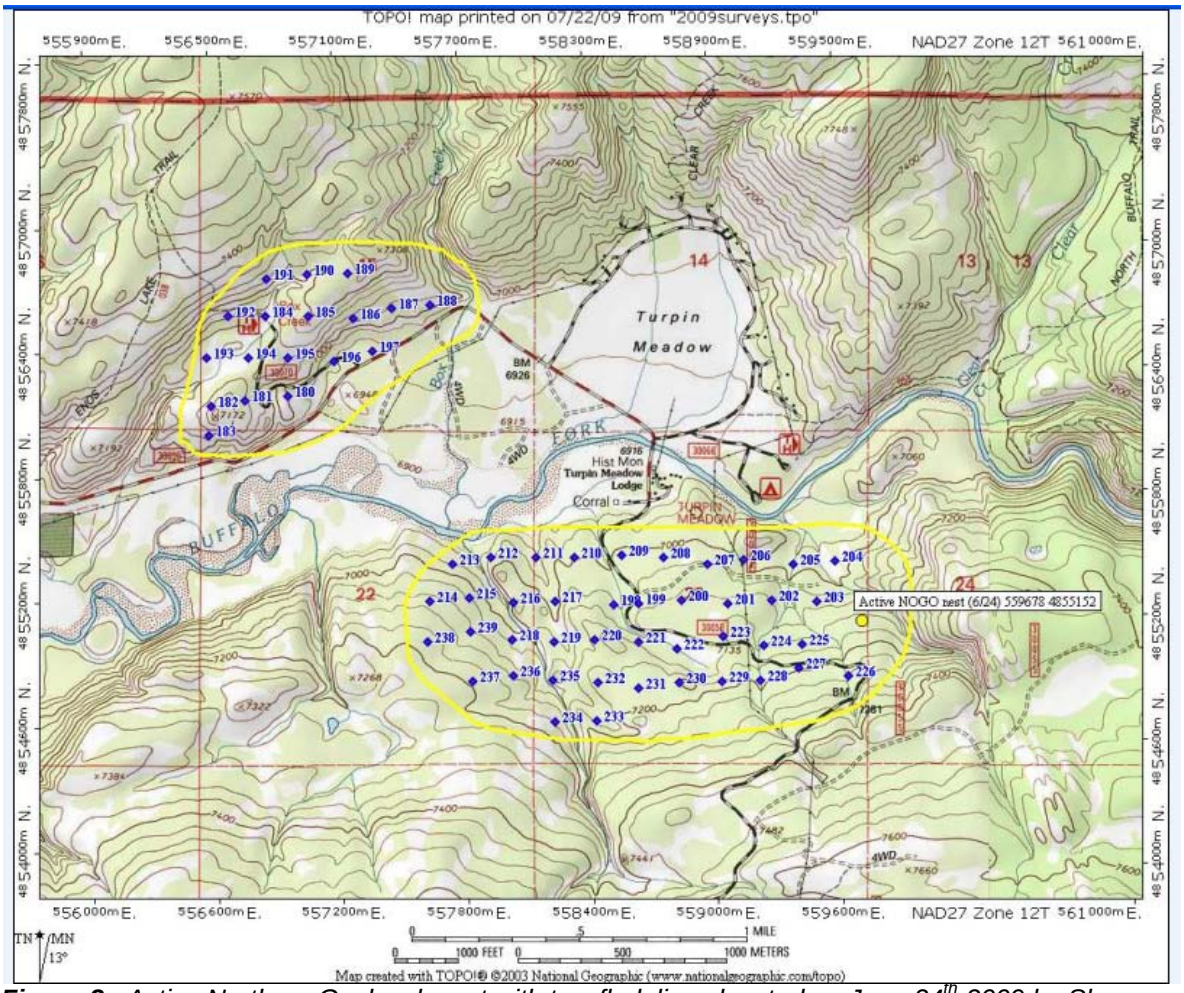

Figure 3. *Active Northern Goshawk nest with two fledglings located on June 24th 2009 by Shawn Langston and BTNF wildlife crew.*

Great Gray Owl *(Strix nebulosa)*

Current Status and Habitat

The great gray owl inhabits the boreal climatic zones of North America and Eurasia. In North America, it breeds from central Alaska and Canada south to central California, the northern Rocky Mountains, northwestern Minnesota, and south-central Ontario. It winters mainly in its breeding range, although it wanders south irregularly into the northern US. It is a year-round resident in Wyoming, primarily in the mountainous areas in the western third of the state, including the BTNF (Hayward and Verner, 1994). The abundance of the great gray owl is

unknown in Wyoming. The WGFD classifies it as a Species of Special Concern with a Native Species Status of 4 (NSS4) because its population status and trends are unknown, although they are expected to be stable, and because its habitat is restricted and vulnerable, although there is no ongoing significant loss of habitat (WYGFD 2005).

The great gray owl inhabits mixed coniferous forests usually bordering small openings or meadows. It is generally associated with the lodgepole pine/Douglas fir/aspen forest zone. The species has been found to prefer mature or old growth Douglas fir and/or lodgepole pine forests on flat ground for nesting. It forages primarily in wet montane meadows. Semi-open areas where small rodents are abundant, near dense coniferous forests for roosting and nesting, is optimum habitat for great gray owls. Broken top snags, stumps, dwarf-mistletoe platforms, or old hawk and raven nests are utilized for nesting.

Columbia Spotted Frog *(Rana luteiventris)*

Current Status and Habitat

The analysis for Columbia Spotted Frog was done at the 6th Hydrologic Unit Code (HUC). Until recently, this species was named the Spotted Frog, *R. pretiosa.* The taxonomy has been changed based on genetic investigations that discerned two separate species (Green et al. 1997); *R. luteiventris* is now the accepted name for the spotted frog species that inhabits northwest Wyoming, Idaho, and Montana. Columbia Spotted Frogs are about 3 inches maximum size, greenish or brown with dark irregular spots, a light jaw stripe, and bumpy skin. Many adults have bright pink or reddish pigmentation on their undersides. Tadpoles have large tails and may reach 3 inches in total length. Breeding occurs in ponds, marshes, slow streams, and along lake edges. Adults disperse after breeding to inhabit marshes, riparian areas, and moist or seasonally-wet forests and meadows.

Northwest Wyoming is at the southeast edge of the main range of the spotted frog. Columbia Spotted Frogs have declined sharply in the Wasatch Mountains of Utah, and the status of isolated populations in western Utah, Nevada, and southern Idaho is under evaluation. Within the zone of the main population (central and north Idaho, western Montana, and northwestern Wyoming) spotted frogs are generally believed to be widespread and/or common, with only localized declines. Spotted frogs are currently listed as sensitive by Regions 2 and 4 of the USFS, and as a species of special concern in Wyoming and southwest Idaho. A USFS Region 4 Conservation Assessment was prepared for spotted frogs in 1994 (Gomez 1994).

Status of the Species in the Proposed Project Area

Columbia spotted frogs are known to occur on the BTNF (Patla 2000). Columbia Spotted Frogs are widespread and common within portions of the project area. Field data collected from 1992 and 2000 do not include amphibian observations in Lava Creek or Box Creek. Observations of spotted frogs were made in the Blackrock Creek and Buffalo Fork River near the Blackrock Ranger Station (Patla 2001) and near the project area in the Teton Wilderness (BTNF wildlife crew 2009, personal observation). While conducting amphibian surveys within treatment units no Columbia Spotted Frogs were observed, though there appeared to be ample habitat (BTNF wildlife survey 2009).

MANAGEMENT INDICATOR SPECIES

National Forest Management Act implementing regulations (36 CFR 219.19) and Forest Service Manual (FSM) 2600 guidance require that Forest Plans identify certain vertebrate and/or

invertebrate species as management indicator species (MIS), and that these species be monitored "in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent (FSM 2620.5)." The effects of the alternatives on MIS groups are summarized below.

*Much of the following MIS status and habitat information is adapted and/or excerpted from the "Updated Assessment of the Condition of Management Indicator Species Habitat With Respect to Livestock Grazing Use on the BTNF" (USFS 2009).

Brewer's Sparrow *(Spizella breweri)*

Current Status

Brewer's sparrows, which are sagebrush obligates, summer in North America and winter in Central or South America. Nationwide, Brewer's sparrow populations have declined from historic levels, but Breeding Bird Survey (BBS) data from 1980 to 2004 indicates that Brewer's sparrow numbers in Wyoming have declined and rebounded, but that there is no discernable downward or upward trend. An analysis cited by Holmes and Johnson (2005) showed a significant decline in Brewer's sparrow numbers during the period 1966-2002 for the entire State of Wyoming. While the number of Brewer's sparrows counted on BBS routes in southern and eastern Wyoming declined during this period, numbers of Brewer's sparrows increased on routes in northwestern Wyoming (Dobkin and Sauer 2004, as cited by Holmes and Johnson 2005).

There are five North American BBS routes on the BTNF. Species occurrence data collected from 1968 to 2003 was analyzed at the route level to determine species trend per route. Four of the routes showed a positive trend during this period (+3.3, +18.1, +8.8, and +29.1 percent increase in the number on each route). The other route showed a negative trend of -16.2 percent/year (BBS GIS data). Regionally in Wyoming, Brewer's sparrow population trends have been relatively stable with a -0.9 percent decrease in the occurrence of Brewer's sparrows on survey routes from 1968-2005 (USGS 2006).

The Rocky Mountain Bird Observatory (RMBO) recently completed breeding bird surveys from 2002 to 2006 on the BTNF. During these 5 years of surveys, the RMBO observed a total of 369 Brewer's sparrows along 22 survey routes. These surveys include BLM land adjacent to the BTNF along the "Piney Front."

According to Holmes and Johnson (2005), "The current hypothesis is that processes operating on the wintering grounds, which are mainly density-independent, regulate population size on the breeding grounds," which was supported by several other experts. Across their breeding grounds, the largest threat is permanent loss of big sagebrush due to land use changes such as cultivated agriculture and residential development. Fire and other disturbances temporarily reduce nesting habitat, but this turnover of the big sagebrush type is needed for its sustained health (Miller et al. 1994) and is a natural part of their habitat. Where big sagebrush habitat remains on their breeding grounds, Holmes and Johnson (2005) assessed that variation in local reproductive success appears to mainly be a function of nest predation, and that nest parasitism by brown-headed cowbirds can also affect reproductive success.

Partial burns are less detrimental to Brewer's Sparrows than complete burns. In burned mountain big sagebrush of western Wyoming, Brewer's Sparrows continued to nest in remaining patches of unburned shrubs (McGee 1976). Arthropods make up the majority (70-

80%) of the adult diet and 100% of the nestling diet during the breeding season (Best 1972, Petersen and Best 1986, Rotenberry et al. 1999, Howe et al. 2000). In southeastern Idaho, prescribed burning did not affect the composition of nestling diets, largely because adults avoided burned areas and continued to forage for arthropods in unburned areas (Winter 1984, Petersen and Best 1986). Although nesting Brewer's Sparrows spend 40-50% of their time foraging, prescribed burning had no effect on their activity budgets, feeding-trip frequency, or prey load size (Winter 1984). After burning, males flew 1.5 times farther from the nest to forage, but this did not change the duration of their foraging bouts (Winter 1984). In southern British Columbia, birds continued to nest in burns that were 4 yr old, but they used a much greater diversity of plant species for nesting, including large perennial forbs (Mahony 2003). Six years after burning, birds switched back to nesting in sagebrush that had germinated after fire (Mahony 2003).

Habitat

Brewer's sparrows are obligates of sagebrush communities, particularly where canopy height is less than about 5 feet (Wyo. Partners in Flight 2003, Holmes and Johnson 2005). In a study in Idaho, average sagebrush height surrounding nest sites was about 1½ feet and average nest shrub height was just over 2 feet. Optimum sagebrush height appears to be 2-2½ feet tall. Opinions vary on optimum shrub canopy cover for Brewer's sparrows. Wyoming Partners in Flight (2003) identified 5-25%, whereas other research (e.g., Reynolds 1981, Peterson and Best 1985) indicates that >25% canopy cover is preferable and that canopy cover as low as 15% is fair. For the purposes of this analysis, shrub canopy cover of 10-25% and >25% in big sagebrush communities (the two categories mapped in the BTNF's vegetation mapping effort) are considered satisfactory.

Based on Wilson (2005), 100 acres of contiguous big sagebrush habitat was used in this analysis as a cut-off between one element of satisfactory and LTS conditions. Contiguous big sagebrush patches that are hundreds to many thousands of acres are best, but patches down to roughly 100 acres also provides good habitat. While some patches less than 100 acres may also provide habitat for Brewer's sparrows, considerably smaller more isolated patches than this do not.

Habitat requirements have not been identified in the literature with respect to canopy cover of herbaceous vegetation within sagebrush communities, so long as herbaceous concealment cover is present and so long as there is sufficient herbaceous vegetation to provide forage (seeds) for Brewer's sparrows and to provide for the needs of a diversity of insects, which in turn are fed upon by Brewer's sparrows (Holmes and Johnson 2005). They feed on insects and seeds gleaned from the ground (Wyo. Partners in Flight 2003).

Nest building and egg laying in this area typically begins in early May to early June, depending on snow melt (Baicich and Harrison 1997, Holmes and Johnson 2005). They build cup nests of grass, rootlets, and forbs low in the branches of live sagebrush shrub or on the ground at the base of a live sagebrush plant. Brewer's sparrows are frequently double-brooded, and they commonly re-nest after nest failure, meaning that the egg-laying period extends into early to late July depending on elevation. The nesting period for this area ends in late July to early August. Brewer's sparrows are a common cowbird host and parasitized nests are occasionally to commonly abandoned (Wyo. Partners in Flight 2003, Holmes and Johnson 2005).

Long-Developing Habitat Attributes

BTNF-wide, the existing proportion of the big sagebrush type in late succession exceeds what would exist if the communities were in healthy, functioning conditions. Since Brewer's sparrows thrive in late succession sagebrush, there is a larger amount of their habitat in satisfactory condition than occurred historically. Because the proportion of the big sagebrush type in late succession exceeds suitable habitat conditions for Brewer's sparrows, there is no need to address this issue further.

Long-developing effects that contribute to Less-than-Satisfactory (LTS) conditions for Brewer's sparrows on the BTNF include the following:

- The number, distribution, and canopy cover of conifers is increasing in big sagebrush habitat, is reducing suitability of habitat and may be reducing the amount of habitat for Brewer's sparrows in some parts of the BTNF, including the project area.
- Herbaceous understories are depleted in big sagebrush communities in some parts of the BTNF, either associated with excessive shrub canopy cover, historic overuse by livestock, and/or current and historic overuse by ungulates such as elk. Holmes and Johnson (2005:20) reported that "Brewer's sparrow abundance was significantly lower at sites with poor range condition (less than 25 percent cover in climax vegetation) than sites with fair condition (25 to 50 percent cover in climax vegetation), but abundance did not differ between fair and good sites (greater than 50 percent cover in climax vegetation)."

Elk *(Cervus canadensis)*

Current Status

Elk were selected as a MIS due to harvest species (socioeconomic) status (USFS 1990). Eleven elk herd units encompass the BTNF (herd units 101-108, 216, 428, 637). The vast majority of the BTNF lies within herd units 101-108 (USFS 2007). The population trend for these elk herd units has been trending slightly downward, but the elk population was above the Wyoming Game and Fish Department (WGFD) objectives by approximately 12% in 2005 for the herd units within the BTNF. The Jackson herd unit (102) encompasses the entire Buffalo Valley Fuels Management Project area and as of 2008 it was above population objectives; however it has been declining over the last few years.

Habitat

Virtually all of the BTNF provides elk habitat. The WGFD has defined seasonal ranges for native ungulates, including elk, and all of the BTNF is classified as some type of elk seasonal range. Elk are habitat generalists and are mobile, adaptive and wide-ranging (Peek and Krausman 1996, Wisdom and Thomas 1996, Skovlin et al. 2002, Kie and Czech 2000). Elk use a wide variety of vegetation types to meet their life history needs, including aspen, several conifer types, big sagebrush, several mountain shrubland types, meadows, grasslands, herblands, and tall forbs. Within woody vegetation types, elk use all seral stages and do best in areas where there is a mix of seral communities.

While elk can be found at all elevations and habitats during summer and fall, most elk are at higher elevations during these seasons where they feed in mountain meadows, forest openings, big sagebrush, herblands, and on open ridge-tops (Boyce 1989). Security cover is a necessary component of elk habitat year-round (Wisdom and Cook 2000, Skovlin et al. 2002). While contiguous forestland used as security cover can be relatively large

(particularly during the hunting season), forest edges need to be close enough for ready access to foraging or must have small forest openings that provide forage.

Transition range is similar to summer habitat, except occupied habitats during fall migrations become lower in elevation through the course of the fall season; with the exception of situations where elk cross mountain ranges to reach winter range; in these cases transition range also includes high elevation habitats. The nutritional quality of forage on late summer and fall habitats is critical to elk, particularly for elk that winter on native winter range (Boyce 1989, Wisdom and Thomas 1996, Cook et al. 2004). Spring, summer, and fall range (including transition range), as mapped by WGFD, encompasses nearly all of the project area.

During winter, elk movements are dictated by forage and browse availability and snow conditions. Prior to Euro-American settlement, most elk on the BTNF migrated off the Forest to lower elevation shrub steppe zones often located within major river basins. Currently, approximately 80% of elk spend their winters on feedgrounds operated by the WGFD (22 feedgrounds) and U.S. Fish and Wildlife Service (1 feedground) (WGFD, 2004). For elk that consistently use winter feedgrounds, the quality of winter range is less important. However, a portion of elk using feedgrounds use native winter range in some winters and some elk migrate to native winter range every winter. Some of the elk that winter on native range spend their winters in the Buffalo Valley, including the proposed project area, typically where south-facing slopes (where snow depth is lower due to sun and wind) are interspersed with aspen stands, conifer forestland, and riparian areas. Additional elk that spend winters away from feedgrounds migrate off Forest lands to adjacent foraging areas (e.g., to Grand Teton National Park and private lands in the Buffalo Valley and elsewhere). Forage conditions on native winter range are critically important to elk that use natural habitat areas (Cook 2002).

Calving habitat for elk consists of foraging areas and hiding and thermal cover. Big sagebrush interspersed with aspen stands and/or conifer forestland is favored for calving, although cow elk will use a variety of habitats (Gruell 1975, Boyce 1989, Skovlin 2002). The Buffalo Valley Fuels Management project area encompasses important parturition range for elk as identified and designated by WGFD.

Elk generally are opportunistic in their diet selection, can easily digest forage of low quality, and form larger herds, all of which may result in giving them a competitive edge over other ungulate species when resources are limited (Wisdom and Thomas 1996, Cook 2002).

Long-Developing Habitat Attributes

Currently there is a major under-representation, BTNF-wide, of early and mid-seral communities in shrubland and forestland types; which can affect elk given their forage needs (Peek and Krausman 1996, Wisdom and Thomas 1996). The high natural diversity of vegetation types across the BTNF (caused by large variability over short distances in topography and soils) ameliorates this lack of early and mid-seral communities to some degree. However, late-seral and old-age classes of rangeland types do not produce nearly the same level of nutritious forage as early- and mid-seral shrubland types and early-seral forest types (Riggs et al. 1996, WAFWA 2008). For example, shrubs in many shrub communities are old and relatively unproductive. In addition to reduced fire-return intervals, heavy browsing by native ungulates has contributed to this. Mortality of conifers due to ongoing Douglas fir and mountain pine beetle epidemics on the Forest, including the project area, may be mitigating the lack of fire to some extent, but while aspen may benefit, the extent to which early-seral conditions are provided is somewhat unclear.

Mule Deer (*Odocoileus hemionus*)

Current Status

Mule deer were selected as a MIS due to harvest species (socioeconomic) status (USFS 1990). Five mule deer herd units encompass the BTNF (herd units 104, 131, 215, 642, and 644). The mule deer population trend for these herd units as a whole has fluctuated somewhat since 1998 (up, then downward, then relatively unchanged for several years). The number of mule deer in these herd units, as a whole, remains below the combined WGFD population objectives for these herd units. In 2007, all five herds combined were approximately 30% below the combined herd objectives. Each herd unit is below population objectives to varying degrees. One of the contributing factors to low numbers is the low doe: fawn ratio. The Sublette herd unit (104) and Dubois herd unit (642) encompass the Buffalo Valley Fuels Management Project area and as of 2008 both herd units were well below population objectives and continuing to decline.

