United States
Department of
Agriculture

Forest
Service

May 2009

Environmental Assessment
Beartooth Front Storm Damage Clean-up and Fuels Reduction Healthy Forests Restoration Act Project – West Fork Rock Creek

Beartooth Ranger District, Custer National Forest
Carbon County, Montana
Township 8S, Range 18E and 20E; Township 7S, Range 18E and 19E.

Post-fire photo of West Fork drainage, looking west.

For Information Contact:
Dan Seifert, Project coordinator
Beartooth Ranger District
6811 US Highway 212 South
Red Lodge, MT 59068
(406) 446-2103
http://www.fs.fed.us/r1/custer/

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDAs TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202)720-6382 (TDD). USDA is an equal opportunity provider and employer.

Table of Contents

SUMMARY i

INTRODUCTION 1
Document Structure 1
Background and Regulatory Framework 2
Purpose and Need for Action 12
Proposed Action 14
Decision Framework 15
Public Involvement 15
Issues 16

COMPARISON OF THE NO-ACTION AND ACTION ALTERNATIVES 18
Alternatives 18
Action Alternative Design and Mitigation Measures 26
Effects Comparison of Alternatives 31

ENVIRONMENTAL CONSEQUENCES 35
Fuels 35
Visuals Resource 38
Water Resources 39
Recreation 41
Wildlife 43
Fisheries 50
Forest Vegetation 52
Heritage Resources 55
Soils 57
Noxious Weeds 58
Sensitive Plants 59
Inventoried Roadless Areas, Wilderness, & Un-roaded Areas 60
Other Issues 61

CONSULTATION AND COORDINATION 67

REFERENCES CITED 69

EA APPENDICES - Available online at: http://www.fs.fed.us/r1/custer/
Printed or electronic copies of the appendices are also available upon request.
Appendix A = Fuels specialist report
Appendix B = Visuals specialist report
Appendix C = Water resources specialist report
Appendix D = Recreation specialist report
Appendix E = Wildlife specialist report
Appendix F = Fisheries specialist report
Appendix G = Forest Vegetation specialist report
Appendix H = Soils Specialist Report
Appendix I = Noxious Weeds Specialist Report
Appendix J = Sensitive Plants Specialist Report
Appendix K = Inventoried Roadless Areas, Wilderness & Un-roaded Areas Specialist Report
Appendix L = Planning Specialist Report
Appendix M = Forest Plan Amendment Number 43 & Determination of Non-Significance

SUMMARY

The United States Forest Service (USFS), Custer National Forest has proposed to clean up and reduce fuels in the West Fork Rock Creek. This includes fuels downed and damaged in a 2007 wind event and the 2008 Cascade Fire. The Beartooth Front Storm Damage Clean-up and Fuels Reduction Healthy Forests Restoration Act Project – West Fork Rock Creek proposes to improve public and firefighter safety, clean-up burned and wind-damaged trees, improve defensible space around structures, and reduce fuel loading on 935 acres of National Forest System (NFS) lands in the West Fork Rock Creek (Figure 1). The West Fork Rock Creek area is approximately 2.5 miles southwest of Red Lodge, Montana.

The purpose and need of the Beartooth Front Storm Damage Clean-up and Fuels Reduction Healthy Forests Restoration Act – West Fork Rock Creek project is to improve public and firefighter safety by 1) removing potentially hazardous burned trees along roads and near recreation sites and 2) reducing existing and future fuel loads and fuel continuity to improve fire suppression capability and firefighter and public ingress/egress. In burned areas, fuel load and fuel continuity reduction would include removing dead and dying trees to create a fuel break along West Fork Road. In unburned areas, fuel load and fuel continuity reduction would include thinning live trees and removing wind damaged standing and downed trees along West Fork Road, treating willow and aspen stands, conifer removal in elk winter range areas, and improving defensibility around buildings on the National Forest. Fuel breaks and fuel reduction would also serve the purpose of improving safety and overall defensible space around the values at risk on private and public lands. Because proposed treatments in the Cascade Fire area would not meet 1986 Custer National Forest Land and Resource Management Plan (Forest Plan) Visual Quality Objectives (VQO's), a project-specific Forest Plan amendment to allow for post-fire regrowth to cover stumps and skid trails is included in the Proposed Action.

In addition to the proposed action, the Forest Service also evaluated the No-action Alternative, which would not conduct any hazard tree removal, fuels reduction, or storm damage clean-up.

Based upon the effects of the alternatives, the District Ranger will decide whether to implement the proposed action alternative, a modified action alternative, or the No-action alternative. If an action alternative is selected, it will include:

- The location, design, and scheduling of proposed fuel reduction on National Forest Lands in the West Fork Rock Creek, if any;
- Design features, mitigation measures, and monitoring requirements.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- *Introduction:* The section includes information on the background and history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of the No-action and Action alternatives:* This section provides a more detailed description of the agency's proposed action for achieving the stated purpose and the no-action alternative. The Proposed Action alternative was developed based on significant issues raised by the public. This discussion also includes possible project design features and mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative as they relate to Key issues.
- *Environmental Consequences:* This section describes brief summaries of the environmental effects of implementing the proposed action and no-action alternatives. This analysis is organized by resource area. Within each resource area sub-section, the affected environment is described first, followed by the effects of the No-action alternative and the action alternative.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* Appendices are an integral part of this environmental assessment and provide complete versions of project specialist reports to support the effects summaries in the Environmental Consequences section. Appendix M includes information regarding a project-specific amendment to the Forest Plan. The appendices are available for viewing and download on the Custer National Forest website at: http://www.fs.fed.us/r1/custer/. Printed or electronic copies of the appendices are available upon request.

Additional documentation, including more detailed analyses of project-area resources and supporting documentation, may be found in the project planning record located at the Beartooth Ranger District Office in Red Lodge, Montana and is available for public inspection.

Background and Regulatory Framework

A November 12, 2007 wind event with recorded gusts over 100 miles per hour created heavy concentrations of wind damaged and fallen trees across the Beartooth District. Concentrations of wind damaged and fallen trees combined with fuels conditions that existed before the wind event to create potentially hazardous fuel loads. In January 2008, the Beartooth Ranger District proposed to conduct clean-up and fuel reduction activities in the West Fork Rock Creek, Main Fork Rock Creek, and Benbow areas. Prior to completion of approval of this proposal, the summer 2008 Cascade Fire burned 10,200 acres of the West Fork drainage.