Habitat

Virtually all of the BTNF provides mule deer habitat. The WGFD has defined seasonal ranges for native ungulates, including mule deer, and all of the BTNF is classified as some type of mule deer seasonal range. Mule deer are habitat generalists and are mobile, adaptive and wide-ranging (Peek and Krausman 1996, Wisdom and Thomas 1996, Skovlin et al. 2002, Kie and Czech 2000). The species uses a wide variety of vegetation types to meet their life history needs, including aspen, several conifer types, big sagebrush, several mountain shrubland types, meadows, grasslands, herblands, and tall forbs. Within woody vegetation types, mule deer use all seral stages and do best in areas where there is a mix of seral communities.

Wallmo (1978, as cited by Peek 2000:643) stated “three general axioms applicable to habitat management for mule deer: (1) early stages of plant succession are more beneficial than climax vegetation, (2) a mixture of plant communities provides better habitat than any single community, and (3) more browse is preferable to less browse.” The third axiom is not as applicable in early spring and summer when mule deer favor succulent and highly digestible forbs.

Mule deer inhabit nearly all habitats of the BTNF at nearly all elevations during summer and fall, although they are most abundant between 7,500 and 10,000 feet in elevation where abundant nutritious forage is available. Mature bucks tend to summer at higher elevations than does. Thermal and security cover is less important to mule deer, compared to elk (Kie and Czech 2000). Transition range is found at the lower elevations of the summer range and contains abundant grass and forbs, intermixed with the shrub and aspen communities. Many mule deer move higher in elevation before descending onto winter ranges since, for these deer, summer and winter ranges are separated by mountain ranges. Late summer and fall habitats are important to over-winter survival and fawn production in mule deer (Peek and Krausman 1996, WGFD 2007) because all mule deer rely on native winter range, much of which is located off the B-TNF. However, there is a limited amount of winter range on the BTNF and within the project area, comprised mostly of south and westerly facing big sagebrush, mountain shrubland, mountain mahogany, and aspen, as well as Douglas-fir forestland on adjoining north slopes.

Fawning habitat for mule deer consists of foraging areas and hiding and thermal cover, and is typically on spring transition range with mild slopes with abundant succulent vegetation

within 600 feet of water. An important component of hiding cover includes herbaceous vegetation in some areas (Robinette et al. 1977, Loft 1987). While many habitats are used for fawning and raising fawns, those providing relatively large quantities of nutritious forbs are most important.

Long-Developing Habitat Attributes

Currently there is a major under-representation, BTNF-wide, of early and mid-seral communities in shrubland and forestland types. This is particularly important for mule deer which require a variety of vegetation types and seral stages to meet their year-round need for high quality forage and browse (Peek and Krausman 1996, Wisdom and Thomas 1996). The high natural diversity of vegetation types across the BTNF (caused by large variability over short distances in topography and soils) ameliorates this lack of early and mid-seral communities to some degree. However, late-seral and old-age classes of rangeland types do not produce nearly the same level of nutritious forage as early- and mid-seral shrubland types and early-seral forest types (Riggs et al. 1996, WAFWA 2008). For example, shrubs in many shrub communities are old and relatively unproductive. In addition to greatly reduced fire-return intervals, heavy browsing by native ungulates has contributed to this. Mortality of conifers due to insect-kill may be mitigating the lack of fire to some extent, but while aspen may benefit, the extent to which early-seral conditions are provided is unclear.

Moose (*Alces alces*)

Current Status

Five moose herd units encompass the BTNF (herd units 103, 105, 211, 417, and 620). The moose population for these herd units (excluding herd unit 211) has been trending downward since 1998, and the total population remains below the WGFD population objective. The Jackson herd unit (103) encompasses the Buffalo Valley Fuels Management Project area and as of 2008 this herd unit was well below population objectives and declining. The population objective for the Jackson herd is 3,600 moose; as of 2008 WGFD estimated there to be 1,710 moose in this herd.

Causes for the major local and regional declines in moose number are being studied by the WGFD, Wildlife Conservation Society, Teton Science School, and other partners. Factors, some of which are documented by research, contributing to the decline in moose numbers include a decline in habitat conditions, predation, human disturbance during winter, and disease. In a major research project on factors affecting moose mortality in the Buffalo Valley area, Becker (2008) concluded that “habitat quality and its effects on the physical condition, survival, and reproductive success of adult female moose appeared to be the primary factor limiting population growth.” Even if one or more other factors are found to be largely responsible for the ongoing population decline, there is good reason to believe that habitat conditions play a contributing role. In the Buffalo Valley reduced summer thermal cover, in the form of live conifer trees, is a limiting factor for adult female moose which leads to increased winter mortality (Becker 2008). Franzmann (2000) stressed that habitat typically is the primary limiting factor of moose populations. High quality habitat conditions for all seasons and resultant healthy animals can help to mitigate adverse factors.

Habitat

Nearly all of the BTNF is classified by the WGFD as some type of moose seasonal range. Peek (1997) characterized moose as “‘selective generalists’ — capable of using forage and

other habitat components in higher proportions than they occur in the environment, and adept at selecting seasonally advantageous habitats." They do best in areas with relatively 'stable' habitats (e.g., willow bottoms) and transitory habitats, particularly post-fire conifer forestland and aspen. Vegetation types used by moose on the BTNF include aspen, many conifer types, several mountain shrubland types, big sagebrush, meadows, herblands, and tall forbs. Within woody vegetation types, moose use all seral stages and do best in areas where there is a mix of seral communities. An important characteristic of moose habitat across their range is periodic disturbance, such as fire (Peek 1997, Franzmann 2000

Moose can be found at all elevations and habitats during summer and fall on the BTNF, except alpine areas, but they are most commonly associated with aspen, aspen-conifer, Douglas-fir, spruce-fir, willow, willow-mixed deciduous, mountain shrubland, and aquatic habitats. Because thermal stress for moose begins at approximately 57-68°F during summer months (Renecker and Schwartz 1997, Schwartz and Renecker 1997), thermal cover is especially important during the hottest months of summer. In montane regions, moose may seek cool mountain valleys and shade provided by aspen and conifers to escape high temperatures and gain "comfort" while foraging (Renecker and Schwartz 1997). Aquatic habitat (e.g., beaver ponds) can also be important for cooling. Fat reserves are built up during summer months, which play an important role in winter survival; body condition can serve as an indicator of range quality (Schwartz and Renecker 1997). Transition range is likely similar to summer habitat, except occupied habitats during fall migrations become lower and lower through the course of the fall season.

During winter, moose are primarily associated with willow bottoms, mountain shrubland, aspen, and conifer forestland with a high composition of young subalpine fir and/or shrubs/deciduous trees. Their preferred winter habitat in this area appears to be wide valley bottoms dominated by willow (Houston 1968, as cited by Peek 1997). Such habitat exists across the BTNF and on other federal and private lands adjacent to the BTNF. However, winter recreation activity and other human activity on and off the BTNF and loss of willow habitat off the BTNF (e.g., private lands, National Elk Refuge) appears to have shifted their habitat use in many areas to a much greater reliance on conifer forestland. In conifer types, biomass of browse in the winter diet varies greatly with seral age of forests, making early and mid-seral forests important (Peek 1997, Renecker and Schwartz 1997). While moose cannot maintain their weight on relatively good quality browse during winter, the nutritive quality of browse influences how fast they burn up their fat reserves (Schwartz and Renecker 1997).

Female moose use a variety of habitats when calving and raising calves, but they tend to seek out dense cover (Peek 1997), such as closed-canopy shrub communities and understories. The effects of nutritional quality and availability of forage during winter and spring on calf production and survival is not fully understood, but Schwartz (1997:166-167) suggested it could potentially be a factor.

There are very few year-long diet studies on moose in the Rocky Mountains, but it appears browse (shrubs and trees) is the most important component of their diet year round, except that forbs may comprise the bulk of the diet when they are available and succulent (Renecker and Schwartz 1997). Moose feed on graminoids to a very limited extent. Winter diets consist almost exclusively of browse, with willows being preferred and subalpine fir being the next most-heavily-used group of browse in the Greater Yellowstone area (Wigglesworth 2004). Palatability of subalpine fir is higher than other conifers, but is lower than willow and other deciduous browse eaten by moose during winter. Direct competition

with livestock for forage is lowest of all native ungulates addressed in this report (Renecker and Schwartz 1997).

Long-Developing Habitat Attributes

Although other habitat conditions (e.g., annual reduction in the amount of herbaceous vegetation, and the introduction and spread of invasive species) may affect moose to some extent, they are not as important as having a mix of successional stages in forestland and rangeland types. The large overrepresentation of late-seral and old-age classes is likely limiting some types of browse production, and the combined effect of heavy browsing by native ungulates exacerbates the low productivity of underrepresented shrub communities and understories. However, it is important to note that young sub-alpine fir, an important winter browse species for moose, is most common in late-seral forests of conifer and aspen. The recent and ongoing mortality of conifers due to Douglas fir and mountain pine beetle is providing new opportunities for an increase in aspen and shrub species in many locations on the Forest and within the project area.

In her review of available information, Wigglesworth (2004) found that willow-species composition in the Jackson Hole area had not changed markedly between the 1950s and 1990s. Locations where the canopy cover in willow communities is substantially reduced exist on the BTNF, however this situation is uncommon. Low level impacts (e.g., extensive trails and openings created by cattle) are more widespread, but they likely do not affect the amount or quality of browse and cover for moose more than a negligible amount in any given area.

The apparent reduced vigor and limited extent of bitterbrush may affect moose diets in the big sagebrush and big sagebrush-bitterbrush communities across the BTNF.

Western Boreal Toad (Bufo boreas boreas)

Current Status

The boreal toad appears to be quite rare on the BTNF. In 2005, five boreal toad breeding sites were chosen from to monitor (Patla 2002). There were three sites between the Buffalo and Jackson Ranger Districts, and two sites in the Big Piney/Pinedale Districts. Only one site had breeding toads associated with it. The other sites were flooded out or somehow changed when the surveys took place. These sites will continue to be monitored in the next 4 years.

In 2006, the boreal toad sites were revisited, and breeding toads were found only at the Blackrock site. Adults were observed, but no young, at the Pinedale sites due to the time of year the monitoring took place, and therefore we were unable to confirm breeding. In 2006 new boreal toad observations were made on the Greys River and Kemmerer Ranger Districts, but they were not observed at a time to indicate breeding.

During summer 2009 while conducting amphibian surveys at the Buffalo Valley Fuels Management project area three mature boreal toads were observed in the riparian corridor of a small perennial stream located within the Turpin treatment unit. Many young boreal toad tadpoles were also observed within the Turpin treatment unit in a ½ acre pond; toads were not observed on other treatment units within the project area (BTNF 2009 wildlife report).

Habitat

The boreal toad occurs from Alaska to northern New Mexico extending from within the Rocky Mountains west to the Pacific Coast. In Wyoming, it is restricted to mountains and foothills and relatively moist conditions (Baxter and Stone 1992). The boreal toad is a species of concern in Wyoming. The range of the boreal toad includes the entire BTNF. Breeding occurs in ponds, slow streams, river backwater channels and along lake edges. Eggs are deposited in the water. Adults are primarily terrestrial and are observed in a great variety of habitats, frequently at night during the summer. This formerly widespread and common species has declined dramatically in the last three decades in many portions of its extensive range in western North America (Carey 1993; Corn 1194; Rose et al. 1995).

Long-Developing Habitat Attributes

The extensive late-seral forests, as well as beetle-killed trees, may be increasing the amount of thermal and security cover for toads on the Buffalo RD; in the future this may bode well for these amphibians. However there is a growing body of research that suggests forest fires likely play an important role in improving habitat for toads (Bull 2006, Kirkland and others 1996, Corn and Hossack, n.d.); in which case, past fire suppression on the Forest, district, and project area may be contributing to the current lack of toads on the Forest.

Boreal Chorus Frog *(Pseudacris maculate)*

Current Status

Boreal chorus frogs appear to be quite common on the BTNF including the Buffalo RD. Several chorus frog sites were identified across the forest by the wildlife crew during summer 2006 (Wildlife Report 2006). In 2006, two previously established boreal chorus frog breeding sites on the Pinedale Ranger District were monitored; adults were observed at one site, and the other site was dry. In recent years boreal chorus frogs have been observed at multiple sites near the Blackrock Ranger Station.

During summer 2009 while conducting amphibian surveys at the Buffalo Valley Fuels Management project area adult boreal chorus frogs were observed in the riparian corridor of a small perennial stream located within the Turpin treatment unit. Many young boreal chorus frog larvae were also observed within the Turpin treatment unit in a ½ acre pond; frogs were not observed on other treatment units within the project area (BTNF 2009 wildlife report).

Habitat

Formerly known as the Western chorus frog, the boreal chorus frog is the smallest (maximum size 1.5 inches) and most conspicuously vocal amphibian in the area. In the spring and early summer, male frogs call from ponds, marshes, and ephemeral pools, attracting females to the breeding sites. Eggs are deposited in water on submerged vegetation. After breeding, adults disperse away from the breeding sites to moist habitats including riparian areas, grasslands, and forests. The range of the boreal chorus frog includes the entire BTNF. They occupy any wetland habitat from low elevation deserts to alpine areas above timberline. This frog appears to be the most common and widespread amphibian species on the Forest.

Long-Developing Habitat Attributes

The extensive late-seral forests, as well as beetle-killed trees, may be increasing the amount of thermal and security cover for toads on the Buffalo RD; in the future this may bode well for these amphibians. The boreal chorus frog's ability to occupy appropriate habitats within a large elevation window (valley bottoms to timberline) will likely help this species adapt to a variety of future climatic conditions.

Direct, Indirect, and Cumulative Effects to Wildlife

THREATENED, ENDANGERED, EXPERIMENTAL, AND CANDIDATE SPECIES

Consultation Requirements:

In accordance with the Endangered Species Act (ESA), its implementation regulations, and FSM 2671.4, the BTNF is required to request written concurrence from the U.S. Fish and Wildlife Service (FWS) with respect to determinations of potential effects on Threatened, Endangered, and Candidate Species that may occur on the Forest.

Canada Lynx *(Lynx Canadensis)*

Direct and Indirect Effects:

The Buffalo Valley Fuels project would implement fuels reduction treatments on approximately 504 acres of mapped lynx habitat in the Buffalo Fork West LAU, and approximately 223 acres of mapped lynx habitat in the Buffalo Fork Middle LAU. These treatments would convert habitat currently suitable for lynx to habitat that is considered unsuitable for lynx, however, the percentage of lynx habitat converted is very small relative to the LAU (Table 5). Most of the identified acres of mapped lynx habitat to be treated are within the Community Wildfire Protection Plan (CWPP), in other words, they are within the Wildland Urban Interface (WUI). Table 5 provides field verification that areas outside the CWPP do not provide adequate horizontal cover for lynx and their primary prey, the snowshoe hare.

Table 5. *Conversion of Potential Lynx Habitat from Proposed Fuels Reduction Treatments*

LAU	Baseline acres of potential lynx habitat	Potential Lynx habitat acres within treatment units	Approx. acres potential habitat within treatment units that will be converted to a less suitable condition (all are within CWPP)	% habitat within LAU converted to less suitable condition following implementation
Buffalo Fork West	17,128	504	504	2.9
Buffalo Fork Middle	46,275	223	223	<1

There is a slight potential for displacement of individual lynx from disturbance during project implementation and a reduction of forest understory cover. It is "slight" due to the suspected low population density (presently no documented occurrence) of Canada lynx in the area of effect and less than ideal foraging and denning habitats present in comparison to those found at higher elevations on the Buffalo Ranger District where lynx are known to occur. Displacement would likely be incidental rather than chronic, and temporal or seasonal rather than year-round due to the short duration of project activities and the limited extent of treatment units (727 acres). The likelihood of lynx occupying these areas of habitat in the

project area during fuels management operations is too slight to be anything other than a remote possibility.

Possible denning structure occurs only incidentally in the project stands, and only limited potential exists for denning in the general project vicinity. Denning occurs primarily in stands that have substantial spruce/subalpine fir and accumulated coarse woody debris components which are not characteristic of the treatment units. Some potential denning habitat may be reduced from broadcast burning of dead and down logs.

The proposed project will not change the permanent road or trail system or designated over-snow routes.

The Buffalo Valley Fuels Management project proposes treatments of forest and non-forest cover that would potentially alter much less than 1% of designated critical habitat for lynx out of approximately 6.7 million acres in the GYA. The treatments to reduce hazardous fuels in the wildland/urban interface would result in insignificant additional effects to the functioning of the GYA critical habitat unit and the Primary Constituent Elements (PCEs): snowshoe hare and denning habitats, and matrix conditions. PCEs operate on a broad landscape scale and the relatively small habitat changes that may result from proposed vegetation treatments at this scale will have insignificant effects to the PCEs and are unlikely to change how the elements function within the unit.

Lynx Conservation Measures

The Northern Rockies Lynx Management Direction (NRLMD) and Lynx Conservation Assessment and Strategy (LCAS) provide direction for management of lynx habitat on Federal lands. A number of conservation measures were developed to reduce or eliminate adverse effects to lynx from vegetation and recreation management on Federal lands. Those measures applicable to the proposed project are discussed below under cumulative effects. Most applicable conservation measures would be met under the Proposed Action.

Cumulative Effects:

The cumulative effects analysis is based upon the standards and guidelines outlined in the LCAS (Ruediger et al. 2000), and the Northern Rockies Lynx Management Direction (NRLMD 2007). The NRLMD and LCAS sets a limit that no more than 30% of lynx habitat in an LAU can be in an unsuitable condition and that no more than 15% of lynx habitat in an LAU can be converted to an unsuitable condition within a 10-year period. It is estimated that 1,228 acres of lynx habitat in the Buffalo Fork West LAU is currently in unsuitable condition (7.2 % of the LAU), and 1,325 acres of lynx habitat in the Buffalo Fork Middle LAU is currently in unsuitable condition (2.9 % of the LAU) (Table 7). The additional lynx habitat that would be disturbed under this project would result in minimal increase in the percentage of lynx habitat that is in unsuitable condition (Table 7). This is below the 30% limit for lynx habitat in unsuitable condition at any given time. The Forest Service has no control over activities that occur on private land in this LAU.

Table 7. *Condition of Lynx Habitat: Currently and Post Project Implementation.*

Lynx Analysis Unit (LAU)	Lynx Habitat (Acres)	Habitat Currently in Unsuitable Condition (Acres)	Habitat Currently in Unsuitable Condition	Proposed for Fuels Reduction Treatment (Acres)	Habitat in Unsuitable Condition Post-Project (%)

			(%)		
Buffalo Fork West	17,128	1,228	7.2	504	10.1
Buffalo Fork Middle	46,275	1,325	2.9	223	3.3

Compliance with Forest Plan Management Standards and Guidelines

The proposed action is consistent with the goals, objectives, standards and guidelines in the Northern Rockies Lynx Management Direction Record of Decision (2007). Although vegetation management standards do not apply to fuel treatment projects within the WUI, these standards were considered in development of the proposal. The proposed action does require an exemption from Standard Veg S6, because forest understory thinning from prescribed burn treatments will reduce horizontal cover for snowshoe hares in multi-storied mature and late forest structural stages. However all stands to be treated currently have low understory horizontal cover and low hare abundance.

The Record of Decision (ROD) for the Northern Rockies Lynx Management Direction (NRLMD) became effective July 16, 2007 (USFS2007). Terms and Conditions (T&C's) of the Biological Opinion and Incidental Take Statement (FWS 2007) are incorporated into the ROD. The Biological Assessment provides a summary to date, including this project, of the Forest's compliance with the Incidental Take Statement (ITS) associated with the NRLMD.

Treatment of approximately 727 acres of potential lynx habitat within the project area could result in short term adverse effects to lynx because the prescribed burning treatments would reduce the density of year around horizontal cover for snowshoe hares and subsequently reduce foraging habitat for lynx. However, because of the small scope and scale of this project, and the low quality snowshoe hare habitat within treatment units, habitat for lynx would be available outside of project area. The management direction in the ROD for Standards VEG S1, VEG S2, VEG S5 and VEG S6 states that the Standards apply "… except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation:

Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest)." In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard." [The standard referred to in the last sentence is VEG S1.]

Designated Critical Habitat

The treatments to reduce hazardous fuels in the wildland/urban interface would result in very small (727 acres) additional effects to the functioning of the GYA critical habitat unit and the Primary Constituent Elements (PCEs): snowshoe hare and denning habitats, and matrix conditions. PCEs operate on a broad landscape scale and the relatively small habitat changes that may result from proposed vegetation treatments at this scale will have negligible effects to the PCEs and are unlikely to change how the elements function within the unit.

Gray Wolf *(Canis lupus irremotus)*

Direct, Indirect, and Cumulative Effects

The proposed treatment is intended to promote aspen regeneration from root suckering and to create a mosaic of sagebrush/grasslands that would provide beneficial cover and forage for big game species. Any resulting benefits to big game populations may provide more foraging opportunities for large predators including gray wolves; this would be a positive effect for wolves.

The proposed project activities may affect dispersing or transient wolves by temporarily displacing them from the immediate area. Even though the project area may be within the Buffalo and Pacific Creek wolf pack's home ranges, overall effects to wolf recovery are expected to be low. Sufficient suitable security areas are adjacent to the project area for wolves and big game.

The Buffalo Valley Fuels project proposed treatments are adjacent to private land, and activity by people is high. The acres proposed for treatment likely provide less than quality habitat for wolves due to their close proximity to high human use areas. Wolves have been documented within the project area, and it is likely that wolves will continue to travel through the project area.

The scope and scale of this project is small, and the area is used heavily by people. Additionally, the availability of big-game as prey for wolves is not expected to change as a result of this project.

Yellow-billed Cuckoo (*Coccyzuz americanus*)

Status of the Species in the Proposed Project Area

The yellow-billed cuckoo and its preferred habitat is believed to be absent from all acres to be treated within the project area. Even though the species and its habitat are not expected to be present within the treatment units appropriate precautions will be implemented by buffering (100 feet on each side) streams and ponds found near and/or within the project area. The likelihood of the yellow-billed cuckoo occupying these areas of habitat in the project area during fuels management operations is too slight to be anything other than a remote possibility.

SENSITIVE SPECIES

Three-toed Woodpecker *(Picoides tridactylus)*

Alternative A - No Action

Direct and Indirect Effects

This alternative maintains the status quo on unmanaged lands continues for several decades. Long-term (several decades) indirect effects could occur if a high severity fire burns an extensive portion of the project area in the future. The result would be to move more mature or old growth habitat into early seral condition reducing habitat suitability for several decades to over 100 years, depending on severity.

Alternative B - Proposed Action

Direct and Indirect Effects

The proposed fuels project would remove many dead and dying trees from within the treatment units in the project area. Three-toed woodpecker may not nest within the units following treatment due to the lack of high snag densities (Samson, 2006); however, larger trees would be retained that may provide future nesting and foraging opportunities. Any slight loss in acreage would be offset by the tremendous amount of new foraging/nesting habitat that has been, and is being created, by the current mountain pine beetle epidemic within the project area and elsewhere on the BTNF.

Cumulative Effects

The defined effects area for three-toed woodpecker is the BTNF. This analysis area is appropriate because of the limited scope of effects on the nesting and foraging habitats present in the project area. Considering the limited scope of this project and the amount and distribution of recently burned forest and beetle-killed forest in the BTNF the additive effects of this project will be negligible.

Determination

The proposed actions **may impact individual three-toed woodpecker but would not likely contribute to a trend towards Federal listing or loss of viability to population or species.**

Northern Goshawk *(Accipiter gentilis)*

Alternative A - No Action

Direct and Indirect Effects

This alternative maintains the status quo on unmanaged lands continues for several decades. Long-term (several decades) indirect effects could occur if a high severity fire burns an extensive portion of the project area in the future. The result would be to move more mature or old growth habitat into early seral condition reducing habitat suitability for several decades to over 100 years, depending on severity.

Alternative B - Proposed Action

Direct and Indirect Effects

Preferred treatments for maintaining stand structure in nest areas include thinning unwanted understory trees, with non-uniform spacing using prescribed fire and/or hand-operated tools (Reynolds et al. 1992). The prescribed fuels treatment would improve existing goshawk nesting and foraging habitat and facilitate development of future goshawk nesting habitat by thinning out the conifer understory and increasing the vigor and growth rates of the overstory trees. Harvest techniques would leave structure suitable for goshawk nesting habitat if and where it currently exists. Such treatments may occur within the nest areas and around known nests if they do not reduce the overstory canopy. Incidental disturbance of foraging goshawks could occur, but would have little impact to goshawks.

In areas that are currently densely stocked with conifers, reducing stocking levels would benefit goshawks by opening up flight lines and making foraging easier for juvenile goshawks. In areas that are not currently densely stocked with conifers, further reducing stocking levels might make it more difficult for juvenile goshawks to approach their prey

undetected. Changes in forest structure would result in increased populations of some goshawk prey species, and decreased populations of others.

All units included in this alternative are likely within the foraging range of at least one goshawk pair.

Proposed treatments would generally retain a forest structure composed of the most mature live trees available, as well as snags and logs within the historic range for the site. These conditions should provide suitable foraging habitat for goshawks, although changes in forest structure may alter the abundance of prey species in some localized areas. The treatments would tend to increase the diversity of habitats across the area, which could benefit goshawks by increasing the diversity of the prey base. Three major goshawk prey items are red squirrels, snowshoe hares and grouse. In mixed conifer stands, numbers of red squirrels increased after a mechanical fuels reduction treatment, but numbers of snowshoe hares decreased (Bull and Blumton 1999). In Oregon, the number of red squirrels remained constant or increased following a thinning treatment (Bull, et al. 2005). Blue grouse benefit from open canopies (Reynolds, et al. 1992). Depending on the juxtaposition of various types of habitat patches to the treatment units, thinning dense stands likely would have both positive and negative effects on goshawks and those species they prey upon.

Cumulative Effects

The defined effects area for goshawks is the Buffalo Ranger District. This analysis area is appropriate because of the limited scope of effects on the nesting and foraging habitats present.

Given an average spacing of approximately two miles between nest areas, it seems unlikely that the project area would contain more than four goshawk territories. Incremental effects of the proposed activities from this project to nesting territories outside the defined cumulative effects analysis area would not be measurable. The Forest level consideration is used to provide a broader context for the more localized effects analysis.

- The incremental reduction in canopy closure due to treatments in multiple units would have a minor detrimental effect on the availability of goshawk nesting habitat. Where reduction in density and competition increases canopy growth, return of sufficient canopy cover for goshawks may be hastened. It still may require 25 – 50 years or more.
- Reduction in understory canopy will improve habitat for some prey species and reduce it for others. In some units it may actually improve or create foraging habitat for goshawks by opening flight lines (Reynolds 1989). These effects would occur for approximately 25 – 50 years until the site re-vegetated, or fire or other vegetative management occurred.
- It is possible that management activities could disturb individual goshawks that are in or near units during implementation, even if the unit is not within an active nest territory. Such disturbance would be minor and temporary, and goshawks could easily avoid the disturbance by flying to other portions of their large territories.

Past fire suppression activities may have increased goshawk nesting habitat in the Buffalo Ranger District in the last several decades. Along the valley-foothill interface

Douglas fir has increased in numbers and matured in the absence of frequent fires that in the past may have favored more fire adapted species. This has resulted in the survival of mature Douglas-fir trees that potentially could be used for nesting. However, since 2004 numerous mature Douglas fir and lodgepole pine trees within the project area have succumbed to beetle infestations, thus some nesting habitat has likely been lost. In some areas, where the encroachment of Douglas-fir and lodgepole pine has altered what was once open habitat, fire suppression may have negatively impacted flight lanes used for foraging; however the recent Douglas fir beetle infestation, and current mountain pine beetle infestation may be positively impacting flight lanes used for foraging.

Changes in forest composition and structure have also likely altered the prey species available to goshawks in the area. With fire suppression activities continuing in the future some of these stands of currently suitable goshawk habitat will become unsuitable in time. The loss could be due to stand densities that don't allow open flight or to loss through fire.

The structure, function and quality of both nesting and foraging habitat have been impacted by timber harvests in the Buffalo Ranger District. In the cumulative effects area clearcuts, shelterwoods, seed tree cuts and sanitation salvage occurred. These management practices may not have left sufficient canopy cover for the dense canopy preference of goshawks, and they decreased the number of snags and the amount of down wood available to support goshawk prey. Timber management has been suspected of affecting goshawks at least at local levels (USFWS 1998). Reduction and fragmentation of habitat of mature forest may favor early successional competitors and predators such as red-tailed hawks and great horned owls (USFWS 1998). Nestling and juvenile goshawks are incapable of or inexperienced at predator avoidance. Predation, therefore, is likely to be a more important mortality factor for these age classes than in adults (USFWS 1998).

Determination

The proposed actions **may impact individual goshawks but would not likely contribute to a trend towards Federal listing or loss of viability to population or species.**

Rationale for Determination

- Some loss of nesting habitat would occur.
- Some prey species would benefit from fuels treatments but some would not; overall the area would still be suitable habitat for foraging.
- The minimal amount of disturbance, in light of the well distributed and excess habitat will not affect species viability.

Great Gray Owl *(Strix nebulosa)*

Alternative A - No Action

Direct and Indirect Effects

This alternative maintains the status quo on unmanaged lands continues for several decades. Long-term (several decades) indirect effects could occur if a high severity fire burns an extensive portion of the project area in the future. If fire severity were high to extreme the result could be to move more mature or old growth habitat into early seral condition reducing habitat suitability for several decades to over 100 years. If severity were

light to moderate relatively small fire created forest openings may provide additional foraging opportunities for owls.

Alternative B - Proposed Action

Direct and Indirect Effects

Proposed silvicultural and fuels treatments will result in stand structure that may be more favorable for foraging. Stands to be treated are mixed Douglas fir, lodgepole pine, and aspen with a few sub-alpine fir and Engelmann spruce. Some residual trees in the thinned stands will likely be broken off by wind damage. Larger snags broken off high above ground level are favored nest sites for great gray owls. Incidental disturbance of foraging owls could occur, but would have little impact on great gray owls.

In areas that are currently densely stocked with conifers, reducing stocking levels in a mosaic pattern may benefit great gray owls by opening up flight lines and making foraging easier for owls (Hayward and Verner, 1994). Great gray owls rarely forage in forest habitat. Changes in forest structure would result in increased populations of most prey species.

Cumulative Effects

The defined effects area for great gray owl is the Buffalo Ranger District. This analysis area is appropriate because of the limited scope of effects on the nesting and foraging habitats present.

Incremental effects of proposed activities of this project to nesting territories outside this defined cumulative effects analysis area would not be measurable.

- The incremental reduction in canopy closure due to treatments in some of units may increase the availability of great gray owl foraging and nesting habitat.
- Reduction in understory canopy may improve habitat conditions for some prey species. These effects would occur for approximately 25 – 50 years until the site re-vegetated.
- It is possible that management activities could disturb individual owls that are in or near units during implementation, even if the unit is not within an active nest territory. Such disturbance would be minor and temporary, and great gray owls could easily avoid the disturbance by flying to other portions of their large territories.

Fire exclusion policies implemented after 1900, climatic changes (cyclic drought), and livestock grazing have all been identified as factors contributing to the successional invasion of conifers into lodgepole pine/ steppe grassland community types occupying the montane zones of area mountain ranges. Past fire suppression activities may have decreased owl nesting habitat in the Buffalo Ranger District in the last several decades. Douglas-fir has increased in numbers and matured in the absence of frequent fires that may have favored more fire adapted species. This has resulted in numerous mature Douglas-fir trees that potentially could be used for nesting. In some areas, where the encroachment of Douglas-fir has altered what was once open habitat, fire suppression may have negatively impacted flight lanes used for foraging. However, the recent Douglas fir beetle infestation and ongoing mountain pine beetle epidemic on the Forest and within the project area may currently be improving nesting and foraging habitat on the Buffalo Ranger District.

Ongoing changes in forest composition and structure have likely altered the prey species available to great gray owls in the area. With fire suppression activities continuing in the future some of these open stands may become unsuitable in time. The loss could be due to

stand densities that don't allow open flight or to loss through fire. However, the majority of stands within the project area are currently being extensively thinned out by the ongoing beetle infestation and this may improve foraging conditions in the near future in many of these thick stands.

The structure, function and quality of both nesting and foraging habitat have been impacted by timber harvests in the Buffalo Ranger District. Timber harvesting, whether clearcuts or selective removal of large-diameter trees, has reduced nesting opportunities for all forest raptors, including great gray owls. Studies show that logging can and does generate "temporary meadows" capable of supporting rodent populations used by breeding great gray owls. But unlike naturally occurring mountain meadows, forest clearings created by logging undergo rapid forest reestablishment; successional development often makes the usefulness of such openings short-lived.

Determination

The proposed actions **may impact individual great gray owls but would not likely contribute to a trend towards Federal listing or loss of viability to population or species.**

Rationale for Determination

- Some loss of nesting habitat would occur
- All of the area would still be suitable habitat for foraging
- Foraging habitat may be enhanced.

Columbia Spotted Frog *(Rana luteiventris)*

Alternative A - No Action

Direct Effects

The impact of not treating 927 acres of upland vegetation in an 18,255 acre sub-basin watershed at risk to mountain pine beetle infestation will have no measurable direct effect to amphibians or amphibian habitat.

Indirect and Cumulative Effects

An increase in tree mortality may improve the size and amounts of large woody debris available for amphibian habitat on the forest floor. Dead trees near Forest roads may attract firewood cutters that may cause resource damage reaching trees with vehicles that may in-turn generate erosion that migrates into the watershed.

Alternative B - Proposed Action

Direct Effects

The proposed project may create negative short term effects to individual spotted frogs from temporary road and skid trails from proposed mechanical treatments. Forest Plan Standards and Guide Lines and State Best Management Practices for timber harvest will reduce and possibly eliminate short-term effects to frogs and amphibian habitat. Prescribed fire treatments are designed for upland vegetation and will not impact riparian areas using Forest Plan Standards and Guide Lines and State Best Management Practices for prescribed fire.

Indirect and Cumulative Effects

The proposed action will reduce the probability of a severe fire and implementation will have a low potential of impacting amphibians or amphibian habitat. Overall the proposed project will have no long term effects to amphibians or amphibian habitat after completion.

Mitigation Measures/Design Criteria

Direct and indirect impacts to amphibians and amphibian habitat can be minimized using Wyoming Forestry Best Management Practices (BMP) for streamside management and BTNF Standards and Guidelines for timber harvest. Standards and Guidelines include maintaining a minimum of 100 foot riparian buffers on perennial and intermittent streams to conserve aquatic and terrestrial riparian habitat, protect stream channel and banks and promote flood plain stability. Impacts from prescribed fire maybe minimized by restricting ignition points 100 feet from streams and rivers and maintaining 50 to 100 foot riparian buffer zone where fire is excluded if possible.

Determination

The proposed actions **may impact individual Columbia Spotted Frogs but would not likely contribute to a trend towards Federal listing or loss of viability to population or species.**

Rationale for Determination

- Some individual frogs and habitat may incidentally be harmed
- Columbia spotted frogs are widespread and common throughout much of the Forest and project area
- 100 foot riparian buffers will be used on perennial and intermittent streams and ponds within the project area

MANAGEMENT INDICATOR SPECIES

Brewer's Sparrow *(Spizella breweri)*

Alternative A - No Action

Direct and Indirect Effects

The no action alternative will not affect Brewer's sparrow populations in the short term. The status quo on unmanaged lands continues for several decades. Populations might eventually decline to some extent due to conifer encroachment into sagebrush communities. The limited sagebrush habitat in the area would continue to be at risk of a high intensity fire which could dramatically reduce the amounts of sagebrush cover.

Alternative B - Proposed Action

Direct and Indirect Effects

The proposed treatments will reduce conifer encroachment and invigorate herbaceous production in sagebrush community types. Treatments will occur in a mosaic pattern on approximately 50 acres of sagebrush habitat. The immediate effect of fire on Brewer's sparrow populations depends greatly upon the season and intensity of the burn. A relatively cool fire during the dormant season could greatly increase food sources (Wright and Bailey

1982). Brewer's sparrows are adapted to eat particular kinds of food, and the birds' abundance may depend largely on the supply of the appropriate kind of food (Bendell 1974).

Best (1979) found that the major impact of burning on foraging behavior was to make plant foods accessible, particularly grass seed that was unavailable before the burn because of the accumulation of grass litter. McGee (1976) also found an influx of non-breeding birds to the burned areas in his study. He attributed this to the increased availability of plants and insects as food items. Winter (1984) found Brewer's sparrow foraging efficiency remained unchanged in the post-burn period. Winter (1984) also found that in late July burned patches contained more arthropods than unburned areas; with the reduced vegetative cover after burning, there was increased arthropod accessibility.

Cumulative Effects

The defined cumulative effects area for Brewer's sparrows is the BTNF. The proposed project will treat approximately 50 acres, which is much less than one percent of the potential Brewer's sparrow habitat occurring on the BTNF. The scope and magnitude of this level of treatment within the broader context of habitat within the Forest is imperceptible. Any additive effect from these projects will be negligible.

Determination

The proposed use of low- to moderate-severity prescribed fire to restore the age class diversity of sagebrush communities will reduce sagebrush cover on approximately 50 acres within the project area. This reduction in cover is not expected to be significant. Treatments will increase vegetative diversity in both plant species composition and structure. Across the Forest, potential Brewer's sparrow habitat is of sufficient quality and abundance to allow the species to continue to be well distributed across federal lands. Historic habitats remain well occupied, although the population will fluctuate within occupied habitats.

Based on the above information, implementation of the proposed action may have both beneficial and negative impacts on occupied habitats for Brewer's sparrow but would not contribute significantly to changes in Forest-wide populations for these species.

Elk *(Cervus canadensis)*

Alternative A - No Action

Direct and Indirect Effects

The no action alternative will not likely affect elk populations in the short term. The status quo on unmanaged lands continues for several decades. Elk populations might eventually decline to some extent due to reduced forage productivity resulting from increasingly dense conifer canopies. However, this is unlikely for a very long period of time within the Buffalo Valley due to the ongoing large-scale Douglas fir and mountain pine beetle epidemics. In the absence of disturbance, forested stands would continue to become denser and taller. Thermal cover and hiding cover percentages are likely to increase over time, resulting in reduced vulnerability to hunting mortality. Open forage and forested forage percentages are likely to decrease, resulting in reduced forage productivity. Continued insect and disease activity would slowly reduce the amount of thermal cover as these pathogens tend to affect older, less vigorous trees that form the overstory layer. The area would continue to be at risk

of a large, high intensity fire which could dramatically reduce the amounts of cover, but dramatically increase the level of forage productivity.

Alternative B - Proposed Action

Direct and Indirect Effects

This alternative would increase elk vulnerability to hunting mortality by increasing sight distances in many of the treatment units in the short term (10-20 years). Hunters would be able to detect and shoot at elk from longer distances within the units. Increased hunting mortality might reduce the number of elk within the project area to some extent. On the other hand, increased forage production resulting from reduction of overstory canopies in some units may lead to more elk surviving the winter in better condition. This in turn may improve birth and calf survival rates, which might increase elk numbers. Overall, it is likely that there would be little discernable change in elk numbers within the project area as a result of implementing this alternative. Changes to elk populations resulting from implementation of this alternative would be difficult to quantify because elk populations are also affected by hunting, predation, disease, and weather, among other limiting factors.

The proposed treatments will reduce conifer encroachment and likely invigorate herbaceous production in winter and summer ranges. Elk could experience beneficial effects from increased forage availability anticipated following application of these treatments.

In general, this alternative would likely reduce hiding cover percentages and increase the amount of forested forage**.** Forested forage percentages would be nearer the levels considered “optimal” in USDA (1978), with an accompanying increase in forage productivity. Recent research (Cook, et al. 1998) indicates that higher levels of forested forage may be more beneficial to elk than high amounts of thermal cover. Hiding cover percentages would still exceed “optimal” levels (USDA 1978) across the project area. Although elk might be more vulnerable to hunting mortality in some areas, adequate hiding cover would remain to allow elk to escape much of the hunting pressure.

The proposed action would not construct any new permanent roads. The use of prescribed fire and timber harvest will not substantially reduce the ability of the project area to serve as security habitat. These treatments will likely increase forage without substantially altering the overstory.

Cumulative Effects

The defined cumulative effects area for elk is the Buffalo Ranger District. This analysis area is appropriate to analyze any incremental effects from the actions of this project on elk in conjunction with past, present, ongoing and reasonably foreseeable future actions. At the state level elk are considered to be common, widespread, and abundant, and not vulnerable in most of their range.

Within the Buffalo RD elk habitat on both winter and summer ranges has been influenced by past harvest activity. The past decades of fire suppression have likely led to more thermal cover than would typically occur in a fire adapted ecosystem, especially in the low elevation forests that were formerly visited more regularly by low severity fires. Fire exclusion in these same areas likely has resulted in less available forage for elk. Timber harvest has resulted in local increases in forage and reductions of thermal cover. Historic low intensity fires burned much more habitat than timber harvest operations have affected in the last several decades, likely resulting in much more thermal cover today than occurred historically.