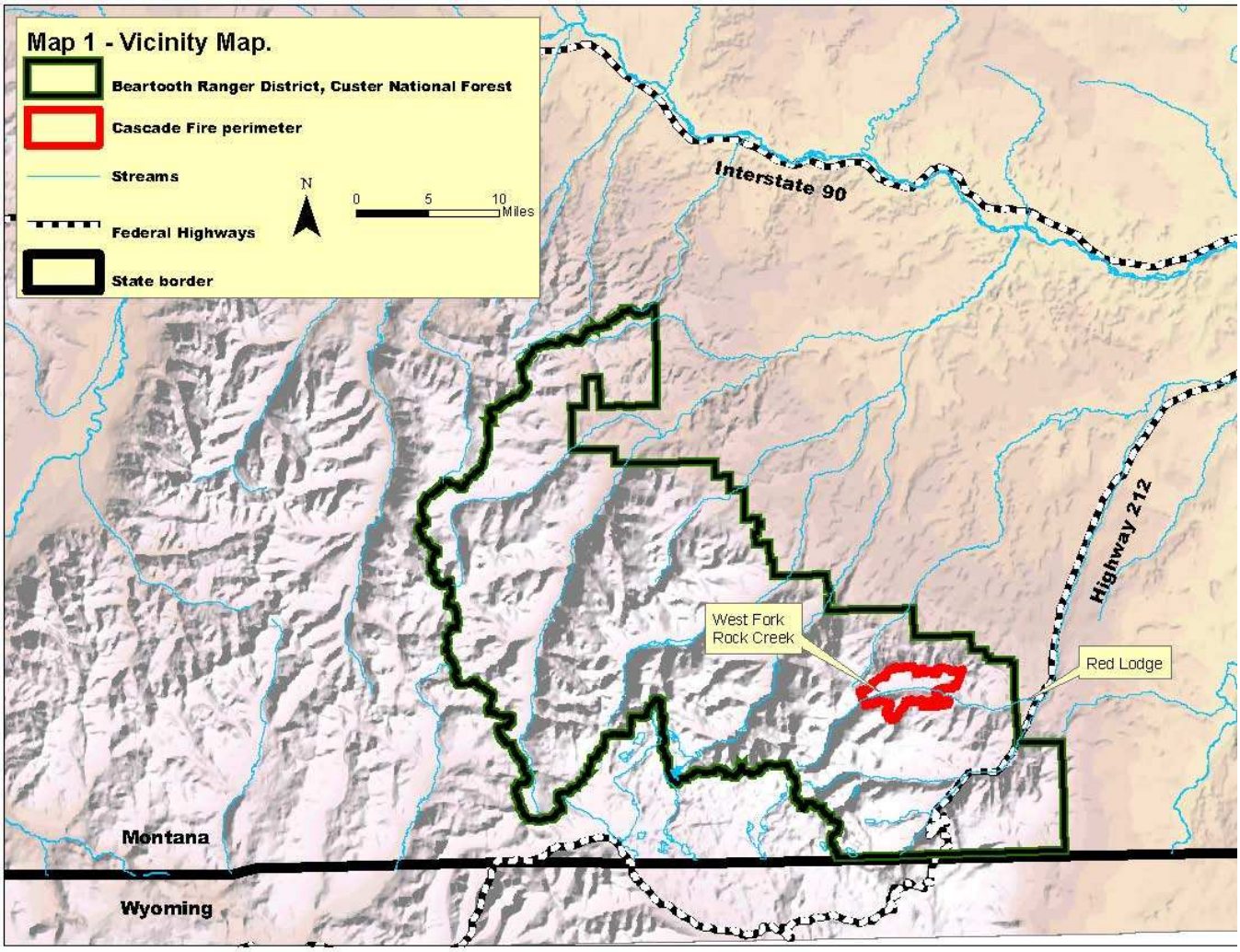

Figure 1. Vicinity map.

Related storm clean-up and fuels reduction efforts

The November 2007 wind event also affected recreation facilities across the Beartooth District, such as signs, picnic tables, trails, roads, and recreation residences damaged by falling trees. To provide facilities for safe use by the public, some hazard tree removal and repairs at these facilities were completed under separate efforts in winter and spring 2008.

In February 2009, the Beartooth Ranger District completed environmental analysis and issued a decision to clean up storm damage and treat fuels in the Main Fork and Benbow area. Areas initially damaged by the 2007 wind event and proposed for treatment burned with high intensity in the Cascade fire. Due to the Cascade Fire, the Forest Service has modified the West Fork proposed treatments and initiated a separate environmental analysis effort that is documented in this Environmental Assessment.

In recent years, the Beartooth Ranger District has completed several fuels reduction projects along the Forest Boundary near the West Fork Rock Creek, including thinning and prescribed burning at the Silver Run elk range, thinning around recreation residences and West Fork work center, and thinning and prescribed burning along Ski Run Road #21479. The Beartooth Front Storm Damage Clean-up and Fuels Reduction project would continue and/or complement these other related efforts in the West Fork area.

Post-fire clean-up and response efforts

The Cascade Fire Burned Area Emergency Response Team (BAER) report identified numerous immediate emergency treatment needs (USDA 2008a), including:

- Ongoing noxious weed treatment and monitoring,
- Work in stream channels in anticipation of increased post-fire flows,
- Road work: improving stream crossing culverts, increasing frequency of crossdrain culverts, pulling ditches and cleaning inlet basins,
- Trail work: installing trail water bars and drain dips, removing hazard trees blocking the effectiveness of the drainage structures and that pose a physical threat to BAER implementation personnel, temporary trail closure to stock/llama use until native vegetation sufficiently recovers, decommissioning part of the Senia Creek trail, and hazard tree removal around recreation residences and the Timberline Trail footbridge to reduce risk to historic structures.

BAER treatments were started in fall 2008 and will continue as funding and weather allow.

The Cascade Fire Large Scale Event Recovery Plan (LaSER) report recommended several long-term recovery actions (USDA 2008b), including:

- Hazard Tree Removal: Remove hazardous snags and protect infrastructure at and near recreation sites, roads, and along the power-line.
- Hazard Fuel Reduction: Reduce post-burn fuel loading along the West Fork road corridor.
- Road and Bridge work: Periodic road grading and ditch pulling should be conducted. Bridges should be monitored for log jams and if found, removed.
- Trail work: Hazard tree felling and trail maintenance along burned trails will likely be a continuing need over the next ten years. As a result of the fire, additional water drainage features need to be installed and damaged structures need to be replaced.