Recent research has questioned the necessity of thermal cover for survival of wintering elk (Cook, et al. 1998). Researchers found "no significant, positive effect of thermal cover on the condition of elk during any of the six experiments. In contrast, dense cover provided a costly energetic environment, resulting in significantly greater over-winter mass loss, fat catabolism, and (in one winter) mortality." Wintering elk survived and retained body weight better in open areas than in thermal cover. For this reason, whether thermal cover is necessary for individual elk survival or elk population viability seems open to question.

This means that it is doubtful that any reduction of thermal cover through prescribed fire will have a quantifiable effect on observed elk population numbers in the Buffalo Ranger District or in the Project Area. The reduction in thermal cover is not expected to impact the Forest's ability to meet the State's elk objectives. The State's elk objectives in most herd units across the Forest will likely continue to be met or exceeded.

Determination

The proposed use of low- to moderate-severity prescribed fire and mechanical treatments to restore vegetation will reduce cover available to elk in the short-term. This reduction in cover is not expected to impact elk in the area. Treatments will likely increase vegetative diversity in both plant species composition and structure. Elk may benefit from an increase in forage following prescribed fire and mechanical treatments. Across the Forest, elk habitat is of sufficient quality and abundance to allow the species to continue to be well distributed across federal lands. Historic habitats remain well occupied, although the population will fluctuate within occupied habitats based on the availability of forage.

Based on the above information, implementation of the proposed action may have a positive impact on elk foraging habitat, but would not contribute significantly to changes in Forest-wide populations of the species.

Mule Deer (*Odocoileus hemionus*)

Alternative A - No Action

Direct and Indirect Effects

The no action alternative is not likely to affect mule deer populations over the short-term. The status quo on unmanaged lands continues for several decades. Mule deer populations might eventually decline to some extent due to reduced forage productivity resulting from increasingly dense conifer canopies. However, this is unlikely to be the case for a long time in the Buffalo Valley due to the large-scale Douglas fir and mountain pine beetle epidemic. In the absence of disturbance, forested stands would continue to become denser and taller. Thermal cover and hiding cover percentages are likely to increase over time, resulting in reduced vulnerability to hunting mortality. Open forage and forested forage percentages are likely to decrease, resulting in further reduced forage productivity. Continued insect and disease activity would slowly reduce the amount of thermal cover as these pathogens tend to affect older, less vigorous trees that form the overstory layer. The area would continue to be at risk of a large, high intensity fire which could dramatically reduce the amounts of cover, but dramatically increase the level of forage productivity.

Alternative B - Proposed Action

Direct and Indirect Effects

The project areas lie within spring-summer-fall mule deer habitat. This alternative would increase mule deer vulnerability to hunting mortality by increasing sight distances in many of the treatment units in the short term (10-20 years). Hunters would be able to detect and shoot at mule deer from longer distances within the units. Increased hunting mortality might reduce the number of mule deer within the project area to some extent. On the other hand, increased forage production resulting from reduction of overstory canopies in some units would lead to more mule deer surviving the winter in better condition. This in turn might improve birth and fawn survival rates, which may tend towards an increase in mule deer numbers. Overall, it is likely that there would be little discernable change in mule deer numbers within the project area as a result of implementing this alternative. Changes to mule deer populations resulting from implementation of this alternative would be difficult to quantify because mule deer populations are also affected by hunting, predation, disease, and weather, among other factors.

The proposed treatments will reduce conifer encroachment and invigorate herbaceous production in winter and summer ranges. Mule deer may experience positive effects from increased forage availability anticipated following application of these treatments.

The proposed action would not construct any new permanent roads. The use of fuels management will not substantially reduce the ability of the project area to serve as security habitat. These treatments may increase forage without substantially altering the overstory.

Cumulative Effects

The defined cumulative effects area for mule deer is the Buffalo Ranger District. This analysis area is appropriate to analyze any incremental effects from the actions of this project on mule deer in conjunction with past, present, ongoing and reasonably foreseeable future actions. At the state level mule deer are considered to be common, widespread, and abundant, and not vulnerable in most of their range.

Within the Buffalo RD mule deer habitat on both winter and summer ranges has been influenced by past harvest, fire, disease, and climate activity. The past decades of fire suppression may have led to more thermal cover than would typically occur in a fire adapted ecosystem, especially in the low elevation forests that may have been visited more often by low severity fires. Fire exclusion in these same areas may have resulted in less available forage for mule deer. Timber harvest has resulted in local increases in forage and reductions of thermal cover. Historic low intensity fires burned over much more habitat than timber harvest operations have affected in the last several decades, perhaps resulting in much more thermal cover today than occurred historically. Douglas fir and mountain pine beetle epidemics on the Buffalo RD are currently reducing the amount of thermal cover in many forested stands within the project area.

Determination

The proposed use of low- to moderate-severity prescribed fire and mechanical treatments will reduce cover available to mule deer in the short-term. This reduction in cover is not expected to be significant. Treatments will likely increase vegetative diversity in understory plant species composition and structure in the long-term. Mule deer may benefit from an increase in forage following fuels management and mechanical treatments. Across the Forest, mule deer habitat is of sufficient quality and quantity to allow the species to continue to be well distributed across federal lands. Historic habitats remain well occupied, although the population will fluctuate within occupied habitats based on the availability of forage.

Based on the above information, implementation of the proposed action could potentially have a beneficial impact on mule deer and their habitat within the project area, but would not contribute significantly to changes in Forest-wide populations for the species.

Moose (*Alces alces*)

Alternative A - No Action

Direct and Indirect Effects

The no action alternative would affect moose populations as described above. The status quo on unmanaged lands continues for several decades. Moose populations may continue to decline to some extent due to a variety of possible environmental factors; or it is possible that certain environmental factors could initiate improved overall trends in abundance. Recent and ongoing Douglas fir and mountain pine beetle infestations may soon improve forage conditions for moose on certain portions of the Forest, including the project area. However, in the absence of such disturbance, forested stands would continue to become denser and taller. Thermal cover and hiding cover percentages are likely to increase over time, resulting in reduced thermal stress for moose during summer months and reduced susceptibility to predation and hunting. Under this scenario open forage percentages are likely to decrease, resulting in reduced forage productivity of certain browse species but likely increased productivity of understory sub-alpine fir. The area would continue to be at risk of a large, high intensity fire which could reduce the amounts of cover, but dramatically increase the level of certain forage species productivity in the long-term.

Proposed Action

Direct and Indirect Effects

Less than one percent of both moose critical winter range and year-round habitat will be affected on the Forest. Increased forage production of certain forbs and woody species resulting from reduction of overstory canopies in treatment areas may have a positive impact on moose in the area; however, the reduction of understory tree species such as sub-alpine fir may counter this positive impact somewhat. Additionally, reduced thermal cover, in the form of summer overstory canopy cover, may increase instances of heat stress on individual moose. However, overall it is likely that there would be little discernable change in moose numbers within the project area as a result of implementing this alternative. Changes to moose populations resulting from implementation of this alternative would be difficult to quantify because populations are also affected by hunting, predation, disease, and weather, among other factors.

The proposed treatments will reduce conifer encroachment and invigorate herbaceous production in winter and summer ranges. The reduction of young understory sub-alpine fir, which are the second most important winter forage for moose in this region, negatively impact moose within the project area. However moose will likely experience beneficial effects from the increased forage availability of other woody and herbaceous plant species anticipated following application of these treatments.

The proposed action would not construct any new permanent roads. In the short-term, the use of prescribed fire and harvest techniques may reduce the ability of the project area to serve as security habitat and summer thermal cover.

Cumulative Effects

The defined cumulative effects area for moose is the Herd Unit. It is at this level that WGFD designs and enforces hunting regulations that satisfy public expectations for hunting recreation and to achieve desired post-season population levels and biologically sound sex and age composition. Population distributions, land ownership patterns, geographic boundaries, roads, and other features are considered in delineating HDs. This analysis area is appropriate to analyze any incremental effects from the actions of this project on moose in conjunction with past, present, ongoing and reasonably foreseeable future actions. Less than one percent of both moose critical winter range and year-round habitat will be affected by the proposed treatments.

Within the project area past decades of fire suppression have led to more thermal cover than would typically occur in a fire adapted ecosystem, especially in the low elevation forests that were formerly visited regularly by low severity fires. Fire exclusion in these same areas, depending on species, has resulted in reduced and increased potential forage for moose. There likely has been a decrease in many woody and herbaceous plant species but an increase in sub-alpine fir, which is known to be important winter forage. Timber harvest has resulted in localized increases in forage (e.g., aspen, woody shrubs, and forbs) and reductions of important summer thermal cover. Historic low intensity fires burned much more habitat than timber harvest operations have affected in the last several decades, perhaps resulting in more thermal cover today than occurred historically. Currently Douglas fir and mountain pine beetle epidemics on the forest, and the project area, are greatly reducing overstory thermal cover.

Determination

The proposed use of low- to moderate-severity prescribed fire and mechanical treatments to restore vegetation will reduce some forage species and thermal cover available to moose in the short-term. This reduction in forage and cover is expected to be small in scope and scale. Treatments will increase vegetative diversity in both plant species composition and structure. In the long-term moose will likely benefit from an increase in forage following prescribed fire and harvest. Across the Forest, moose habitat is of sufficient quality and abundance to allow the species to continue to be well distributed across federal lands. Historic habitats remain well occupied, although the population will fluctuate within occupied habitats based on a variety of environmental factors including the availability of forage.

Based on the above information, implementation of the proposed action may have both beneficial and negative impacts on occupied habitats for moose but would not contribute dramatically to changes in Forest-wide populations for these species.

Western Boreal Toad (Bufo boreas boreas)

Alternative A - No Action

Direct Effects

The impact of not treating 927 acres of upland vegetation in an 18,255 acre sub-basin watershed at risk to mountain pine beetle infestation will have no measurable direct effect to boreal toads or their habitat.

Indirect and Cumulative Effects

An increase in tree mortality may improve the size and amounts of large woody debris available for amphibian habitat on the forest floor. Past and present fire suppression activities may currently be suppressing toad abundance. Dead trees near Forest roads may attract firewood cutters that may cause resource damage reaching trees with vehicles that may in-turn generate erosion that migrates into the watershed.

Alternative B - Proposed Action

Direct Effects

The proposed project may create negative short term effects to individual boreal toads from temporary road and skid trails from proposed mechanical treatments. Forest Plan Standards and Guide Lines and State Best Management Practices for timber harvest will reduce and possibly eliminate short-term effects to boreal toads and their habitat. Prescribed fire treatments are designed for upland vegetation and will not impact riparian areas using Forest Plan Standards and Guide Lines and State Best Management Practices for prescribed fire.

Indirect and Cumulative Effects

The proposed action will reduce the probability of a severe fire and implementation will have a low potential of impacting toads or toad habitat. Overall the proposed project will have no long term negative effects to toads or toad habitat after completion.

Mitigation Measures/Design Criteria

Direct and indirect impacts to boreal toads and boreal toad habitat can be minimized using Wyoming Forestry Best Management Practices (BMP) for streamside management and BTNF Standards and Guidelines for timber harvest. Standards and Guidelines include maintaining a minimum of 100 foot riparian buffers on perennial and intermittent streams to conserve aquatic and terrestrial riparian habitat, protect stream channel and banks and promote flood plain stability. Impacts from prescribed fire may be minimized by restricting ignition points 100 feet from streams and rivers and maintaining 50 to 100 foot riparian buffer zone where fire is excluded.

Determination

The proposed actions **may impact individual western boreal toads but would not likely contribute to a trend towards Federal listing or loss of viability to population or species.**

Rationale for Determination

- Some individual toads and habitat may incidentally be harmed
- Boreal toads, their habitat, and breeding grounds are located elsewhere on the Forest and district.
- 100 foot riparian buffers will be used on perennial and intermittent streams and ponds within the project area.

Boreal Chorus Frog *(Pseudacris maculate)*

Alterantive A - No Action

Direct Effects

The impact of not treating a small amount of upland vegetation in an 18,255 acre sub-basin watershed at risk to mountain pine beetle infestation will have no measurable direct effect to boreal chorus frogs or their habitat.

Indirect and Cumulative Effects

An increase in tree mortality may improve the size and amounts of large woody debris available for amphibian habitat on the forest floor. Past and present fire suppression activities, timber harvest, beetle killed trees, and climate variables do not appear to be limiting boreal chorus frogs on the forest. Chorus frogs are found from the lowest elevations up to tree line on the BTNF and this adaptability likely bodes well for this species.

Alternative B - Proposed Action

Direct Effects

The proposed project may create negative short term effects to individual boreal chorus frogs from temporary road and skid trails from proposed mechanical treatments. Forest Plan Standards and Guide Lines and State Best Management Practices for timber harvest will reduce and possibly eliminate short-term effects to boreal chorus frogs and their habitat. Prescribed fire treatments are designed for upland vegetation and will not impact riparian areas using Forest Plan Standards and Guide Lines and State Best Management Practices for prescribed fire.

Indirect and Cumulative Effects

The proposed action will reduce the probability of a severe fire and implementation will have a low potential of impacting boreal chorus frogs or their habitat. Overall the proposed project will have no long term negative effects to boreal chorus frogs or their habitat after completion.

Conservation Measures/Design Criteria

Direct and indirect impacts to boreal chorus frogs and their habitat can be minimized using Wyoming Forestry Best Management Practices (BMP) for streamside management and BTNF Standards and Guidelines for timber harvest. Standards and Guidelines include maintaining a minimum of 100 foot riparian buffers on perennial and intermittent streams to conserve aquatic and terrestrial riparian habitat, protect stream channel and banks and promote flood plain stability. Impacts from prescribed fire may be minimized by restricting ignition points 100 feet from streams and rivers and maintaining 50 to 100 foot riparian buffer zone where fire is excluded.

Determination

The proposed actions **may impact individual boreal chorus frogs but would not likely contribute to a trend towards Federal listing or loss of viability to population or species.**

Rationale for Determination

- Some individual chorus frogs and habitat may incidentally be harmed
- Chorus frogs, their habitat, and breeding grounds appear to be well distributed across the Forest and district.

- 100 foot riparian buffers will be used on perennial and intermittent streams and ponds within the project area.

3.1.3 Hydrology

Affected Environment

The lands of the Bridger-Teton National Forest have been divided into hydrologic units (HUCs) for analyses. These HUCs are typically watersheds, although there are rare exceptions when HUC boundaries do not follow watershed divides. HUCs are assigned numbers based on a watershed coding system: the longer the number, the smaller the watershed being described, with two numbers identifying each successively smaller watershed. For most purposes, the Forest looks at watershed impacts on a 6th-field HUC basis (i.e., the watershed codes have twelve numbers). These HUCs are approximately 5000 to 50,000 acres in size. The following HUCs are included in the project area (Table 8, Figure 4).

Table 8. *Buffalo Valley Fuels 6th field HUCs and areas*

HUC number	HUC name	Area (acres)
170401010607	Upper Buffalo Fork	29,116
170401010609	Lower Buffalo Fork	18,241
170401010608	Blackrock Creek	31,282
170401010610	Lava Creek	17,005

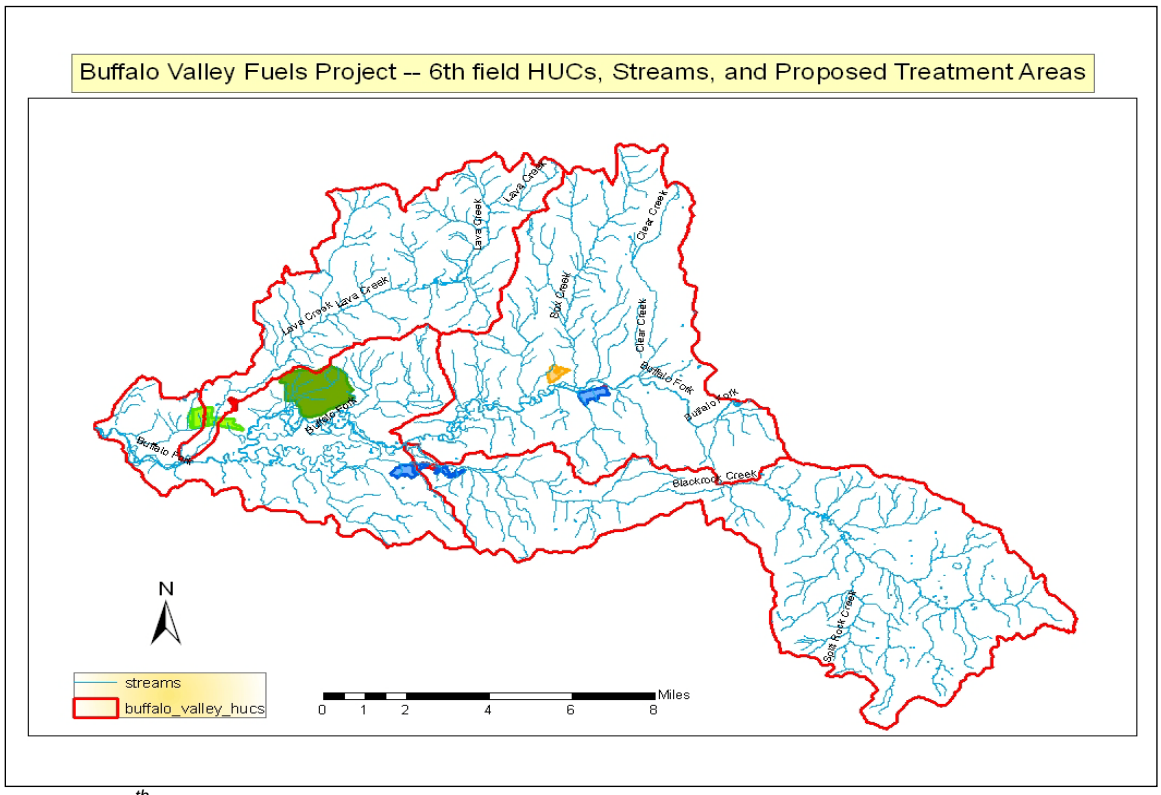

Figure 4. *6th level HUCS, Streams, and Proposed Treatment areas within project area.*

<u>Water Quality</u>

There are no 303(d) streams in or downstream from the project area. There are no municipal supply watersheds partly or fully within the analysis area.

The USGS collected water temperature, air temperature, specific conductance, and discharge data on the Buffalo Fork above Lava Creek from October 1985 to October 1998; the site is approximately two miles upstream from the mouth of Lava Creek. Because there are also non-Forest lands upstream from the sampling site, impacts from non-Forest lands are included in the results. Wyoming DEQ collected water quality data once on the Buffalo Fork in August 1994, just downstream from the Teton Wilderness boundary. Sampling results are summarized here:

- Stream water temperatures measured by the USGS varied widely between winter and summer. Temperatures reached a low of 0°C (frozen) every winter for the period of record. High temperatures peaked at 17°C one year (1988), but most summer water temperatures peaked between 15.5°C and 16.5°C. Wyoming water quality standards state that, for the classes of water present in the project area (see below), "the maximum allowable stream temperature will be the maximum natural daily stream temperature plus the allowable change [2°F or 1.1°C], provided that this temperature is not lethal to existing fish life and under no circumstance shall this maximum temperature exceed 68 °F (20 °C) in the case of cold water fisheries…" (WDEQ, 2001, Section 25(d)) Water temperature met this standard for the entire period of record. Maximum summer water temperatures were usually reached in late August. When air temperature rose or fell, water temperature followed suit.
- USGS measured specific conductance at the Buffalo Fork site. This parameter reflects the dissolved ionic content of water due to local geology and human inputs. Specific conductance values generally varied between about 80 uS/cm and 300 uS/cm, with one abnormally high value of 424 uS/cm on February 13, 1996. These values rose and fell on a cyclical basis: values peaked in winter and early spring (when stream discharge was lowest) and were near or at their lowest values when discharge was peaking. This indicates a dilution effect on specific conductance which probably reflects natural impacts. There is no State standard for this parameter.
- Turbidity was not measured by USGS. Wyoming DEQ measured turbidity at 0.5 NTU, which is very low. Total suspended solids were non-detectable.
- Nutrients: USGS did not sample for nutrients. Wyoming DEQ found that Nitrite (NO_2) + Nitrate (NO_3) were "undetectable", as were levels of Phosphorus.

Wyoming DEQ lists streams in the Wyoming Surface Water Classification List, Tables A and B, according to beneficial uses that are, or should be, supported for a given stream or reach. Buffalo Fork, Lava Creek, Blackrock Creek, and Clear Creek are listed as Class 2AB waters. "Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters are also protected for non-game fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value uses." (Source: WYDEQ)

Box Creek is listed as a Class 3B water. These are "tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. [They] are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain [some aquatic life] including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles…" (Source: WYDEQ)

<u>Stream Channel Conditions, Floodplains, Riparian Areas, and Wetlands</u>
Stream channel condition and trend was assessed in 2006. Proposed treatment areas were visited, air photos were reviewed, and streams were walked to obtain an overview of general channel

characteristics and conditions. Treatment areas were further visited in 2009, after changes were made to project boundaries, to evaluate potential impacts to water resources.

Information on the project area is presented below.

- Wilderness Ranches: No defined channels are present. No wetlands or riparian areas are mapped. The State Engineer's Office has identified a domestic water right point of diversion approximately 100 feet north of the project area.
- Heart Six: East of the project area (in channels trending generally north-south), vegetation biomass is heavier in the draws and channels than in the adjacent uplands. Streams were walked in early July 2006, and were flowing at the time of visit. Channels had very confined valleys with narrow, but healthy, riparian areas. Channels carried high amounts of sediment, derived at least partly from old mass movements that were visible along their valley walls, and had moderate to steep gradients; they were mostly "A" and "B" Rosgen channel types (Rosgen, 1996).

  Within the project area, channels mostly drain to the southwest and west. Two possible wetland areas have been mapped by the NWI in channels north of the Heart Six Ranch. Another wetland is mapped approximately 400 feet outside (northwest of) the project area perimeter, and water is clearly visible on aerial photography associated with the feature. In one channel north of the Heart Six Ranch, an extensive willow complex fills a valley bottom; this was not mapped as wetland by NWI, but was mapped as having riparian vegetation by the Bridger-Teton National Forest in 2007. Figure 5 shows wetlands from the NWI and riparian areas from the BTNF vegetation map.

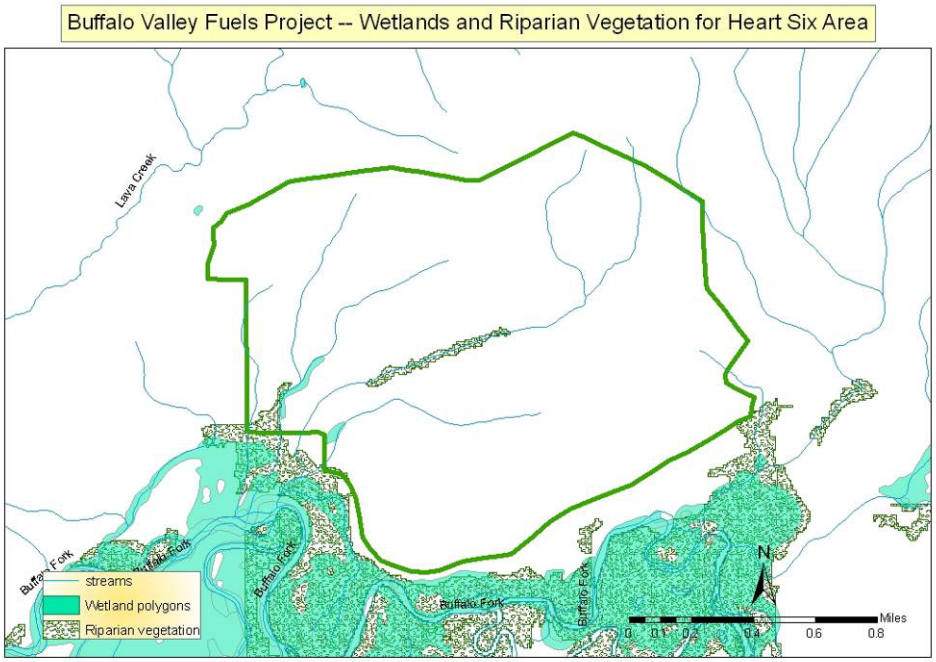

Figure 5. *Wetlands and riparian vegetation in the vicinity of the Heart Six treatment area.*

The Heart Six unit is bounded to the south by the Buffalo Fork River in several places. The stream is a Rosgen type "C" channel—likely a C4 (dominated by gravel). It is naturally very

dynamic, with active lateral movement along much of its length due to its geomorphic setting and noncohesive channel materials (cobble/gravel). Old, filled-in meanders and oxbow lakes (old meanders that are disconnected from the main channel and that now support ponds) are evident all along the valley bottom. This channel is dependent on riparian vegetation for stability; impacts from the highway and possibly from diversions and riparian grazing have caused areas of instability, accelerating natural lateral channel migration. Wetlands and riparian vegetation along the Buffalo Fork are shown in Figure 5. The Buffalo Fork's 100-year floodplain as delineated by FEMA Flood Insurance Rate Maps (FIRMs) generally includes the area within the active stream's "meander belt" (i.e., the area between lines drawn tangential to the extreme limits of fully developed meanders), but this isn't always the case.

There are two water right points of diversion within the proposed project area. One is a well owned by the Heart Six Ranch that is in the center of the project area (source: State Engineer's Office). The other is a pipeline that originates in Box K Draw on the west side of the project area (source: BTNF water rights files).

- Box Creek: Low portions of this area are extremely wet in spring and into summer. Both the road into the project area and the project area stands in low areas are poorly drained, with standing water in low spots making entry difficult. There are no wetlands mapped in the area in the NWI, and the only riparian vegetation is mapped on the western edge of the unit; although they are not mapped and have not been formally delineated, wetlands may be located in the Box Creek project area due to the prevalence of water.

  The Box Creek trailhead spring diversion and trough are located on the west side of the project area. They are outside the project area boundary, but are close enough to it (within approximately 100 feet) that they are noted here.

- Blackrock-Hatchet Timber Sale and Cut-Pile: The Blackrock-Hatchet Timber Sale is already marked for sale and is under contract. NEPA analysis was done in 2004 for the project, but no Hydrology report was submitted.

  A field review of the area proposed for inclusion in the Buffalo Valley Fuels Project found riparian vegetation (along with Canada thistle and tansy) along the two-track road and intermittent channel in the western-most unit. The site was visited in early July 2009 and there was water present in the draw just above the main road, partly due to lack of road drainage in that location. The draw through the next unit to the east appears to be dry, lacking riparian vegetation, as do the draws in the other units.

  The database for the State Engineer's Office shows a water right for Moran Mountain Resorts in the northwest portion of the western unit.

  Blackrock Cut and Pile includes (or abuts) the diverted channel from Blackrock Creek.

- Turpin Lodge Timber Sale and Cut-Pile: The northeast edge of the proposed Cut-Pile treatment area is within approximately fifty feet of the Buffalo Fork. The proposed treatment area is flat, with no channels and no apparent wet features or riparian vegetation.

  The northwest boundary of the timber sale area comes close to the Buffalo Fork. The project area has a number of ponds and areas of riparian vegetation within its boundaries that are not mapped in the NWI or on the Forest's vegetation map. There are also defined stream channels that are not marked on topographic maps. One apparent ditch was noted within the sale area,

although it appeared not to have been used for a long time. Two wells used by the Turpin Meadows Ranch are mapped along the northern boundary of the timber sale area. The State Engineer's Office has identified a domestic water right along the southeastern boundary of the sale area.

- Lava Creek Rx Burn: Lava Creek is perennial and flows through this project area; several other channels cross it as well but these lack riparian vegetation and are likely intermittent. A wetland area has been identified by the NWI in the eastern end of the project area. There are no water rights identified in the project area.

Water Quantity

Precipitation: The nearest SNOTEL station to the project area is the Base Camp site, located approximately ten miles to the northwest. Average annual precipitation (1981-2000) is 31.85 inches. In water year 2005 (October 2004 to September 2005), total precipitation was 27.40 inches and summer precipitation (June through September) totaled 7.3 inches compared with the long-term average of 6.22 inches for the same period. The site shows a late fall/winter monthly precipitation peak (November through February) due to snow accumulation. July and August are the months of lowest precipitation.

Streamflow: The USGS has an active stream gage on the Buffalo Fork, approximately two miles upstream from Lava Creek, which has been operational since 1965. A gage approximately three miles downstream was operated periodically between 1906 and 1960.

Extreme flows for the period of record at the present gage include a maximum discharge of 6540 cfs on June 9, 1981, and a minimum daily flow of 60 cfs on December 25, 2002. Mean daily discharges tend to be lowest between late January and early March (minimum mean daily value of 112 cfs). Peak flows occur from mid to late June, with flows increasing beginning in mid-April in response to snowmelt. Mean of daily mean discharge values for the period of record show two peaks in June—2360 cfs on June 10 and 2430 cfs on June 23. Peak streamflow in 2005 occurred on June 24 and was 3300 cfs. In 2006, a flow of 3860 cfs was recorded on June 9 (provisional data). There has been no systematic change over time in peak flow magnitude or date of peak flow occurrence.

General Effects

- Effects from Prescribed Fire: Various investigators have described the effects of prescribed fire on erosion and sediment delivery to streams. Sediment production on hillslopes depends on burn severity (and resulting vegetation or duff cover, versus bare ground), surface soil textures, and magnitude of precipitation events following burning. (e.g., Elliot and Robichaud, 2001; Wonzell and Clifton, 2001; Robichaud and Waldrop, 1994; MacDonald and Stednick, 2003) See the Soils Specialist Report for information on erosion potential following prescribed burning.

  Sediment delivery to channels depends on the amount of sediment produced from burning in uplands and riparian areas, and the amount delivered to – and through -- riparian areas. The latter is, in turn, dependent on a large number of factors including adjacent slope steepness, amount of obstructions to overland flow (e.g., rocks, down wood, type of vegetation, etc.), and other factors; in Dissmeyer (2000), studies cited showed that turbidity changes after broadcast burning were most pronounced in the steepest watersheds.

The Water Erosion Prediction Project model interface for Disturbed Forest and Range Runoff, Erosion and Sediment Delivery ("Disturbed WEPP") was run for transects within the original Heart Six prescribed burn area for the Randolph Mountain project (i.e., the Heart Six boundary that was defined for the Randolph Mountain project— approximately 1.5 to 2.5 miles east of the currently-defined project boundary) to assess potential sediment delivery to stream channels and riparian areas. Documentation for the model is available at http://forest.moscowfsl.wsu.edu/fswepp/docs/distweppdoc.html. The Fuel Management interface for WEPP (FuME) was also run, but this interface does not have as much flexibility as Disturbed WEPP in allowing the user to adjust local soil and vegetation conditions. Because of this limitation, results from Disturbed WEPP are reported here. Additional discussion related to the analysis may be found in the specialist report contained in the project file.

Two transects in the Heart Six prescribed burn area were run for this assessment. These areas were chosen because of the presence of perennial streams in and near the project areas, and because steep slopes and erosive soils could lead to high sediment delivery to streams. Other areas not chosen for analysis did not drain to notable natural stream channels or were not as steep (transect 1 was up to 60% in grade, transect 2 was up to 30% in grade).

***Table 9**: Modeled sediment delivery to channels, average annual rates over 50 years*

Transect location	Existing modeled sediment delivery (t/ac/yr)	Proposed action modeled sediment delivery (t/ac/yr)
Heart Six transect 1 (sec. 24)	0	0.098
Heart Six transect 2 (sec. 18)	0	0.085

As stated above, the relative increase in sediment delivery over current conditions is the key factor to note. The increase in sediment delivery to channels under the proposed action, along both transects, would not be measurable and would not have measurable adverse impacts to stream channels. This is consistent with the field findings of Wondzell and Clifton (2001). The small increases that are shown would be short-term, lasting until ground cover became re-established (estimated to be approximately five years). Long-term, conditions would approximate existing conditions.

- Effects from timber harvest, cut and pile: Timber harvest in the Blackrock-Hatchet and Turpin Lodge areas would consist of commercial thinning, piling, and burning of slash. No new temporary roads would be constructed as all haul would use existing roads.

  Required mitigation measures would prevent measurable amounts of sediment associated with timber harvest from reaching the Buffalo Fork, Blackrock Creek, and other bodies of water in the project area, including intermittent channels.

- Effects to riparian vegetation and stream channel condition: Mitigation measures restricting ignitions to greater than 100 feet from the edge of channels and riparian vegetation (200 feet along the Buffalo Fork) would protect riparian vegetation and maintain stream channel condition. Allowing fire to "back" into riparian areas has not been shown to adversely affect resources. (Wondzell and Clifton, 2001) Restrictions on timber harvest and cut/pile activities would protect riparian areas and stream channels from those activities.

- Effects upon water quantity and water use: Treatment of more than 30% of the area of a 6th field HUC may lead to a change in water yield and runoff timing, particularly in forested areas (Megahan et al., 1995; Cheng 1989). Treatments that leave more than 30% of the forested

area of a 6th field HUC in a clear-cut or equivalent condition within a 30-year period are contrary to Forest Plan direction.

Following is a summary of the **maximum** number of acres, and percent of HUC (on NFS land), that would be treated in the 6th field HUCs under this project:

Table 10. *Maximum area, and percent of HUC, treated under the no action alternative (existing) and the proposed action.*

HUC	Existing amount of HUC treated (NFS acres)	Existing amount of HUC treated (NFS only) (%)	Maximum area treated—NFS only (acres)	Maximum percent of HUC treated—NFS only
Lower Buffalo Fork	430	3.2	1775	9.7
Upper Buffalo Fork	926	3.2	1084	3.7
Lava Creek	525	3.1	613	3.6
Blackrock Creek	507	1.6	588	1.9

The amount of treatments shown above would not lead to significant impacts on water quantity and timing.

Potential impacts on downstream or senior water uses could be a concern with this type of project due to water withdrawals for road watering or fire suppression. As required under the mitigation measure that addresses this issue, however, no water would be drafted in a location or manner that would adversely affect other downstream or senior water uses.

Conclusion – Aquatic Effects

Under the no action alternative, existing conditions would continue. No measurable adverse impacts to water resources would occur under the proposed action.

Mitigation Measures

- General activities: Ground-verify the presence and extent of wetlands shown on National Wetlands Inventory (NWI) maps before project implementation to determine wetland protection needs.

  If water is needed for fire suppression or road watering it will be drafted in a location and manner that will not adversely affect downstream or senior water rights and users. It will also be drafted from sources on reserved NFS land.

  Water developments will be protected from the impacts of activities.

  No fuel storage or equipment refueling would occur within 150 feet of perennial stream channels or intermittent channels. Where more than five gallons of fuel or other petroleum products are being stored on-site, they would be stored on an impermeable surface to avoid groundwater contamination in the event of a spill. (See State BMPs, Practices #4 and #39)

- Prescribed Burns: No ignitions will occur in riparian/floodplain areas, and will be at least 100 feet from the outer edges of defined stream channels (perennial and intermittent) and the outer edges of riparian vegetation and wetlands. This includes wetlands shown on National Wetland Inventory maps, those not mapped but evident in the Box Creek project area, and other wetlands and riparian areas found during project preparation. The lower boundary of the Heart

Six prescribed burn project area will be at least 200 feet from the outer edge of the Buffalo Fork River floodplain and riparian vegetation.

Low-intensity fire may be allowed to “back” into riparian and wetland areas. If fire intensities appear to be increasing to high, minimum impact suppression measures will be used to reduce fire intensity in these areas.

Fireline will be constructed by hand or by Bobcat; no dozer line will be constructed. All fireline will be waterbarred and seeded per Soil Scientist’s recommendations. Fireline will not be constructed within 100 feet of perennial streams or intermittent channels.

- Timber harvest, cut and pile: Bridger-Teton National Forest Best Management Practices for timber harvest—including applicable Forest Plan Standards and Guidelines, and measures from FSH 2509.22, R-1/R-4 Amendment No. 1-- would be implemented. These BMPs will meet or exceed Wyoming Silviculture Best Management Practices as described in the Wyoming Nonpoint Source Management Plan (Wyoming DEQ, 2004).

  Buffer widths for harvest along streams will follow guidance provided in the Wyoming Nonpoint Source Management Plan, Silviculture Best Management Practices (Practice #3), interpreted as follows:

  - Harvest buffers along streams: actual minimum buffer widths will be the following widths or a width equivalent to the mean height of mature dominant late-seral vegetation, whichever is greater.

***Table 11**. Buffer width correlated to adjacent slope.*

Adjacent slope (%)	Minimum buffer width (feet)
0-35	50 (or equal to the height of mature trees)
Greater than 35	100

Buffers along defined intermittent channels (i.e., those having defined bed and banks) will be at least 50 feet in width. Buffers along perennial streams will be at least 100 feet in width.

Except when they are on approved roads or on approved temporary crossing structures, ground-based harvest equipment would not be allowed within 100 feet of perennial streams or intermittent channels and wetlands. Strive to keep ground-based harvest equipment out of swale bottoms (i.e., draws where there is not a defined channel) except to cross them, to avoid accelerated erosion of these features.

In the Turpin Meadows timber sale (and cut and pile) area, no mechanized equipment will come within 200 feet of the edge of the Buffalo Fork River.

In Section 31 of the project area, provide a buffer of at least 150 feet on Blackrock Creek and 100 feet on the diversion from mechanized equipment.

Landings would not be constructed within 100 feet of perennial streams or intermittent channels and wetlands. An exception to this would be provided only if no other alternatives are available within identified economic and resource constraints, and only if impacts could be mitigated. See BMPs, Practices #11 and #12, for more information.

No timber harvest or mechanical fuel treatment, including personal use post and pole gathering, will be allowed in the wet areas of the Box Creek project or other wet areas.

The Forest Hydrologist will be consulted if live stream crossings are to be constructed or reconstructed.

All wet swales, wetlands, and spring areas would be identified and flagged during layout and no equipment would be allowed to enter such areas. Layout of the unit and buffers will be conducted when wetlands, channels, and other aquatic features can be identified. Also see State BMPs, Practice #2.

3.1.4 Soils

Affected Environment

- Box Creek area: According to the soil survey of the area, the analysis area occurs on six different map units (see Table 12). Riparian and wetland areas are visible just to the southwest of the trailhead and parking area. There are also some small wetland areas along the access road. Detailed soil and map unit descriptions are included in the specialist report.

  The erosion hazard rating is high in map units 646, 651 and 654. The compaction hazard rating is high in map unit 651. Table 12 lists all the ratings for each different map unit within the treatment area. The stability rating is marginally unstable in map units 646, 651 and 654. A rating of marginally unstable means that evidence of past landslide activity is discernible but none are of recent origin. The assumption is that the area is gaining stability but certain disturbances at critical locations could reactivate mass movements. However, review of aerial photos, landslide mapping, and an on the ground inspection indicate that the area of highest concern for slope stability is in map unit 654 in the northeastern part of the treatment area where an existing landslide is located.

- Heart Six area: According to the soil survey of the area, the analysis area occurs on 14 different map units (see Table 12).

  The erosion hazard rating is high in map units 340, 489, 575, 618 and 651. The compaction hazard rating is high in map units 102, 575, 618 and 651. The stability rating of map units 340, 376, 618, and 651 is marginally unstable. A rating of marginally unstable means that evidence of past landslide activity is discernible but none are of recent origin. The assumption is that the area is gaining stability but certain disturbances at critical locations could reactivate mass movements. However, review of aerial photos, landslide mapping, and an on the ground inspection indicate that the area of highest concern for slope stability is in the eastern and southwestern part of the analysis area where existing landslides are located.

- Wilderness Ranches area: According to the soil survey of the area, the analysis area occurs on three different map units (see Table 12). Map unit 364 comprises 90 percent of the area. Soils formed in sandstones and shale and surface texture is loam or gravelly loam. The soil surface ranges in depth from 5 to 10 inches. Slopes range from 10 to 30 percent (USDA Forest Service, 1985).

  The erosion hazard is rated high in map unit 340. The soil survey indicates that the stability rating of map unit 364 is marginally unstable. A rating of marginally unstable means that evidence of past landslide activity is discernible but none are of recent origin. The assumption is that the area is gaining stability but certain disturbances at critical locations could reactivate mass movements. However, review of aerial photos, landslide mapping, and an on the ground inspection revealed that no potential for mass movement exists within this particular project area.