- Basin campground erosion protection: Rip-rap needs to be placed along the West Fork Rock Creek stream boundary adjacent to site #5 in Basin campground to protect the campground from erosion due to higher flows in the creek resulting from increased runoff in the fire area.
- Property Protection Measures: Hazard tree and burned tree removal from recreation residence tracts to reduce risk to cabins and historic structures.
- Noxious Weeds: Monitoring and treating noxious weeds within the Cascade Fire perimeter into the future as needed.
- Regeneration: Monitoring for natural tree regeneration success in burned areas.

LaSER actions were initiated in winter 2009 and will continue as any required environmental analysis is completed for these long-term actions and as funding is attained. This environmental assessment addresses analysis requirements for LaSER hazard tree removal and hazardous fuel reduction in the Cascade fire area.

Climatic and terrain influences

Events similar to the November 2007 wind event are common in Carbon County. Most of the West Fork is characterized by steep, forested, and wind-prone slopes. Narrow drainages, including the West Fork can funnel winds down slope from the plateaus and increase wind speeds. Flame length, rate of spread, and fire spotting generally increase with wind speed and often result in crown-fires in lodgepole pine forests such as the West Fork. Winds, topography, and fuel loads result in rapid wildland fire growth potential, as evidenced by the 2008 Cascade Fire and other recent fires.

During dry periods, lightning and human-caused fires are a regular occurrence on the Beartooth District. Trees weakened by drought can also become more susceptible to insect infestations. For most of the past 10 years, summer precipitation has been below historic levels. Recent drought in Carbon County has significantly heightened risk of wildland fire along the Beartooth Front. This is evidenced by lower than normal live fuel moistures over the past few years. Live and dead forest fuel moistures on the Beartooth District have been recorded since the 1970's and are used to calculate Energy Release Component (ERC) for wildland forest fires. Higher ERC values indicate higher potential wildland fire severity. In general, larger fires (≥1000 acres) tend to be associated with higher ERC values. Large fires can be quite expensive and dangerous. Over the past several years, peak summer ERC values have been exceeding historic high values on the Beartooth Ranger District.

Wildfire size, frequency, and length of wildfire season have increased in western U.S. forests in the late 20th century (Westerling et al 2006, Graham et al 2004, Meyer and Pierce 2003). This trend is evident on the Beartooth Ranger District. In the past 20 years, strong winds, topography and dry fuels have resulted in rapidly spreading high-intensity fires on Custer National Forest lands in Carbon and Stillwater Counties. Examples include the 2008 Cascade fire (10,200 acres), 2006 Derby fire (200,000 acres), 2002 Red Waffle fire (2,000 acres), 2000 Willie Fire (1,503 acres), 1996 Shepherd Mountain fire (14,890 acres), and the 1988 Storm Creek (56,856 acres) and Clover/Mist fires (387,400 acres). Several of these fires have resulted in damage to Forest Service facilities and private property, including loss of homes and structures. Predicted continued climatic changes may result in earlier spring snowmelt, longer fire seasons, and consequent large wildfires (Westerling et al 2006).

Forest Vegetation and Fuel Loads

Prior to European settlement of the area, lightning-caused fires reduced fuels on the Beartooth Ranger District. Computer modeling simulations indicate the Beartooth Front was characterized by high severity fires every 35 to 200 or more years. The last known large fire event prior to the Cascade fire, for the West Fork of Rock Creek drainage was estimated at 102 years (Appendix A). From 1870 to 1904, more than 138,000 acres of forest land burned on the Beartooth District (Figure 2). Logging for mine timbers in the West Fork Rock Creek started in the 1890s and included extensive harvest of burned trees and brush piling from 1890 to 1910 (Montana State Water Conservation Board 1966, Clark 1982).

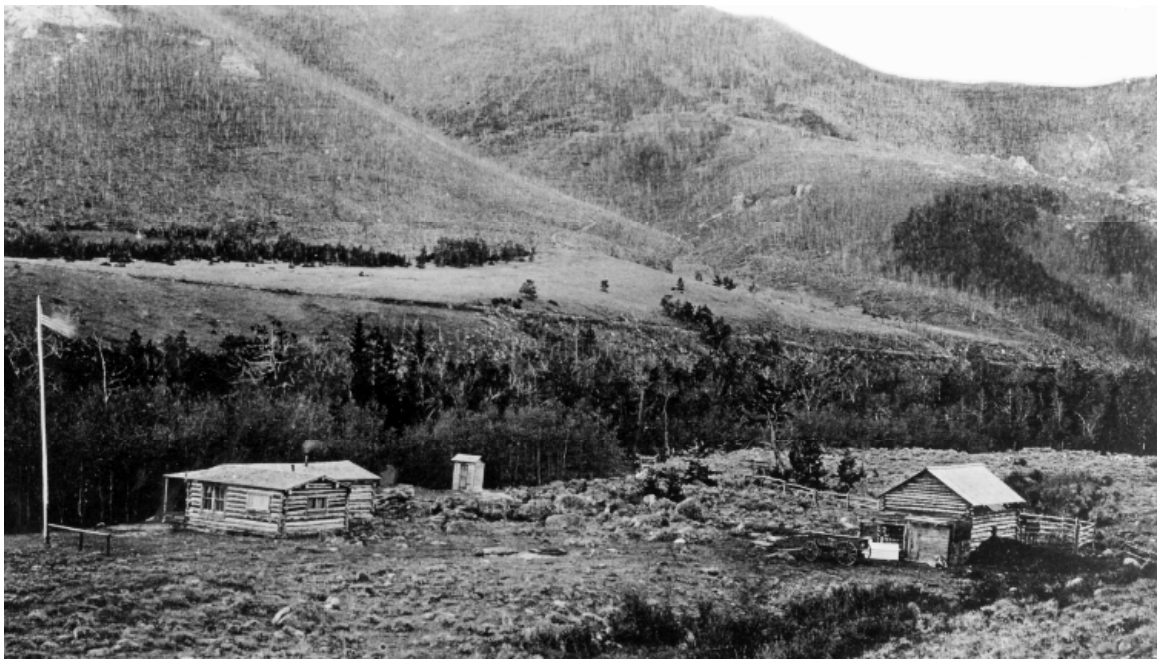

Figure 2. Photo of West Fork Rock Creek work center around 1906.