***Table 12**. Soil Interpretations by map unit for each treatment area.*

TREATMENT UNIT	MAPUNIT	COMPACTION	EROSION	SLOPE STABILITY
BOX CREEK	100	Low	Low	Stable
BOX CREEK	110	Low	Low	Stable
BOX CREEK	119	Moderate	Moderate	Stable
BOX CREEK	154	Moderate	Moderate	Marginally Stable
BOX CREEK	202	Moderate	Moderate	Marginally Stable
BOX CREEK	253	Moderate	Moderate	Marginally Stable
BOX CREEK	646	Moderate	High	Marginally Unstable
BOX CREEK	651	High	High	Marginally Unstable
BOX CREEK	654	Moderate	High	Marginally Unstable
HEART SIX	100	Low	Low	Stable
HEART SIX	102	High	Low	Stable
HEART SIX	110	Low	Low	Stable
HEART SIX	170	Moderate	Moderate	Marginally Stable
HEART SIX	202	Moderate	Moderate	Marginally Stable
HEART SIX	232	Moderate	Moderate	Stable
HEART SIX	253	Moderate	Moderate	Marginally Stable
HEART SIX	340	Moderate	High	Marginally Unstable
HEART SIX	376	Moderate	Moderate	Marginally Unstable
HEART SIX	392	Moderate	Moderate	Stable
HEART SIX	489	Moderate	High	Marginally Stable
HEART SIX	575	High	High	Stable
HEART SIX	618	High	High	Marginally Unstable
HEART SIX	651	High	High	Marginally Unstable
WILDERNESS RANCHES	170	Moderate	Moderate	Marginally Stable
WILDERNESS RANCHES	340	Moderate	High	Marginally Unstable
WILDERNESS RANCHES	364	Moderate	Moderate	Marginally Unstable
BLACKROCK	253	Moderate	Moderate	Marginally Unstable
BLACKROCK	100	Low	Low	Stable
BLACKROCK	102	High	Low	Stable
TURPIN MEADOWS	100	Low	Low	Stable
TURPIN MEADOWS	102	High	Low	Stable
TURPIN MEADOWS	150	Low	Low	Stable

Soils Direct and Indirect Effects

- Box Creek area: The potential for soil erosion to occur is high on about 475 acres or about 68 percent of the analysis area represented by map units 646, 651 and 654. Slopes greater than 12 percent have the highest risk especially if all the plant material is consumed leaving bare mineral soil. The potential for soils to become compacted is highest in map unit 651 and near the riparian-wetland areas southwest of the trailhead parking lot and adjacent to the access road. The

landslide area mapped in the northern part of the analysis area may be reactivated by a high intensity burn or by removal of all vegetation, thus allowing excess water in infiltrate into the unstable soil.

- Burro Hill area: The potential for soil erosion to occur is high in map units 340 and 386 on about 100 acres or approximately 20 percent of the analysis area. Slopes greater than 12 percent have the highest risk especially if all the plant material is consumed leaving bare mineral soil. The potential for soils to become compacted is highest in map unit 102 on about 12 acres or 2 percent of the analysis area. The landslide area mapped in the western part of the project area may be reactivated by a high intensity burn or by removal of all vegetation, thus allowing excess water in infiltrate into the unstable soil.
- Heart Six area: The potential for soil erosion to occur is high in map units 340, 489, 575, 618 and 651, on about 1175 acres or approximately 34 percent of the analysis area. Slopes greater than 12 percent have the highest risk especially if all the plant material is consumed leaving bare mineral soil. The potential for soils to become compacted is highest in map unit 575, 618 and 651 on about 252 acres or approximately 7 percent of the analysis area. The landslide areas mapped in the eastern and southwestern parts of the project area may be reactivated by a high intensity burn or by removal of all vegetation, thus allowing excess water in infiltrate into the unstable soil.
- Wilderness Ranch area: The potential for soil erosion to occur is high in map unit 340, on about 1 acre or less than 1 percent of the analysis area. The potential for soils to become compacted is moderate throughout the analysis area. There are no landslides within the analysis area.
- Blackrock-Hatchet area: The potential for soil erosion to occur is moderate in the throughout the analysis area. Slopes greater than 12 percent have the highest risk especially if bare soil is left exposed such as on skid trails. The potential for soils to become compacted is moderate throughout the analysis area. There are no landslides within the analysis area.
- Turpin Lodge area: The potential for soil erosion to occur is low throughout the analysis area. Slopes greater than 12 percent have the highest risk especially if bare soil is left exposed such as on skid trails. The potential for soils to become compacted is low throughout the analysis area. There are no landslides within the analysis area.

Mitigation

Mitigation measures within prescribed burn areas:

- Monitor the fire severity post burn to determine areas of high burn intensity to implement any erosion control needs.
- Mapped landslide areas should be avoided if possible.
- Where practical leave a 100 foot buffer of unburned vegetation from edge of riparian (greenline) areas.
- Where practical, leave a 100 foot buffer of unburned vegetation, i.e. 50 feet either side of drainages.

Mitigation measures within selective harvest areas:

- Skid trails on slopes greater than 40 percent should be avoided.
- On slopes greater than 40 percent, logs will be yarded by raising one end of the log (preferably the butt end).
- Skid trails will be designated and not exceed 15 percent of the unit in area (USDA Forest Service 2003).
- Skid trails will be ripped to reduce compaction and slash will be placed on top to reduce erosion.
- Use ground-based systems only in times of low soil moisture (< 50% measured using field methodology, see Appendix A.)
- When rutting exceeds 4 inches, operations should be suspended.

- Maintain 60 percent or greater ground cover to reduce the hazard of erosion.
- Maintain 5 to 10 tons per acre of down woody debris (slash) to maintain soil productivity.
- Mapped landslide areas will be avoided.

3.1.5 Fisheries and Amphibians

Affected Environment - Fisheries

The Buffalo Fork Basin is 351 square miles with 184 miles of streams (5th HUC 1704010106). The analysis area for this fisheries report is in the Lower Buffalo Fork (6th HUC 170401010609) sub-basin. The Lower Buffalo Fork sub-basin is 29 square miles (18, 255 acres) and includes Lava Creek, and Box Creek, downstream from the Teton Wilderness Boundary and Blackrock Creek.

Rivers and streams in the project area provide habitat to a wide assortment of aquatic vertebrates and invertebrates that are important to the health of the Snake River watershed. All streams in the basin are managed as wild trout fisheries by the Wyoming Game and Fish Department (WG&FD).

Table 13. *Game and non-game fishes, native or non-native status, and abundance in the project area (Source: Wyoming Game and Fish, 2004).*

Species Name	Native (Y/N)	Abundance
Snake River Cutthroat Trout	Y	abundant
Mountain Whitefish	Y	common
Brook Trout	N	rare
Rainbow Trout	N	rare
Mountain Sucker	Y	rare
Utah Sucker	Y	common
Mottled Sculpin	Y	abundant
Paiute Sculpin	Y	common

Affected Environment - Amphibians

Data for this report is based on incidental observation and partial habitat inventory. A systematic inventory of amphibian habitat and population estimates has not been done in the analysis area.

Boreal Toad, Northern Leopard Frog, and Columbia Spotted Frog are species of concern in Teton County Wyoming (WNDD 2003). Field data collected from 1992 and 2000 do not include amphibian observations in the Lava Creek or Box Creek parts of the project area. Observations of spotted frogs, Boral toad and tiger salamanders were made in the Blackrock Creek and Buffalo Fork River portions of the project area (Patla 2001).

Columbia Spotted Frogs are widespread and common in parts of the project area. Observations of Columbia spotted frogs were made in the Blackrock Creek and Buffalo Fork River portions of the project area (Patla 2001). Northwest Wyoming is at the southeast edge of the main range of the Columbia spotted frog. Within the zone of the main population (central and north Idaho, western Montana, and northwestern Wyoming) Columbia spotted frogs are generally believed to be widespread and/or common, with only localized declines.

The range of the boreal toad includes the entire BTNF. Boreal toads are species of concern in Teton County Wyoming (WNDD 2003). Field data collected from 1992 and 2000 do not include observations in the Lava Creek or Box Creek parts of the project area. Observations of Boral toads and tiger

salamanders were made in the Blackrock Creek and Buffalo Fork River portions of the project area (Patla 2001).

Habitat ranging from small intermittent ponds to river and stream riparian habitat can be found throughout the project area. Suitable habitat for all life stages of amphibians may be present throughout the project area.

Fisheries Effects

Alternative A - No Action

- Direct Effects: The impact of not treating 376 acres of upland vegetation in an 18,255 acre sub-basin watershed at risk to mountain pine beetle infestation will have no measurable direct effect to fish or fish habitat.
- Indirect and Cumulative Effects: An increase in tree mortality may improve the size and amounts of large woody debris available for recruitment into the Buffalo Fork River for fish habitat. Dead trees also attract firewood cutters that often cause resource damage reaching trees with vehicles that may in-turn generate erosion that migrates into the watershed.

Alternative B - Proposed Action

- Direct Effects: The proposed project may create negative short term effects to individual fish from sediment entering streams from 53 acres of "cut and pile" fuel reduction treatments, 268 acres of timber harvest, 1331 acres of Prescribed Fire, and 41 acres of "post and pole" harvest. Forest Plan Standards and Guide Lines and State Best Management Practices for timber harvest will reduce and possibly eliminate short-term effects to fish and fish habitat from timber harvest, and post and pole removal. Cut and pile fuel reduction will as proposed will not affect fish or fish habitat. Prescribed fire treatments on 259 acres in Lava Creek and 1,072 acres at Heart Six are designed for upland vegetation and will not impact riparian areas using Forest Plan Standards and Guide Lines and State Best Management Practices for prescribed fire.
- Indirect and Cumulative Effects: The proposed action will reduce the probability of a severe fire and implementation will have a low potential of impacting fish or fish habitat. Overall the proposed project will have no long term effects to fish or fish habitat after completion.

Fisheries Effects

Alternative A - No Action

- Direct Effects: The impact of not treating upland vegetation for fuel reduction in the 18,255 acre sub-basin watershed will have no measurable direct effect to amphibians or amphibian habitat.
- Indirect and Cumulative Effects: An increase in tree mortality may improve the size and amounts of large woody debris available for amphibian habitat on the forest floor. Dead trees also attract firewood cutters that often cause resource damage reaching trees with vehicles that may in-turn generate erosion that migrates into the watershed.

Alternative B - Proposed Action

- Direct Effects: The proposed project may cause some individual mortality from the proposed "post and pole" harvest as a result of removing material (dragging and skidding). Forest Plan Standards and Guide Lines and State Best Management Practices for timber harvest will reduce and possibly eliminate short-term effects to amphibian habitat from post and pole harvest. Cut and pile treatments will have no direct effects on amphibians as a result of ground disturbance.

Prescribed fire treatments are designed for upland vegetation and will not impact riparian areas using Forest Plan Standards and Guide Lines and State Best Management Practices for prescribed fire. Prescribed fire will reduce the size and amounts of large woody debris available for amphibian habitat on the forest floor in the short-term. Long-term woody debris recruitment from trees killed by fire may improve the amount and quality of habitat available to amphibians.

- Indirect and Cumulative Effects: Pilliod et al. (2003) lists indirect effects to amphibian populations as solar radiation and temperature changes, sediment and substrate alteration, hydroperiods (fire induced changes in the water holding capacity of plants and soil), nutrient pulses, changes in woody debris, and habitat succession from vegetation management similar to the Buffalo Fork Fuel Management project. Research from Pacific Northwest Research Station (2008) indicates that maintaining riparian buffers and thinning upslope vegetation in western Oregon does not adversely affect amphibian population. The proposed action may create some of the short term indirect effects from changes in micro-climate on the forest floor, altering the amount and availability of woody debris. Long-term and cumulative effects may occur from altering habitat succession but how these effects (positive or negative) would be difficult to monitor.

Mitigation

Direct and indirect impacts to fish and fish habitat can be minimized using Wyoming Forestry Best Management Practices (BMP) for streamside management and BTNF Standards and Guidelines for timber harvest. Standards and Guidelines include maintaining a minimum of 100 foot riparian buffers on perennial and intermittent streams to conserve aquatic and terrestrial riparian habitat, protect stream channel and banks and promote flood plain stability. Impacts from prescribed fire maybe minimized by restricting ignition points 100 feet from streams and rivers and maintaining 50 to 100 foot riparian buffer zone where fire is excluded if possible.

Direct and indirect impacts to amphibians and amphibian habitat can be minimized using Wyoming Forestry Best Management Practices (BMP) for streamside management and BTNF Standards and Guidelines for timber harvest. Standards and Guidelines include maintaining a minimum of 100 foot riparian buffers on perennial and intermittent streams to conserve aquatic and terrestrial riparian habitat, protect stream channel and banks and promote flood plain stability. Impacts from prescribed fire maybe minimized by restricting ignition points 100 feet from streams and rivers and maintaining 50 to 100 foot riparian buffer zone where fire is excluded if possible.

3.1.6 Roadless

Affected Environment

Nearly all of this IRA lies within the SPNM recreation setting. Non-native plant species are few and species at risk, including the gray wolf, Canada lynx, and grizzly bear, find quality habitat here. U.S. 26 and the Buffalo Valley Road lie south of the area and the sights and sounds of human activity are evident in some places; the north boundary of the area is the Teton Wilderness.

Other than trails there is little evidence of human activity although adjacent developments such as the dude ranches, private homes and associated roads are visible from some locations. For most of the summer, aside from mainline trails, the opportunity for solitude and unconfined recreation is high. There is a good deal of activity summer-long in the vicinity of Buffalo Valley and Turpin Meadows, especially along the main trail corridors and the trails used by outfitters and dude ranches. Fall hunting season brings more people to some of these areas.

Natural integrity is a measure of whether the long-term ecological processes of the area are intact and operating. This appears to be the case in the project area. The extent to which human influences have altered natural processes is localized and minor—firewood and post/pole removal, trails, and fence construction.

Although most of this area is close to roads and settlements, the rugged terrain, opportunities for cross-country travel, climbing and cave exploration, and presence of grizzly bears add to the challenge and skills needed to travel in this area. The sights and sounds of recreation complexes, a main highway, and private residences are fairly evident and close to the area, yet forested draws have a remote feel. Since this IRA is contiguous with the vast Teton Wilderness, there is a sense of remoteness possible even in the front country.

The area of the three proposed burn/mechanical treatment acres, 5,192 combined, is about 20% of the IRA.

Direct and Indirect Effects

Alternative A - No Action: There will be no direct effect to roadless areas under the No Action Alternative.

Alternative B - Proposed Action:

Potential adverse effects to the area's roadless character can be described using the nine roadless area characteristics found in the 2000 Roadless Area Conservation Rule FEIS. These include:

1. Soil, water, and air**:** There are no adverse effects on these resources expected as a result of implementing this project.
2. Sources of public drinking water: There may be a community water source on the forest. The only permitted water developments in the area are shown below; the first one is to an individual and therefore not a public source, though it may be within the IRA. The second one is issued to Buffalo Valley water district and is in part within the IRA. Section 16 is entirely within the IRA; section 21 is partly within. Without specific information about the location of these improvements and whether they are above ground or vulnerable to damage, it is impossible to say whether the project would have an effect on them. It can be said that the project would not impair natural or surface or ground water within the IRA.
3. Diversity of plant and animal communities: The diversity of plant and animal communities in the affected area would not be adversely affected and may be enhanced by the implementation of this project. Though not specifically designed to increase diversity, this project would likely result in an increase in aspen and deciduous shrubs.
4. Habitat for threatened**,** endangered**,** proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land: see wildlife/TES specialist section.
5. Primitive**,** Semi-Primitive Non-Motorized, and Semi-Primitive Motorized classes of recreation opportunities: See recreation report.
6. Reference landscapes: No anticipated effect on the general IRA landscape.
7. Landscape character and scenic integrity: Project effects to the scenic integrity of the IRA and changes to the character of the area are not expected to be negative in either the short- or long-term. This assumes the visual quality objectives are met.
8. Traditional cultural properties and sacred sites: See Cultural resources report.
9. Other locally identified unique characteristics: The Pacific-Blackrock IRA has numerous features of local and regional interest; none are within the project area.

Potential effects of the project on the IRA's roadless character and wilderness potential:

- Natural and undeveloped character: The project would have the effect of converting some older age-class forest to younger seral stages—including shrub/deciduous which may persist for some time, and converting closed forest to open, more park-like forest, mimicking natural processes while reducing the risk of wildfire near the WUI.
- Outstanding opportunities for solitude and primitive, unconfined recreation: No significant effect expected in regard to roadless character. See recreation report for specific impacts to recreation activities.
- Special features and values: No effect.

3.1.7 Cultural Resources

Uncontrolled wildland fires have the potential for adversely affecting cultural resources or historic properties. In addition to damaging or destroying sites that contain cabin or other wooden structure, wildland fires could expose archeological features and sites and make them susceptible to erosion or unauthorized artifact collecting. Implementation of prescribed burn and/or mechanical treatment projects can reduce the long term threat to cultural resources by reducing the buildup of fuels and reducing the potential for uncontrolled wildland fire. Prior to implementing prescribed fires and/or mechanical treatment project, cultural resource surveys are conducted to identify historic and prehistoric sites. Treatment areas can then be proposed to avoid significant historic properties, thereby reducing or eliminating potential threats to cultural resources.

Affected Environment

A total of 2648 acres within the proposed Buffalo Valley Fuels Management area have been intensely inventoried for cultural resources. These include the 1997 survey of the Heart 6 Resort and areas surrounding the resort, the 2004 survey for the Buffalo Valley WUI (which included the Blackrock Hatchet and Buffalo Valley Defensible Space projects), and the 2006 survey for the Randolph Mountain Hazardous Fuels project. A total of five sites have been recorded within the project area. These include the Turpin Meadows Lodge, the remains of an early 1900s coal mine located just north of U.S. Highway 287 near Lava Creek, and three small prehistoric lithic scatters. The Turpin Meadows Lodge and the coal mine site have been determined to be not eligible for the National Register. Two of the three prehistoric lithic scatters have also been determined to be not eligible for the National Register while the remaining lithic scatter is unevaluated for the National Register. A detailed cultural resource survey report was sent to the Wyoming State Historic Preservation Office (SHPO) on 8/26/04 for the Buffalo Valley WUI with a recommendation that no historic properties would be affected by the proposed project. SHPO did not respond within 30 days, and in accordance with 36 CFR 800.4(d)(1), the BTNF's responsibilities under section 106 of the National Historic Preservation Act were fulfilled. On 9/8/06 a detailed cultural resource survey report for the Randolph Mountain Hazardous Fuels Reduction project was submitted to the Wyoming SHPO with a recommendation that no historic properties would be affected by the proposed project. The Wyoming SHPO concurred with this recommendation on 9/18/06. Cultural resource clearance has been given for all actions associated with these two survey reports and that no further cultural resource survey or evaluation is required.

Cultural Resource Effects

<u>Alternative A - No Action</u>

- Direct Effects: There will be no direct affect to cultural resources under the No Action Alternative.

- Indirect and Cumulative Effects: There remains the potential for indirect and cumulative effects to cultural resources under this alternative. Because there would be no fuels treatment, there would be an increase risk that uncontrolled wildland fires could burn through the Buffalo Valley area. These fires could result in the damage or destruction historic properties, especially those sites that contain wood structures or features.

Alternative B – Proposed Action

- Direct Effects: The proposed project will have no direct effects to cultural resources.
- Indirect and Cumulative Effects: The proposed action will reduce the probability of a severe fire and implementation will have a low potential of impacting cultural resources. Overall the proposed project will have no long term effects to cultural resources after completion.

3.1.8 Wild and Scenic Rivers

Affected Environment

This project lies within or visible from the corridors of the Buffalo Fork and Blackrock Creek, both Scenic Rivers in this area. The following analysis describes effects on free flow, water quality, and outstandingly remarkable values. WSR corridor characteristics to be analyzed come from legislation and FSM direction.

Table 14*. Forest Plan Direction applicable to Scenic Rivers.*

Resource type	Standard that apply to Scenic Rivers
General Management Standard	Any management activity conducted within the corridor of an eligible river will be subject to analysis of effects on the river's outstandingly remarkable values. If a project would alter either the stream's water quality and flow or its ORVs such that mitigation would not be effective, a suitability study for that river is required.
Scenic quality Standard	The VQO is Retention in the foreground and Partial Retention beyond. A natural appearing scenic quality will be maintained, with few alterations to the natural landscape within the corridor other than existing structures and facilities constructed in order to accommodate recreation and access. Alterations to the landscape beyond the corridor are subordinate and compatible with the natural setting.
Forested Vegetation Management Standard	Timber harvest may occur as long as no substantial adverse effects to the river or its foreground viewing zone are caused. Timber may be managed to provide long-term enhancement of scenery, removal of insect-infested trees, or for other purposes relating to ecological health and river values. Prescribed fires are compatible with river values, given scenic quality constraints.
Non-forested Vegetation Management Standard	Management of vegetation for ecological purposes or to enhance the river's ORVs may occur within the corridor if no adverse effects on scenery or water quality occur; this includes prescribed fires, weed control, and restoration projects. Access will generally be available by road.
Livestock Grazing Standard	Grazing is compatible with any of the three classifications. Operations will be managed to protect riparian zones and follow other standard protection clauses in the grazing permits.
Water Development Standard	Minor diversions, such as ditches or pumps for irrigation, may occur in the river.
Mining	Disturbance within river corridor should not be visible to the visitor, nor should dust or

Guideline (subject to existing rights)	noise be noticed.

Buffalo Fork, Turpin Meadows to GTNP boundary

Water quality and flow: quality is high and flow is mostly natural; a number of irrigation diversions exist and gravel mining has taken place in the river. Some water projects that exist of private lands are not recorded. Some dispersed campsites and corrals within 100 feet of the river are contributing to a reduction in water quality (runoff from bare earth, horse manure in concentration); also the bridge at the west end of the NF section of the river has done the same (bare earth slumping from fill slopes, drainage directly into the river) but these effects have not been measured so their significance is not known. Existing conditions provide opportunities to improve water quality in the Buffalo Fork.

ORVs specific to this reach: The lower segment is well known for its spectacular views of the Teton Range and the pastoral setting of the Buffalo Valley. The river corridor is habitat for many species of wildlife including grizzly bears, bald eagles, moose, and increasingly, wolves. The river valley provides an important migration route for elk wintering in Jackson Hole, and is well known for its large population of wintering moose. The Buffalo Fork is a major cold water sport fishery for the native (fine-spotted) cutthroat trout population. High-quality wildlife habitat, opportunities for wildlife viewing, hunting and fishing, and retention of the overall scenic/rural character of the corridor are the primary elements of the existing environment to be analyzed in this document.

Habitat for TES and species dependent on the river: the Buffalo Fork offers habitat for amphibians, migrating moose and elk as well as resident carnivores, raptors, water birds and songbirds. As of this writing, no TES species depend on it.

ROS settings: the corridor is within the Roaded Natural-appearing and Rural ROS settings.

VQOs and existing scenic conditions: The visual quality objective for the corridor is Retention.

Current forest plan standards/guidelines – until amendment to 1990 forest plan can be completed to include newly designated wild and scenic rivers, we are using Forest Plan amendment #2, 3/92 as guidance. An excerpt of the standards that apply to Blackrock Creek is given below.

Blackrock Creek, west end of Rosie's Ridge to FS compound

Water quality and flow: quality is high and flow is natural; irrigation diversions are small and do not detract from the free-flowing character of the creek.

ORVs specific to this reach: Scenic and wildlife. A segment of the Wyoming Centennial Scenic Byway (U.S. 26/89) runs parallel to the creek. The visual quality objective for the foreground distance zone is Retention. The creek corridor is used for habitat, foraging and movement by many wildlife species, large and small. Quality wildlife habitat, opportunities for wildlife viewing, hunting and fishing, and retention of the overall scenic character of the corridor are the primary elements of the existing environment to be analyzed in this document.

Habitat for TES and species dependent on the river: lower Blackrock Creek offers habitat for amphibians, migrating moose and elk as well as resident carnivores, raptors, water birds and songbirds. As of this writing, no TES species depend on the creek.

ROS settings: the creek corridor is within the Roaded Natural-appearing ROS setting.

VQOs and existing scenic conditions: The visual quality objective for the corridor is Retention; this VQO also applies to the scenic byway. Existing condition of the scenic resource is one of a largely natural-appearing forested landscape with small structures that provide information and recreation for visitors. Ongoing highway construction has created some visual intrusions in the corridor but these are expected to be restored after construction is completed.

Current Forest Plan standards and guidelines: see table above.

Wild and Scenic Rivers Direct and Indirect Effects

Heart Six Prescribed Burn Area: Assuming that no dozer lines or other unnatural-appearing alterations are made to the part of this project that is visible from the river, no negative effects on the Buffalo Fork Scenic River are anticipated.

Wilderness Ranches Timber Sale mechanical thinning: No negative effects on the Buffalo Fork Scenic River are anticipated since the area in question is barely visible from the river corridor.

Box Creek Trailhead Post and Pole mechanical thinning: The small extent of this post-and-pole area and the forest screening between it and the Buffalo Fork help reduce the chance that scenic intrusions will take place within the river corridor. The existing post and pole unit can be seen from the Buffalo Valley Road but it appears as a natural opening and does not detract from the scenery. One positive effect of removing post and pole sized conifers from the lower Box Creek road is the increased sunlight that will help dry the road sooner. [This section of road needs to be built up with adequate drainage on both sides, a project beyond the scope of this document. Box Creek CG is supposed to be open by June 1 but it cannot be accessed with the road in its current condition.]

Turpin Lodge Timber Sale mechanical Thinning: No negative effects on the Buffalo Fork Scenic River are anticipated, assuming adherence with the standards and guidelines in the above table. Below is a map of the river corridor where it intersects the Turpin Meadows Resort project.

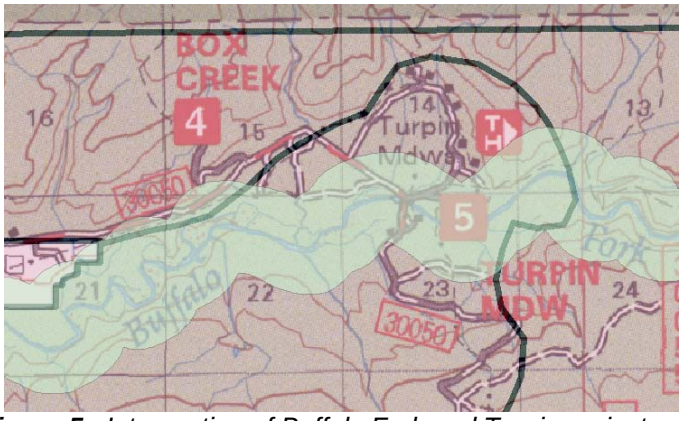

***Figure 5**. Intersection of Buffalo Fork and Turpin project unit.*

Blackrock Hatchet Timber Sale mechanical Thinning: No negative effects on Blackrock Creek Scenic River are anticipated.

Lava Creek/Wilderness Ranches Prescribed Burn: Assuming that no dozer lines or other unnatural-appearing alterations are made to the project, no negative effects on the Buffalo Fork Scenic River are anticipated. A positive effect of this project would likely include enhanced growth of aspen and other deciduous plants, thus providing additional habitat for wildlife and increasing the diversity of size and

color in the viewing zone of the river. The Buffalo Fork's ORVs include wildlife and scenery, so this project is expected to have the effect of enhancing those.

3.1.9 Forested Vegetation

Affected Environment: This analysis is based on intensive stand exam data collected in summer of 2004 as well as walk-through assessments of the treatment areas. The forested vegetation analysis area is the treatment units.

Table 15. Description of current forested condition by treatment unit

	Turpin	Blackrock/Hatchet	Lava Creek	Heart Six	Box Creek
Acres	117	187	259	1072	83
Species	Logepole pine /subalpine fir /spruce	Lodgepole Pine, Douglas-fir, aspen	Sagebrush, Douglas-fir	Sagebrush, Douglas-fir, aspen, spruce	Lodgepole pine, subalpine fir, spruce
Basal Area	60-270	114			
Trees/Acre	370-720	558			
SDI	186 - 225	254			
Age	100+	65			
Average Diameter	8.0	17.1			
Average Height	60	59			
Insects	Mountain pine beetle	Mountain Pine Beetle	Douglas-fir beetle	Douglas-fir beetle	Mountain Pine Beetle
Disease	Dwarf Mistletoe				
Slope	5-25%	20-70%			
Aspect	North, west	North, Northwest			
Old Growth	No	70 acres			
Habitat Type	ABLA CARU	ABLA BERE, ABLA SYAL			
Down Woody Material		28 tons/acre			

Turpin treatment unit is composed primarily of mature lodgepole pine with Englemann spruce and subalpine fir intermixed within the lodgepole pine. Dwarf mistletoe is present in the lodgepole pine. These units have experienced previous logging at least 50 years ago

Hatchet/Blackrock unit is composed primarily of mature Douglas-fir with mature lodgepole pine, aspen clumps and blue spruce intermixed. Aspen is regenerating in more open areas and subalpine fir is under the mature trees. Lodgepole pine has produced dense regeneration in previously logged patches.

Lava Creek treatment unit is composed primarily of sagebrush with clumps of mature Douglas-fir and aspen spread throughout the unit.

Box Creek – Mature lodgepole pine, aspen and Englemann spruce stand. Mountain pine beetle present in lodgepole pine. Portions of this unit have been thinned from below to remove small diameter (3 inches- 6 inches dbh) lodgepole pine.

Heart Six treatment unit is composed of sagebrush, clumps of mature live and dead Douglas-fir, clumps of mature subalpine fir, spruce mixed with mature and immature aspen. Douglas-fir beetle is present in this area.

Mountain pine beetle is attacking mature (greater than 80 years old) lodgepole pine trees in the stand and killing them. Lodgepole pine greater than 8 inches in diameter, 80 years old and stand densities greater than 80 square feet of basal area (SDI between 120 and 230) are susceptible to mountain pine beetle attack (Koch 1996, Shaw 1998). During an epidemic, all sizes of lodgepole pine are susceptible (Koch 1996). Currently the Forest is experiencing an epidemic outbreak of mountain pine beetle.

Douglas-fir bark beetle is present in the area and appears to be attacking larger diameter (greater than 12 inches dbh) Douglas-fir trees within and outside the project area. Clusters of large diameter Douglas-fir are dead from bark beetle attack. Drought conditions and higher stand densities are stressing the trees, creating conditions suitable for bark beetle attack.

Old Growth Characteristics: Old growth characteristics are based on Intermountain Region's recommendations (1993). Old growth as designated in the 1990 Forest Plan exists in the analysis area and intersects the Blackrock/Hatchet timber sale treatment unit. The designated old growth is primarily Douglas-fir of all diameter sizes and ages. The designated old growth stand is 635 acres and the portion of the treatment unit in the old growth stand is 50 acres. The old growth in Blackrock/Hatchet represents eight percent of the 635 acre designated old growth unit. (Old growth map is located in the project file.

Forested Vegetation Direct and Indirect Effects

Alternative A - No Action

Direct and Indirect Effects: If no cutting or burning took place in these treatment units, species composition would remain the same as current condition. Eventually, larger diameter Douglas-fir and most of the mature lodgepole pine would be killed by bark beetles. Over time, most of the aspen would die out due to competition from the remaining live conifers. Within the next 20 years most of the dead trees will fall to the ground increasing the down woody material. Smaller diameter trees will remain in the understory and mid canopy position creating a fire ladder to the crowns.

Cumulative Effects: Past thinning treatments have occurred in the area within the last five years. 188 acres were thinned in the areas adjacent to Turpin Summer homes. Small diameter lodgepole pines were removed from the understory and mid canopy reducing ladder fuels in the area. These materials were hand piled and burned. The effect of this treatment was to reduce the density of the timber stands while maintaining the current tree species composition.

Approximately 41 acres of small diameter (three to six inches dbh) lodgepole pine were removed from the Box Creek treatment unit. The tops and limbs of these trees remained on the ground. Mature dead conifers were removed from Box K campground. The effects of these treatments reduced the density of trees in the area and increase the amount of down woody material.

In the vicinity of the Buffalo Ranger Station and around the compound, 140 acres were thinned in a timber sale and service contract. This treatment increased crown spacing, decreased ladder fuels, decreased conifer representation in the stands as well as increased immature aspen. Down woody material was piled and burned leaving surface fuel loads less than seven tons per acre.

In the area adjacent to Box K subdivision, 26 acres experienced a ladder fuel treatment where small diameter trees were removed and hand piled. The piles were burned. This reduced the density of small diameter trees within those treatment units and did not change the overall tree species composition.

No treatments or effects would occur in designated old growth stands.

Alternative B - Proposed Action

Direct and Indirect Effects: The following apply to affects of treating Blackrock/Hatchet treatment unit. Following treatments, the remaining units will still contain the majority of the components in the existing stands. The tree species will remain mature Douglas-fir, lodgepole pine and subalpine fir. Average diameter will increase, tree density will decrease, multi-storied structures will decrease and change to single storied structures, down woody material will decrease.

Removal of the overstory lodgepole pine and Douglas-fir to basal area of 60 to 80 square feet will reduce future susceptibility to mountain pine beetle and Douglas-fir beetle infestation. These densities create an environment unsuitable for bark beetles development by opening the stand to light and heat, creating drier conditions (Amman 1985, Negron 2001). Thinning also improves individual tree vigor enabling the trees to “pitch out” the bark beetle; an unsuccessful attack (Cole 1985, Negron 2001).

Thinning clumps of lodgepole pine to a 12 by 12 foot spacing will decrease susceptibility to mountain pine beetle when the trees are mature and approaching 80 years old (Cole 1985). This density will also provide elk hiding cover for approximately 30 years providing the trees have not begun self pruning of the lower live limbs (Shaw 1998). Following 30 years, lower live limbs will begin to die. Future thinning of lodgepole pine between age 60 and 80 should occur to ensure bark beetles do not attack trees.

Removing conifers from aspen clones and adjacent to the clumps, will reduce competition to the mature aspen and promote suckering of aspen seedlings, perpetuating this species in the treatment area.

Retaining large diameter Douglas-fir will result in a stand composed primarily of thick barked Douglas-fir more fire resistant and less prone to future insect attacks. This will also provide a future seed source for Douglas-fir.

Removing green trees recently attacked by bark beetles will remove a source of adult bark beetles that can attack other mature trees in the unit.

Removing ladder fuels or the understory, small diameter component of the treatment units will reduce competition to the remaining trees and change multi-storied clumpy structure to single-storied structure in Douglas-fir. Pruning lower live limbs of remaining trees will raise crown height in the unit.

Whole tree logging will reduce amount of nutrients returned to the system that could result in reduced site productivity in the future.

The specific treatments in the old growth stands found in Blackrock/Hatchet unit will affect old growth characteristics by removing understory, multi-storied component and reducing large down woody debris, both old growth characteristics. The treatments will increase average tree diameters by removing smaller diameter material enhancing old growth characteristics. The integrity of the overall designated old growth stand will be maintained and at least 200 acres (as required in the

Forest Plan) will remain untreated. The treatments in Blackrock/Hatchet would affect 50 acres of designated old growth within 635 acre old growth unit.

Following are the affects of treatments in the Turpin treatment unit. Following treatments, the remaining units will still contain the majority of the components in the existing stands. The tree species will remain mature Douglas-fir, lodgepole pine and apsen. Representation of subalpine fir and Englemann spruce will be greatly reduced in the Turpin treatment unit. Average diameter will remain the same or increase slightly, tree density will decrease, multi-storied structures will change to basically single storied structures, down woody material will decrease. Removing lodgepole pine in patches will create conditions suitable to promote lodgepole pine regeneration and create age class diversity within the treatment units. Areas with age class diversity are less susceptible to mountain pine beetle epidemics.

Removal of the overstory lodgepole pine to basal area of 80 square feet will reduce susceptibility to mountain pine beetle infestation. These densities create an environment unsuitable for bark beetles development by opening the stand to light and heat, creating drier conditions (Amman 1985, Negron 2001). Thinning also improves individual tree vigor enabling the trees to “pitch out” the bark beetle; an unsuccessful attack (Cole 1985, Negron 2001).

Removing conifers from aspen clones and adjacent to the clumps, will reduce competition to the mature aspen, promoting suckering of aspen seedlings; perpetuating this species in the treatment area. Additional aspen in the units will create age and species diversity less susceptible to infestation by bark beetles. Increase in aspen suckers will provide additional browse for wild and domestic ungulates. If browsing suppresses aspen regeneration, then steps must be taken to reduce browsing pressure on aspen until it reaches greater than six feet in height.

Removing green trees recently attacked by bark beetles will remove a source of adult bark beetles that can attack other mature trees in the area.

Removing ladder fuels, the small diameter component of the treatment units, will reduce competition to the remaining trees and change multi-storied clumpy structure to single-storied structure in all the treatment units. Pruning lower live limbs of remaining trees will raise crown height in the unit.

Whole tree logging will reduce amount of nutrients returned to the system resulting in reduced future site productivity.

The following affects apply to Box Creek treatment unit. Thinning of lodgepole pine three to six inches dbh will reduce the overall stand density, increase diameter growth of remaining trees, decrease number of trees per acre and increase spacing between tree crowns. Piling and burning down woody material will decrease surface fuels and amount of logs on the ground. Removing conifer from in and around the aspen stands will increase aspen vigor and increase aspen regeneration and maintain aspen on the site for 80 plus years.

Following are the affects of treatments to forested vegetation in Turpin, Blackrock/Hatchet and Wilderness Ranch cut and pile treatment units. Removal of conifers within the dripline of mature trees will increase the average diameter of the stand, decrease the number of trees per acre, and maintain species composition as stated in existing condition. Pile and burn slash treatments will reduce the amount of down woody material on the ground.

Following are the affects of treatments to forested vegetation in the Lava Creek and Heart Six prescribed burn. Light intensity fire will kill most of the small diameter Douglas-fir, and aspen as these trees are not resistant to heat. Light and moderate intensity fire will burn most of the smaller

down woody material. Moderate intensity fire will kill mature aspen and some of the mature Douglas-fir with thinner bark. This will create small openings in the timber stands and increase potential for Douglas-fir and aspen to regenerate. Moderate intensity fire will increase snags in the burn area. Burning may create conditions more conducive to Douglas-fir bark beetle attack. Fire makes the trees more susceptible to beetle attacks as well as burned trees are a greater attractant to bark beetles. This may increase beetle populations in the area and create additional dead trees. The burn will provide conditions suitable for aspen regeneration. Additional aspen in the units will create age and species diversity less susceptible to infestation by bark beetles. (Negron 1997)

Cumulative Effects: Past thinning treatments have occurred in the area within the last five years. 188 acres were thinned in the areas adjacent to Turpin Summer homes. Small diameter lodgepole pines were removed from the understory and mid canopy reducing ladder fuels in the area. These materials were hand piled and burned. The effect of this treatment was to reduce the density of the timber stands while maintaining the current tree species composition.

Approximately 41 acres of small diameter (three to six inches dbh) lodgepole pine were removed from the Box Creek treatment unit. The tops and limbs of these trees remained on the ground. Mature dead conifers were removed from Box K campground. The effects of these treatments reduced the density of trees in the area and increase the amount of down woody material.

In the vicinity of the Buffalo Ranger Station and around the compound, 140 acres were thinned in a timber sale and service contract. This treatment increased crown spacing, decreased ladder fuels, decreased conifer representation in the stands as well as increased immature aspen. Down woody material was piled and burned leaving surface fuel loads less than seven tons per acre.

In the area adjacent to Box K subdivision, 26 acres experienced a ladder fuel treatment where small diameter trees were removed and hand piled. The piles were burned. This reduced the density of small diameter trees within those treatment units and did not change the overall tree species composition.

In addition to thinning 50 acres of old growth in the proposed action, an additional 34 acres will be thinned in a future timber sale. This will cumulatively affect 13 percent of a designated old growth stand. The affects will be short term by reducing the multi-story and down wood component of old growth. In the long term, the average diameter of the designated old growth stand will increase at a faster rate due to the reduction of competition from adjacent trees.

Mitigation Measures / Design Criteria: Apply MCH pheremones to Douglas-fir within the prescribed burn treatment units to the remaining Douglas-fir to prevent Douglas-fir beetle from attacking those trees. This should be done the spring immediately following the burn for at least 2 years depending on the intensity of the infestation in the surrounding stands.

3.1.10 Noxious Weeds

Affected Environment: Noxious weeds are increasingly present in the Buffalo Valley, particularly since the mid 1990's. For the most part, known distributions follow the paved roads, and to a lesser extent the dirt roads and trails. The following table shows weed species that have been mapped in or near the Buffalo Valley Fuels Project units by the Jackson Hole Weed Management Association (as of 2008). All of these species easily colonizes or spread in disturbed areas. Species that are known to be favored by fire are noted. Research is lacking, however, and complete information about the fire effects of many of these weeds is not available.