Considerable growth of timber along the Beartooth front has occurred since the fires and timber harvest of the early 1900's (Figure 3). Fire suppression to protect natural resources, homes and cabins in the project areas has prevented wildfire from performing its natural fuels reduction role. Forests in the project areas are primarily even-aged mature lodgepole pine. Lodgepole forests that survive more than about 100 years often become susceptible to and die from mountain pine beetle infestations (Gibson 2004). The resulting buildup of dead and dry fuels can invite a large stand-replacing wildland fire. There are also spruce, Douglas-fir, aspen, subalpine fir, limber pine, and whitebark pine forests. Prior to European settlement, these forest types had low intensity fires periodically burning through them to reduce fuels. Crown fires can readily spread into these forest types from adjacent lodgepole forests. Fire exclusion has generally made these forest types more susceptible to beetle infestations and stand-replacement fires.

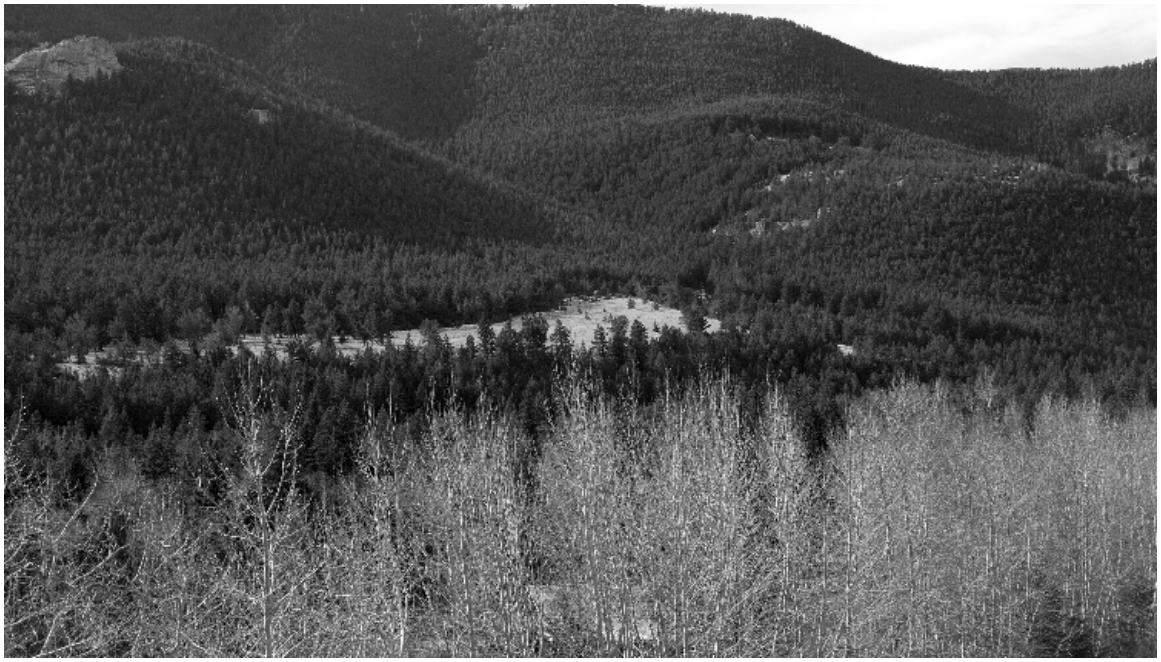

Figure 3. West Fork Rock Creek work center, 2008.

Most historic human-caused fires on the Beartooth District occur in drainage bottoms with more frequent recreational use. From 1953 to 2007, there were 49 recorded wildfires in the West Fork Drainage ranging in size from .10 to 8 acres. Of those, 14 have been lightning (29%) and 35 human or other ignition sources (71%). From 1997 to 2007, in the West Fork drainage, there have been 14 fires, or and average of 1.4 fires per year. Of those fires, 2 were lightning (14%), and 12 were human caused or other ignition sources (86%). From 1953 to 2007, 11 recorded fires have occurred within or on the edge of the proposed treatment units in the West Fork of Rock creek. All 11 fires during this period were human caused. The cause of the 10,200 acre 2008 Cascade Fire remains under investigation.

Most large fire events on the Beartooth Ranger District are down canyon wind driven events, such as the Shepard Mountain fire (1996), Derby fire (2006), Willie fire (2000) and Cascade fire (2008). Predominate south and southwest winds in the West Fork drainage are conducive to down canyon fire events, such as the winds that pushed the 2008 Cascade Fire.

The November 2007 wind event resulted in heavy concentrations of trees blowing over or being damaged in the West Fork Rock Creek. When combined with fuel loads that existed before the storm, these trees form areas of down fuel that readily carried fire (Figure 4). Unburned areas of extensive storm damage remain in the lower reaches of the West Fork drainage. Numerous additional photos of storm and fire damage and fuel loads are in the Project Record.

Figure 4. Left is 11/2007 pre-fire storm damage along West Fork Rock Creek. Right is same location after the 2008 Cascade fire.

Community Wildfire Protection Plans

In 2001, Red Lodge was added to the Federal government's nationwide list of communities at high risk from wildfire in the vicinity of Federal lands (Federal Register 2001). The 2005 Carbon County Community Wildfire Protection Plan and Pre-Disaster Mitigation Plan (CWPP/PDM) identified the West Fork Rock Creek and Main Fork Rock Creek areas as Wildland Urban Interface (WUI), which is defined as areas within or adjacent to a community that is at-risk due to wild fire potential. The CWPP/PDM states that "The most extreme situation with respect to fuel conditions and values at risk occurs south and west of Red Lodge where there are numerous high-value individual homes and subdivisions located in the wildland urban interface area in close proximity to the National Forest boundary." This includes the West Fork of Rock Creek. The Carbon County CWPP/PDM is available online at: http://dma.mt.gov/DES/Counties/carbon/index.asp.

The 2008 City of Red Lodge Growth Policy states that "The City of Red Lodge is surrounded by wildland areas that contain heavy fuel loads and the potential for severe wildland fire activity.

Surrounding areas of concern include the Main and West Forks of Rock Creek and the Palisades Area, all south and west of town. These areas contain significant fuel loads that could easily cause ignition within City Limits by blowing fire brands". The Growth Policy is available online at: http://www.cityofredlodge.com/gov_GrowthPolicy.asp?navID=GOV.

The CWPP/PDM analyzed a catastrophic wildland fire scenario in the West Fork Rock Creek. The potential outcome of this scenario presented in the CWPP/PDM included:

- Potential loss of human life.
- Over 15,000 acres burned.
- Direct Cost loss estimates of over $44 million dollars.
- Destruction of numerous assets, including 27 Recreation Residences in the West Fork, communications facilities at Grizzly Peak.
- Loss of economic viability of Red Lodge Mountain ski area and resultant major long-term impact to Carbon County's economy.

Some of the CWPP/PDM scenario was realized during the Cascade Fire. Four residences, 2 guest homes, and 7 outbuildings were destroyed on the Custer National Forest. Due to threat of the Cascade fire burning toward Red Lodge, approximately 150 residences were evacuated. Protection of Red Lodge Mountain Ski Area was a major emphasis during the Cascade fire – while the fire burned trees within the ski area permit boundary, no structures or ski lifts were burned. While no total direct loss estimate has been compiled, total fire suppression costs were approximately 9 million dollars.

Forest Service fire behavior modeling of predominant unburned fuel types concluded that under extreme fire conditions in the West Fork drainage (Appendix A):

- There would be a 46% probability that lightning would ignite a wildfire.
- If the fire remained a surface fire, flame lengths would be 1.3 to 11.1 feet.
- Winds of 20 to 28 mph would result in fire burning into the crowns of trees. A crown fire would have 38 to 44 foot flame lengths. Crown fire could spread at rates of 1 to 7 miles per hour and start spot fires up to 0.5 miles in front of the main fire.
- With 40 mph winds, a fire could spread at nearly 3 mph, with spotting up to 0.7 miles.

The Cascade fire changed conditions by burning much of the November 2007 storm damaged trees and adding to available fuels that will likely increase the risk of a future re-burn within five to ten years (Figure 4). As seen in Figure 5, ladder fuels from future tree regeneration will compound the setting (USDA 2008b). Fire behavior in this fuel type has been observed in 14 year old post burn lodgepole pine in the 2002 Phlox fire, which burned 2600 acre in nearby Yellowstone National Park (Miller et. al. 2004). Based on data collected in 12 year old post fire lodgepole pine, modeling indicates rates of spread of about 1 mile per hour and flame lengths of 5.9 feet with 80 percent probability of ignition from a firebrand (Appendix A).

Figure 5. Lodgepole regeneration and down fuels in 1996 Shepherd Mountain fire area, East Rosebud drainage, Custer National Forest.

Healthy Forests Restoration Act of 2003

The Healthy Forests Restoration Act of 2003 (HFRA) established procedures for Federal agencies conducting environmental analysis for authorized hazardous-fuel-reduction projects on Federal land. The proposed Beartooth Front Storm Damage Clean-up and Fuels Reduction Project is designed under the requirements of HFRA and for the purpose of responding to the 10-year Comprehensive Strategy (Western Governor's Association 2006). Specifically, project activities were identified in the CWPP/PDM, portions of the project areas are identified as WUI, portions of the project area are condition class 2 Federal land located within fire regime III in proximity to a municipal watershed, and presence of wind throw areas pose the significant threat of increased fire danger and potential impacts of a large wildfire to various ecosystem components. Additional wind throw is anticipated in the Cascade fire area, which will further increase fuel loads and future fire danger. Potential impacts of a future wildfire are described in the Environmental Consequences section and Appendices of this Environmental Assessment.

Watershed and Water Supply Protection

One purpose of the HFRA is to reduce wildfire risk to municipal water supplies. The West Fork Rock Creek is the municipal watershed for the City of Red Lodge. Drinking water for the City of Red Lodge is pumped from a series of shallow wells with hydrologic connection to surface waters in the West Fork Rock Creek. The City also maintains facilities for surface water diversion in the event that wells do not

supply adequate water. Hundreds of privately owned groundwater wells used for drinking water and ditches and wells used for irrigation purposes are also supplied by water from the West Fork.

Post-fire run-off can increase levels of nutrients and sediment in surface waters (Miller et al 2006, Wondzell and King 2003, USDA 2008b). In fall 2008, post-fire rain events mobilized and flushed observable amounts of ash and fine sediment from tributary drainages to the confluence with West Fork Rock Creek. Initially, there were concerns over heavy metals that could be dissolved or suspended in surface waters with subsequent infiltration into groundwaters USDA 2008b). While ash and soil data appeared to indicate presence of metals that could be potentially mobilized and transported by overland flow, subsequent surface and groundwater samples met State drinking water quality standards (Montana Bureau of Mines and Geology 2008 and Appendix C). It is unknown how or if a large storm event could result in significant amounts of metal-laden ash and sediment entering the West Fork Rock Creek.

Following the Cascade fire, anticipated post-fire landscape responses from high intensity storm events include increases in surface erosion and downslope transport, mass wasting, streamflow, channel erosion and bedload mobilization. Low to moderate increases in flood magnitude are anticipated in larger watersheds, while substantial increases in five of six smaller tributaries can be expected. Increased flood magnitude in tributaries will increase channel erosion, may increase mass wasting potential by cutting toe slopes, both of which will increase bedload mobilization and transport (Appendix C).

Due to the Cascade Fire, there is a projected potential increase in runoff flows until post-fire ground cover can re-establish. Another large wildland fire in the West Fork could increase this potential. Water yield, surface erosion, mass wasting, streamflow and instream erosion could all increase dependent on intensity, duration, location and amount of area burned. Risk of channel adjustments (scour and bank erosion) would increase as precipitation/runoff events increase in magnitude. However, due to the high cobble/boulder content of adjacent soils, these adjustments are not likely to be substantial across the entire stream system.

Custer National Forest Land and Resource Management Plan

The 1986 Custer National Forest Land and Resource Management Plan (Forest Plan) Forest-wide Fuels Management standard specifies that "A combination of treatments will be used that will most efficiently meet the fuels management direction of each management area" (USDA 1986, page 39). Each Forest Plan Management Area (MA) has specific goals and standards. Activities in the West Fork Rock Creek are proposed in MA F, MA M, MA R, and MA P. Maps of Forest Plan MAs and proposed MA treatment acreages spreadsheet are in the project record. Goals and standards for these MAs include:

- The MA F goal is “To provide a spectrum of recreation opportunities and settings in the and around developed sites and the access corridors to the sites…” (page 61). Applicable MA F recreation standards include: “Vegetation in developed sites will be managed to maintain the appropriate recreation setting, including planting new plant to supplement existing vegetation as well as preventative measures for insect and disease control when necessary” and “Closing facilities will be considered if public safety or sanitation cannot be provided….” MA F timber and fuels standards include that “Harvest within developed recreation sites will normally be for removal of hazardous trees and protection of improvements” and “Planned ignitions may be used for slash and debris disposal, enhancement of visual quality and preventative measures to reduce

wildfire intensity." The Visual Quality Objective (VQO) in the foreground viewing area from a developed site or along an access corridor is Retention or Partial Retention.