Table 16. *Mapped weed species in or near project units.*

Weed Species	Mapped in or near Units:	Declared Noxious in Wyoming	Declared Noxious in Teton Co.	Teton County Priority*	Favored by fire?**
Field bindweed - *Convulvulus arevensis*	Lava Cr.	x		2	
Canada thistle - *Cirsium arvense*	Blackrock-Hatchet Box Cr. Heart Six Turpin Lava Cr.	x		4	YES
Perennial sowthistle - *Sonchus arvensis*	Lava Cr.	x		4	MAYBE
Hoarycress/Whitetop - *Cardaria draba* and *pubescens*	Lava Cr. Heart Six	x		2	
Perennial pepperweed - *Lepidium latifolium*	Lava Cr.	x		1	
Russian knapweed - *Acroptilon* repens	Blackrock-Hatchet, Heart Six RX, Lava RX	x		1	
Dalmatian toadflax - *Linaria dalmatica*	Blackrock-Hatchet	x		3	MAYBE
Musk thistle - *Carduus nutans*	Blackrock-Hatchet Box Cr. Heart Six Turpin Lava Cr.	x		4	YES with high severity burns
Houndstongue - *Cynoglossum officinale*	Blackrock-Hatchet Heart Six Turpin	x		3	
Spotted knapweed - *Centaurea maculosa*	Blackrock-Hatchet Lava Cr.	x		3	
Diffuse knapweed - *Centaurea diffusa*	Blackrock-Hatchet Heart Six	x		1	YES
Common tansy - *Tanacetum vulgare*	Blackrock-Hatchet Heart Six	x		3	
Black henbane - *Hyoscyamus niger*	Box Cr.		x	3	
Bull thistle - *Cirsium vulgare*	Box Cr. Blackrock-Hatchet, Lava Cr.		x	4	MAYBE
Common mullein - *Verbascum thapsus*	Blackrock-Hatchet Lava Cr.		x	4	YES
Yellow hawkweed - *Hieracium pratense*	Turpin		x	1	
Sulfur cinquefoil - *Potentilla recta*	Lava Cr.		x	2	
Absinth wormwood - *Artemisia absinthium*	Blackrock-Hatchet		x	2	NO – Fire can be used to control it
Cheatgrass – *Bromus tectorum* (NOT MAPPED by JHWMA)	Lava Cr., Possibly others				YES

*Teton County Weed Management Priorities:
Priority 1: No tolerance, with a goal of eradication upon detection
Priority 2: No tolerance, aggressive control on all known infestations
Priority 3: No tolerance of further spread from their established locations, control and maintenance of current weed infestations and aggressive control to areas otherwise free of these weeds.
Priority 4: No tolerance of further spread, control and maintenance of current weed infestations.

** Information Source: Fire Effects Information System (FEIS) www.fs.fed.us/database/feis/plants/weed/weedpage.html

Weeds Direct and Indirect Effects

Alternative A - No Action

Direct and indirect effects from noxious weeds: Without the proposed vegetation and/or soil disturbances, weed control efforts will be ongoing as their federal and local agency respective priorities dictate. In the case of an unplanned fire, vegetation rehabilitation (possibly including weed control) will take place according to post-incident evaluation and planning.

Direct and indirect effects from invasive species: While recent maps of Cheatgrass distribution do not exist, it is present in the project area along the Togwotee Highway and Buffalo Valley road. Under the No Action Alternative, it is likely that Cheatgrass will continue to spread along roadsides and dry hillsides. If an unplanned fire burns an area in or adjacent to Cheatgrass, it will most likely cause the weed to spread.

Cumulative effects: Under the no action alternative, the distribution of weeds will continue to be an issue managed by landowners and government agencies.

Alternative B – Proposed Action

Direct and indirect effects from noxious weeds: Effects, cumulative effects, and recommendations relevant to weeds under the proposed action are addressed separately by project unit below.

- Lava Creek Prescribed Burn: Within the proposed burn unit, musk thistle, Canada thistle, spotted knapweed, sulfur cinquefoil, field bindweed, common mullien, and bull thistle have been mapped. Perennial pepperweed, perennial sowthistle, Russian knapweed, houndstongue, field bindweed, and white top have been documented nearby (map contained in project file). Of these species, common mullien, Canada thistle, and perennial sowthistle are of the greatest concern with fire disturbance. Musk thistle and bull thistle can also respond favorably to severe burns (which are not expected with prescribed fire). Fire disturbance could also create openings for new infestations of noxious weeds or allow existing ones to spread when competition from native plants is temporarily removed.
- Turpin Lodge Timber Sale and Cut and Pile: Timber removal and pile burning have the potential to create small areas of bare soil exposure, where introduced weed seeds could establish. Project-associated vehicles may bring weed seeds into the area. Burn piles cause deep soil heating, which is usually re-vegetated by pioneer species such as conifer seedlings, moss, fireweed, and other forbs with windblown seeds. To date, other local cut and pile projects have not been found to cause noxious weed problems.
- Blackrock-Hatchet Timber Sale and Cut & Pile: Timber removal and pile burning have the potential to create small areas of bare soil exposure, where introduced weed seeds could establish. Project-associated vehicles may bring weed seeds into the area. Burn piles cause deep soil heating, which is usually re-vegetated by pioneer species such as conifer seedlings, moss, fireweed, and other forbs with windblown seeds. To date, other local cut and pile projects have not been found to cause noxious weed problems.
- Wilderness Ranch Cut and Pile: The proposed Wilderness Ranch cut and pile area does not contain any known infestations of noxious weeds.
- Heart Six Prescribed Burn: Canada thistle responds favorably to fire, especially for the first several years post burn. Musk thistle can increase in severely burned areas. Fire disturbance in the Heart Six unit could also create openings for new infestations of noxious weeds. Areas near trails and pastures would probably be most vulnerable to these new introductions.
- Box Creek Post & Pole Sale: The black henbane infestation has the potential to spread with people felling and removing small trees in the area, because the sticky seeds attach

themselves to clothing. Post and pole removal has the potential to create small areas of bare soil exposure, where introduced weed seeds could establish. Woodcutters may bring weed seeds into the area.

Direct and indirect effects from invasive species: Effects, cumulative effects, and recommendations relevant to weeds under the proposed action are addressed separately by project unit below.

- Lava Creek prescribed burn: Cheatgrass is the most likely invasive species to spread in the Lava Creek prescribed burn unit as a result of fire. This species is currently found growing on dry slopes along the highway. Unfortunately, no maps exist of this infestation. Cheatgrass poses a serious threat to native plants in dry sites, because it depletes soil moisture. It is also a fire risk because it cures early in summer, and creates a continuous fine fuel bed where fire can rapidly spread.
- Turpin Lodge Timber Sale and Cut and Pile: It is unlikely that Cheatgrass is present within the treatment units because the area is forested and partially shaded.
- Blackrock-Hatchet Timber Sale and Cut & Pile: It is unlikely that Cheatgrass is present within the treatment units because the areas are forested and partially shaded.
- Wilderness Ranch Cut and Pile: No infestations of invasive species are known to exist in the vicinity of the Wilderness Ranch Cut & Pile unit. The moist forested environment is not conducive to Cheatgrass invasion.
- Heart Six Prescribed Burn: Cheatgrass is likely to be present in this burn unit on dry south-facing aspects along the Buffalo Valley Road. Cheatgrass spreads easily into recently burned areas. It poses a serious threat to native plants in dry sites, because it depletes soil moisture. It is also a fire risk because it cures early in summer, and creates a continuous fine fuel bed where fire can rapidly spread.
- Box Creek Post & Pole Sale: It is unlikely that Cheatgrass would spread in the Box Creek unit, because of the current forested vegetation. However, it may exist along the roadsides in small patches.

Design Criteria/Mitigation Measures

During the prescribed burn, foot and motorized vehicle traffic through weed infestations should be avoided if possible. All vehicles that will be leaving established roads should be pre-washed to avoid introducing weed seeds. After the burn, any potentially contaminated vehicles should be washed again.

In the Lava Creek burn unit, the area most vulnerable to weed invasions and spread due to the effects of prescribed fire is along the highway. In order to reduce this risk, ignitions within the infested areas should be avoided. Current infestations of Cheatgrass, common mullien, Canada thistle, and perennial sowthistle along US 287-26 should be flagged to avoid burning. Blacklining along the unit's south boundary should be offset from the highway at least 100 ft, or so that they are outside of the identified and flagged infestation zones. Weed distributions should be compared pre- and post burn to determine if any infestations have occurred or spread in association with this treatment. Appropriate follow-up herbicide application should be used if necessary. Funding for this contingency should be obtained in advance.

In the Turpin, Blackrock/Hatchet units, timber operations should avoid activities that cause soil disturbance whenever possible. Associated vehicles should be washed to avoid introducing seeds to locations where they are parked or driven off of established roads. Burn piles should be constructed at least 20 feet from roadsides. Burn piles should not be constructed on top of Canada thistle plants.

In the Wilderness Ranch unit, Vehicles associated with the cut and pile treatment should be parked in designated areas and washed to avoid introducing noxious weed seeds. Burn piles should be constructed at least 20 feet from roadsides, and 10 feet from trails. Burn piles should not be constructed on top of Canada thistle plants, if they are encountered.

In the Heart Six burn unit, prescribed fire poses the threat of Cheatgrass spread along the Buffalo Valley road. In order to reduce this risk, ignitions within the infested areas should be avoided (these Cheatgrass areas should be identified prior to the burn if possible). Blacklining along the unit's south boundary should be offset from the road at least 100 ft. During the prescribed burn, foot and motorized vehicle traffic through Cheatgrass infestations should be avoided if possible. All vehicles that will be leaving established roads should be pre-washed to avoid introducing weed seeds. After the burn, any potentially contaminated vehicles should be washed again. Ignitions along the eastern burn unit boundary should be located to exclude the large area of Canada thistle near the trail switchbacks if possible. Cheatgrass and Canada thistle distributions should be compared pre- and post burn to determine if spread has occurred in association with this treatment. Appropriate follow-up herbicide application should be used if necessary. Funding for this contingency should be obtained in advance.

In the Box Creek Post and pole unit, Post and pole sale permittees should be instructed to park vehicles in appropriate locations and avoid driving off of established roads.

3.1.11 Fire and Fuels

Wildland fire occurrence within and adjacent to the project area is well documented by the Bridger Teton National Forest's fire history database. Prescribed fire has also been applied to the area for wildlife habitat improvement and research since the 1950's. In the late 1980's the Wyoming Game and Fish Department implemented a mechanical aspen improvement/habitat project north of the Buffalo Valley Road. Generally fire occurrence in the area is considered to be within the normal wildland fire cycle; however, fire suppression has limited the effects of these ignitions to relatively small (less than 10 acre) patches, allowing fuel buildup which may have otherwise been consumed by low to very high intensity fire effects. This analysis is conducted to address this fuel buildup and also takes into account the current bark beetle outbreak affecting the area.

Mechanical treatments and prescribe burns will affect wildland fuels and forest species composition. In this analysis fuel models are assigned to existing vegetation and the proposed action in order to predict fire behavior under High and Very High fire danger conditions (National Fire Danger Rating System) as recorded by the Burro Hill Remote Automated Weather Station (RAWS). The analysis of relative risk to adjacent developments is also included based on the current fuel models and fuel models resulting from the proposed action.

Affected Environment

This analysis is based on stand exam data collected in summer of 2004, the Bridger-Teton National Forest (BTNF) fuels map layer, Photo series for quantifying natural fuels, documented fire behavior observations from similar fire environments, and walk-through assessments of the treatment areas. The wildland fuels analysis addresses the proposed treatment units.

Table 17. Description of current fuels condition by treatment unit

	Turpin	Blackrock/Hatchet	Lava Creek	Heart Six	Box Creek
Acres	117	187	259	1072	83
Species	Logepole pine	Lodgepole Pine,	Sagebrush,	Sagebrush,	Lodgepole pine,

	/subalpine fir /spruce	Douglas-fir, aspen	Douglas-fir	Douglas-fir, aspen, spruce	subalpine fir, spruce
Standard Fuel Model	70% - 10 30% - 8	60% - 10 40% - 8	60% - 6 20% - 8 20% - 2	15% - 2 32% - 5 43% - 8 5% - 10	25% - 6 60% - 8 15% - 10
Scott & Burgan Model	90% - TU 10% - TL	2% - GR 3% - GS 4% - SH 78% - TU 13% - TL	4% - NB 43% - GR 29% - GS 23% - TU 1% - TL	12% - GR 27% - GS 6% - SH 38% - TU 15% - TL	14% - GR 24% - GS 59% - TU 2% - TL
Fuel Loading (Tons/Acre)	0 - 40 Avg = 17	28 tons/acre	0 – 66 Avg = 7	1 - 51 Avg = 17	1 – 37 Avg = 11
Slope	5-25%	20-70%	5-25%	5-70%	5-40%
Aspect	North, west	North, Northwest	South	South, SE, SW,N	South, SE, SW
High Fire Behavior 45th Percentile Weather		Grass GR-2	Grass - Shrub GS-2	Timber Understory TU-1	Timber Litter TL-3
Flame Length – feet		4.7	5.7	2.0	0.7
Rate of Spread – feet/minute		36.5	28.9	3.7	1.1
Spotting Distance - miles		N/A	N/A	0.4 miles	0.4 miles
Very High Fire Behavior 90th Percentile Weather		Grass GR-2	Grass - Shrub GS-2	Timber Understory TU-1	Timber Litter TL-3
Flame Length		12.8	14.4	4.7	2.0
Rate of Spread		272.1	167.8	18.5	6.0
Spotting Distance		N/A	N/A	0.9	0.9

Timber Fuel Model Analysis (TU-1, TL-3)

"High" fire danger: Expected fire behavior in the area under high fire danger conditions would consist of surface fire flame lengths from 1-2 feet. In areas of jackpots of dead and down fuels combined with shrubs or conifer regeneration patches, vertical fire movement into the crowns of overstory trees would cause isolated torching of single trees or small groups of trees. Due to the sheltering of the surface fuels from the conifer overstory, very high 20 foot wind speeds (>30 mph) would be required to create wind-driven fire behavior in the surface fuels. Similarly, wind driven crown fire would be rare under normal conditions with fire spread primarily from creeping, torching and spotting. Spotting distances are modeled to 0.4 miles and are likely over predicted for this area with likely spotting distances of 100-200 yards.

"Very High" fire danger: Fires occurring during "Very High" fire danger indices would behave similarly to high fire danger but with surface fire flame lengths of 2-4 feet. This added flame length and associated drier fuel moistures would contribute to more frequent torching and a higher probability of ignition for ember fallout; contributing to higher rates of spread and fire growth. Higher winds would cause the potential for short to medium range crown runs (10 – 60 acres) with long range spotting (0.7 miles) and active surface fire likely. The Hardscrabble (2007) and Purdy (2006) fires are examples of fire spread conditions during Very High fire danger conditions (Bridger Teton NF fire history records).

Grass-Shrub Fuel Model Analysis (GS-2)

"High" fire danger: Expected fire behavior in the area under high fire danger conditions would consist of surface fire flame lengths of 4-7 feet. Areas of continuous brush fields would likely experience crown fire runs where wind and topography align to create convective and radiant pre-heating of downwind/uphill fuels. Higher flame lengths (7-12 feet) than modeled have been observed in this fuel type during high fire danger, especially when fine fuels (grasses) are abundant. In areas were shrub canopy cover is below 20% or fine fuels are sparse or absent, fire may not carry at all or be reduced to isolated flare-up in brush patches. Fine fuel dryness is critical in determining if fire behavior will become problematic. Higher fine fuel moistures would contribute to lower fire behavior. Rate of spread is primarily from creeping and running fire and is predicted to be up to 29 feet/minute assuming continuous fuels.

"Very High" fire danger: Fire behavior in Very High fire danger conditions shows dramatic increases in flame length and fireline intensity. The chemical content of the shrub model (primarily sagebrush) contributes to fire spread and intensity creating problematic fire behavior conditions especially when eye level winds exceed 5 miles per hour. Winds aligned with slope create rapidly escalating crown fire conditions and high resistance to control by ground and aerial suppression resources. Rate of spread is nearly 6 times faster than high fire danger conditions. The shrub/grass model is very susceptible to wind and slope with wind generally overriding the effects of slope when surface winds exceed 5 miles per hour. Fire whirls and spotting from wind driven fires can contribute to dangerous conditions for wildland firefighting resources forcing indirect attack along downwind flanks of the fire. The Blacktail Fire (2003) in Grand Teton National Park is an example of this problem fire behavior during Very High fire danger conditions.

Grass Fuel Model Analysis (GR-2)

"High" fire danger: Fire behavior in grass fuel models under High fire danger conditions includes flame lengths from 1-5 feet depending on fuel moistures and percent of the fire area that is in a "cured" condition. As grasses cure, more of the fuel bed can contribute to fire spread and fire behavior increases. Additionally non-grazed fuel beds are more volatile than grazed areas. Spotting from wind driven fires is minimal and does not generally contribute to fire spread. Calculated rates of spread are higher than other fuel models, however resistance to control by firefighting resources is generally low.

"Very High" fire danger: Fire behavior in grass fuel models under Very High fire danger is similar to high fire danger with higher flame lengths (4-12 feet) depending on the height of the grass, with higher grass fields producing the highest flame lengths. Fires burning in grass models are generally wind driven with terrain also contributing to fire spread when eye level wind speeds are less than 3 miles per hour. When wind speeds exceed 3 miles per hour, wind direction is the primary factor in determining fire spread direction. While rates of spread in grass models are the highest modeled in this analysis, resistance to control by ground and aerial resources is the lowest. Direct attack methods are generally effective and safest for fire resources during grass fires because changes in wind direction can drastically change the direction of spread. Because grass fuel moistures can change rapidly, these fires generally only persist during hot and windy conditions. As diurnal cooling occurs grass fires rapidly loose intensity and can quickly reach their moisture of extinction. Resistance to control by firefighting resources is generally moderate to low.

The effect of MPB infestations on fire occurrence and severity in lodgepole pine forests are variable and influenced by time since beetle outbreak. Time since beetle outbreak is an important factor to consider in the relationship between bark beetle outbreaks and fire risk because fuels change over time (Simard et al, 2008). Page and Jenkins (2007) indicate that fire behavior increases following bark beetle epidemic due to decreased sheltering from the wind

thus increasing mid-flame wind speeds. This increase in fire behavior would likely increase the potential for loss of property and decrease the safety of responding firefighters.

Fire history for the Buffalo Valley Area

Fire name	Year	Cause	Total Acres
Buffalo	1971	Lightning	0.1
Mount Bell	1973	Human	0.1
Scheer Pl	1986	Human	0.1
Uhl Hill	1988	Lightning	6.0
Bama	1990	Lightning	0.4
Pinto	1990	Lightning	0.1
Buffalo	2000	Lightning	0.4

Fuels Direct and Indirect Effects

Alternative A – No Action

- Direct Effects: Fuels will continue to accumulate according to natural decay and decomposition cycles. The beetle killed timber will increase dead and down fuel loads more quickly over time than in the absence of beetle disturbance. Beetle mortality occurs in groups of trees within the stand and across the whole stand creating conditions where jackpots of dead and down fuels are exposed to higher eye level wind speeds (lack of sheltering from forest canopy) and increased sun exposure. Higher wind speeds contribute to more rapid drying of all size classes of fuels but may dry larger diameter fuels more quickly than under more sheltered conditions. With the no action alternative dead and down fuels would be expected to dry and become available for combustion more quickly during the fire season potentially contributing to longer than normal high and very high fire behavior conditions.
- Indirect Effects: Potentially longer fire seasons and higher fuel loading over time could contribute to more severe fires burning in these areas. Areas affected by these higher intensity fires may change soil structure and change forest succession dynamics as described in forest structure, soils, hydrology, and wildlife reports attached.

Alternative B – Proposed Action

- Direct Effects: Removal of accumulated forest fuels and thinning of understory and overstory vegetation will maintain forest and shrubland dynamics even with the effects of beetle disturbances or fire. Shrubland systems have a fire return interval of 20-60 years and are adapted to fire disturbances. Forested systems have also evolved with fire and beetle disturbances but have also had aggressive fire suppression applied since the 1950's. Effective fire suppression has allowed forest stand succession to continue towards closed canopy dense forests with abundant ladder fuels and surface fuel loading. Firewood cutting, historic grazing, and prescribed fires have affected some stands within the analysis area while others have been essentially undisturbed until the recent beetle outbreak.

  The location of private property improvements in the form of subdivisions combined with current fuel conditions creates higher than normal risk of damage to improvements in the event of an unplanned fire start in the area. Removing fuel accumulations and thinning of dense stands reduces the risk to these areas while maintaining forest structure and minimizing the possibility of stand replacement wildfire.
- Indirect Effects: Long term maintenance of forest and shrubland structures will be enhanced with mechanical and prescribed fire treatments in these ecotypes. Shrubland

regeneration resulting from carefully applied fire mosaics reduces flame lengths and increases forb and grass production for up to 10 years post treatment. Forested lands mechanically thinned or prescribed burned help to reduce fire behavior and resistance to control for 10-15 years. Reintroduction of fire into Douglas fir dominated stands helps to limb and thin smaller trees, making the stands more fire resistant and promoting recruitment into the overstory which will replace the mature trees currently targeted by bark beetles. Aspen stands may increase in size on the landscape; promoting this fire resistant species reduces fire risk and benefits multiple wildlife game and non-game species.

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