- Riparian areas are designated as MA M. MA M occurs in nearly every other MA and, for the most part, is not specifically mapped. The Forest Plan MA goal for riparian areas is to provide healthy, self-perpetuating plant and water communities that will have optimum diversity and density of under-story and over-story vegetation (pages 80-82). Management standards specify that in riparian areas, prescribed fire "may be used for debris cleanup" and that "Silvicultural prescriptions will be used along fishery streams to insure that an adequate number of trees will be available to maximize the continual, natural development of pools necessary to meet the need of the individual fishery involved." VQO is Retention or Partial Retention.
- The MA R goal is "To protect and maintain high quality water for public domestic use" (page 91). MA R standards specify that "Timber management activities, such as thinning, regeneration cutting, and selection cutting to enhance or perpetuate existing watershed, recreation and visual values or provide for public safety are permitted. Cutting activities will be managed to assure high water quality is maintained." Other applicable standards include that "Planned ignitions may be used for hazard reduction, debris and slash disposal and maintenance of diversity for watershed values." The VQO is Retention and Partial Retention.
- The West Fork work center administrative site is MA F. The goal of MA F is "To provide adequate facilities for the administration of the Custer National Forest" (page 88). Standards include: Timber harvest may be used to protect or maintain other values; planned ignition may be used for debris disposal; and the VQO will not exceed modification.
- Visual Resource Management Standards (page 14) state that "As a general rule the VQO established by management area direction or project assessement will be met. In the event a project environmental analysis determines that the VQO cannot be met, the project will either be modified to meet the VQO for the Management Area or the Forest Plan amended."

While not repeated here, there are other applicable Goals, Standards, and Objectives in the *Forest Plan*, which is available online at: http://www.fs.fed.us/r1/custer/projects/environmental/index.

Custer National Forest Fire Management Plan

The Forest Plan requires that a Fire Management Plan be developed and implemented. Custer National Forest Fire Management Plan (USDA 2008c) goals include:

- Make firefighter and public safety the highest priority in every fire management activity. The objective for this goal is to ensure that wildland and prescribed fire operations cause no injuries to either the public or firefighters.
- Reduce wildland fire hazards in and near high value public and private property. The objective for this goal is to employ strategies to reduce risk of fire destroying or damaging cultural, historic, or any private structure. The strategy for this goal is to use a combination of mechanical hazardous fuel reduction practices and prescribed fire to reduce the intensity of unwanted fires near structures, cultural and historic sites.

The Fire Management Plan specifies that "long-term fuels management on the CNF will focus on protection of property, lowering the risk to firefighters, the general public and restoring conditions that promote lower intensity wildland fires, reducing large fire suppression costs and improving ecosystem health" (USDA 2008c, page 28). This Plan also states (pages 11-12) that "mechanical treatments for

fuels reduction will be used to modify wildland fuels to reduce the flammability and resistance to control. The mechanical reduction of fuels near structures and other developments is the preferred option for treating fuels. In many instances this treatment will precede an application of prescribed fire. Non fire treatments most commonly used may include thinning, pruning, lop and scatter, hand or machine piling, chipping or mulching or removal as fuel wood by the general public."

Purpose and Need for Action

The Forest Service has prepared this Environmental Assessment (EA) to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. This EA discloses and informs the public of the potential environmental effects that could result from implementing fuels reduction activities in the West Fork Rock Creek drainage near Red Lodge, Montana. This EA was completed in compliance with the National Environmental Policy Act (NEPA), HFRA, and other relevant laws and regulations. This EA discloses the direct, indirect and cumulative environmental impacts that would result from the proposed action. It is prepared according to the format established by Council of Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508) and guidance for environmental assessment of forest health projects (Connaughton 2002).

Planning was coordinated with Federal, State, and local government entities and agencies, and local federally recognized tribes. Additional documentation, including public involvement, comment, and coordination, may be found in the project planning record located at the Beartooth Ranger District Office in Red Lodge, Montana and is available for public review upon request.

The purpose and need of the Beartooth Front Storm Damage Clean-up and Fuels Reduction Healthy Forests Restoration Act – West Fork Rock Creek project is to improve public and firefighter safety by 1) removing potentially hazardous burned trees along roads and near recreation sites and 2) reducing existing and future fuel loads and fuel continuity to improve fire suppression capability and firefighter and public ingress/egress. In burned areas, fuel load and fuel continuity reduction would include removing dead and dying trees to create a fuel break along West Fork Road. In unburned areas, fuel load and fuel continuity reduction would include thinning live trees and removing wind damaged standing and downed trees along West Fork Road, treating willow and aspen stands, conifer removal in elk winter range areas, and improving defensibility around buildings on the National Forest. Fuel breaks and fuel reduction would also serve the purpose of improving safety and overall defensible space around the values at risk on private and public lands.

The presence of potentially hazardous fire-killed trees in the heavily used West Fork drainage recreation corridor is a value at risk in that harm to the people and public and private property will be more likely if hazard tree removal and clean-up efforts are not completed in burned areas. Hazard trees are a primary concern at and near roads, trails, recreation residences, trailheads, campgrounds, and dispersed campsites in the Cascade fire area. To provide a safe visitor experience, hazard trees need to be removed within 2 tree lengths (or about 150 feet) of these areas.

The West Fork is susceptible to severe wildfire behavior that can potentially impact values at risk. Without fuel reduction treatments, there are a number of additional values at risk within and adjacent to the West Fork of Rock Creek. The City of Red Lodge municipal watershed, Red Lodge Mountain Ski area, the City of Red Lodge and outlying subdivisions located at the mouth of the canyon could be

impacted by wildfire. In addition to subdivisions, numerous recreation lease residences and Timbercrest Girl Scout camp are located on the West Fork drainage bottom. Forest Service infrastructure within the canyon bottom includes nine structures at West Fork of Rock Creek Work Center, six trailheads, Cascade campground, Basin campground, and Wild Bill Lake recreation site. Fuel loads in conjunction with structure conditions make many structures in the proposed treatment units un-defendable and reduce fire survivability.

Based upon findings from field reconnaissance, information gathering, and analysis by USFS fire and fuels management specialists, the existing condition within the proposed project area includes fuel loading, arrangement of fuels on the ground and in the tree crowns, wind patterns, and topography that make it difficult to efficiently and safely suppress wildfires (Fuels analysis, Appendix A). Desired fuels conditions for the project areas would be conditions that reduce fire behavior with the purpose of improving access and egress for firefighters, emergency personnel and the general public; improve firefighter capabilities in suppressing fires in the project area; and to enhance structure survivability within the project area.

Proposed actions respond to the goals and objectives outlined in the Forest Plan and Custer Fire Management Plan. Specific MA fire control objectives, appropriate suppression responses, and goals/objectives for use of mechanical fuels treatments and prescribed fire are listed above. Hazard tree removal is needed to meet forestwide Forest Plan management standards for safe trails (page 13) and roads (page 37) and to meet MA F recreation and timber standards (pages 61-62). Proposed hazard tree removal and fuel reduction in foreground viewing areas would not meet Forest Plan retention and partial retention VQOs due to post-treatment presence of visible stumps and other disturbance. Because proposed treatments in the Cascade Fire area may not meet Forest Plan VQO's, a project-specific Forest Plan amendment would be necessary until post-fire regrowth obscures stumps, skid trails, and other impacts of the proposal.

The proposed Beartooth Front Storm Damage Clean-up and Fuels Reduction - West Fork project is designed under the requirements of HFRA and for the purpose of responding to the 10-year Comprehensive Strategy, focusing on reducing wildfire risk to communities, municipal water supplies, and other at-risk lands. This proposal concurrently addresses identified hazards and vulnerabilities described in the Carbon County CWPP/PDM, and City of Red Lodge Growth Policy.

The Beartooth Front Storm Damage Clean-up and Fuels Reduction – West Fork project is not intended to nor can completely prevent wildfires in the West Fork area. These are fire-dependent ecosystems comprised primarily of even-aged timber stands. Many of these stands are at an age when they would, under natural conditions, burn in a high severity stand-replacing wildfire. This situation has been exacerbated by down fuels created by the 2007 wind event. The Cascade fire changed conditions by burning much of the West Fork area damaged by the 2007 wind event. The Cascade fire added to available fuels that will likely increase the re-burn risk within five to ten years as it is estimated that burned trees will be prone to complete mortality and begin to unravel through wind throw and snow damage (Appendix A). The lack of access roads, tendency for high winds, short burning condition windows, and continuous fuels in these areas can make fuels treatments using prescribed broadcast burning or wildland fire use very expensive and oftentimes not physically possible. Proposed mechanical treatments may create thinned areas from which future prescribed burning, wildland fire use, and/or fire suppression tactics could be implemented.

There will be additional human- and lightning-caused wildfires in the project areas. Dependent upon weather and other conditions, wildfires in these areas could grow large and suppression may not be immediately possible. Rather than attempt to treat fuels across large landscapes, proposed activities are focused on treatments in specific and strategic areas where such treatments would likely be most effective at improving public and firefighter safety and improving the ability to suppress fires. Proposed fuel reduction units are connected to existing fuel breaks, such as roads, talus slopes, meadows, and other openings in vegetation. A variety of treatments are proposed to create fuel breaks along West Fork Road # 2071 and adjacent to the Forest boundary. Given that a high percentage of recent fires in the area have been started due to human activities, fuels reduction is focused on the areas most used by the public, such as near roads and developed recreation facilities with storm damage. When (not "if") wildfires start in the project areas, proposed fuels treatments are designed to improve the ability of firefighting personnel to suppress wildfires, protect infrastructure, use existing roads as fire control lines, and increase effectiveness of aerial fire retardant use. Proposed fuels treatments are also designed to approve the ability of firefighting personnel and the public to leave the areas in the event that a wildfire cannot be safely suppressed.

It is estimated that there are thousands of acres of November 2007 wind damage on the Beartooth District. It is important to note that the majority of the wind damaged areas are not proposed for treatment due to wilderness designation, steep terrain, lack of merchantable timber products, and lack of access roads. Proposed removal of dead, wind-damaged, and beetle infested trees is a treatment that would help reduce local beetle populations and prevent further mortality within and immediately adjacent to specific treatment areas. Proposed treatments are intended to improve resistance to beetle infestation potential in specific areas, not at the landscape level. Timing is critical since treatment activities must take place before adult beetle flight occurs and the insect spreads to different sites (Samman and Logan 2000). Weather over the next few years will likely be largest determining factor as to whether a bark beetle infestation occurs along the Beartooth Front (Gibson 2008).

Proposed Action

In January 2008, the Forest Service proposed fuels reduction and storm damage clean-up across 109 acres in the Benbow area, 1070 acres in the West Fork Rock Creek area, and 238 acres in the Main Fork Rock Creek area. Following the 2008 Cascade Fire, the Forest Service modified proposed treatments in the West Fork Rock Creek to address post-fire hazard tree and fuels needs. In response to public comment, and Forest Service Interdisciplinary Team recommendations and to better address the project purpose and need, the Responsible Official has modified the West Fork proposed action to:

- Not include previously proposed fuel reduction and removal of storm damaged trees in the Benbow and Main Fork Rock Creek areas. Environmental analysis has been completed for these areas under a separate decision. Contracts for treating these areas are pending and on-the-ground work should begin in Spring 2009.
- Include specific treatments to remove hazard trees and reduce fuel loads in areas burned by the Cascade fire.
- Allow for personal use firewood harvest in burned areas in designated areas only.
- Specify fuels objectives for each treatment type.
- Include fuels reduction that also improves wildlife habitat.
- Include specific design criteria to eliminate or minimize environmental effects.

- Include a project-specific Forest Plan amendment for VQO's in burned treatment areas.

The modified proposed action is the Action Alternative that is considered for this environmental analysis. The Action Alternative would meet the purpose and need by removing hazard trees and reducing fuels across 935 acres in the West Fork Rock Creek area. A full description of the Action Alternative is provided below.

Decision Framework

The Responsible Official for this proposal is Mary Erickson, the acting Custer National Forest Supervisor. The Responsible Official considered comments submitted regarding the project. The Responsible Official will decide whether and how to meet the Purpose and Need in the West Fork Rock Creek and document this decision in a Decision Notice. The Responsible Official will decide whether to implement the proposed action alternative, a modified action alternative, or the No-action alternative. If an action alternative is selected, it will include:

- The location, design, and scheduling of proposed hazard tree removal and fuel reduction on National Forest Lands in the West Fork Rock Creek area, if any;
- Design features, mitigation measures, and monitoring requirements.

Public Involvement

The proposal has been listed in the CNF's Schedule of Proposed Actions since April 2008. A proposal including treatments in the West Fork Rock Creek, Main Fork Rock Creek, and Benbow area was provided to the public and other agencies for comment from January 25 to February 25, 2008. Comment period and public meeting notification were provided via a legal advertisement published in the Billings Gazette newspaper on January 29, 2008 and news releases sent to several area and regional newspapers. Approximately 200 letters describing the proposed action and asking for comment were mailed or e-mailed to individuals, agencies, groups, and Forest Service permit holders that could be potentially affected by or interested in the proposal. The Beartooth District Ranger presented project information to the Red Lodge City Council and Carbon County Commissioners. Public collaboration meetings were held on January 30 in Nye and on February 6 and 19, 2007 in Red Lodge. A total of 17 responses to these project collaboration and public comment efforts were received in response to winter 2008 public involvement and collaboration (see project record).

Following the Cascade Fire, the West Fork proposal was modified and made available for public review and comment from November 4, 2008 to December 6, 2008. Approximately 200 letters describing the proposed action and asking for comment were mailed or e-mailed to individuals, agencies, groups, and Forest Service permit holders that could be potentially affected by or interested in the proposal. Comment period and public meeting notification were provided via news releases sent to area and regional newspapers. Project information was presented to the Red Lodge City Council and the Red Lodge City/ Carbon County Fire Chief. A public collaboration meeting was held on December 3, 2008 in Red Lodge. A total of 16 responses to these winter 2008 project collaboration and public comment efforts (see project record).

Using the comments received, the interdisciplinary team developed a list of issues to address.

Issues

Issues were identified through content analysis of public comment received during the project comment periods, Interdisciplinary Team discussion, and legal requirements. The Forest Service separated the issues and comments into two groups:

- **Key Issues** are significant issues that drive project design, identify additional project needs, or result in a specific monitoring or mitigation measure.
- **Comments for Analysis** are non-significant issues identified from comment to be analyzed to display effects of the project.

Eight topics raised during scoping and public comment were identified as Key Issues that relate to proposed activities in the West Fork Rock Creek area (Table 1). An Indicator was developed for each Key Issue to measure or describe effects of proposed activities. Twenty-four Comments for Analysis were identified to display effects of the project (Table 2). Other comments were dismissed from further analysis because they were either 1) beyond the project's scope; 2) a request that would not address the project's purpose and need; 3) already decided by law, regulation, Forest Plan, or other higher level decision; 4) irrelevant to the decision to be made; 5) not related to the project's effects; 5) conjectural in nature or not supported by scientific evidence; or 6) the magnitude, extent, duration, speed, and direction of preliminary effects were determined to be non-significant. The CEQ NEPA regulations require this delineation to "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

Table 1. Key Issues.

Number	Key Issue	Indicators
1	Effects to visual resources, particularly visual appearance around recreational residence cabins and compliance with Forest Plan Visual Quality Objectives.	Consistency with Forest Plan Visual Quality Objectives (VQO's).
2	Effectiveness of fuels treatments in decreasing fire risk and improving firefighter and public safety.	Qualitative and quantitative change in future fire behavior within the treatment areas based on modeling results
3	Effects of project implementation (including road closures) to summer and winter recreational users (including effects to recreational residence permit holders and potential for future off-road or camping use of skid trails and landings).	Consistency with applicable Forest Plan recreation goals, objectives, and standards.
4	Identification of a need for commercial and personal forest product harvest opportunities, including sawlogs, houselogs, firewood, and post and poles.	Qualitative descriptions of existing and predicted harvest opportunities disclose project effects to commercial and personal use forest product harvest opportunities.
5	Effects to water quality, including adequacy of streamside woody debris retention.	Equivalent clearcut area acres (ECA); qualitative discussion of effects to water

		yield, sedimentation, and channel and floodplain function.
6	Effects to fisheries, including adequacy of streamside woody debris retention.	Potential for riparian, streambank stability and large woody debris related effects to aquatic species and habitat. Units of measure utilized to display effects are ECA, number of stream crossings, and miles of new or temporary roads.
7	Effects of project implementation to noxious weed proliferation and post-project weed monitoring needs.	Noxious weed risk assessment rating.
8	Effects to snag habitat and snag associated species.	Average minimum number of snags retained per acre at the stand level.

Table 2 – Comments for Analysis.

Number	Comments for Analysis
1	Effects of project activities to subdivisions adjacent to the Forest boundary.
2	Effects of logging truck traffic and associated safety concerns.
3	Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging.
4	Effects to moose.
5	Concern about project implementation causing fire starts.
6	Identification of a need for interpretive education associated with project.
7	Effects of project implementation to the West Fork Road.
8	Effects of increased cabin visibility to cabin vandalism.
9	Effects of thinning to future timber stand wind damage potential.
10	Effects of future regeneration to fuel loading and fire risk.
11	Effects to wildlife habitat diversity
12	Effects to old growth habitat and species.
13	Effects to MIS.
14	Effects to Sensitive wildlife species.
15	Effects to pine marten.
16	Effects to lynx.
17	Cumulative effects of proposal and historic timber harvest.
18	Effects to beetle infestation levels.
19	Project compliance with National Historic Preservation Act & request to work with Carbon County Historic Preservation Officer
20	Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations.

Number	Comments for Analysis
21	Impacts to air quality and suggestion to use mastication instead of prescribed burning.
22	Effects of project on climate change
23	Effects of project to soil productivity and compliance with Region 1 Soil Quality Standards
24	Effects of project to "un-inventoried" and inventoried roadless areas.

COMPARISON OF THE NO-ACTION AND ACTION ALTERNATIVES

This section describes and compares the alternatives considered for the Beartooth Front Storm Damage Clean-up and Fuels Reduction – West Fork project. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. As recommended by the CEQ (Connaughton 2002), the No-action is presented to contrast the impacts of the proposed action with the current condition and expected future condition in the absence of the Action Alternative.

Alternatives

No-action Alternative

No-action

Under the No-action alternative, current management plans would continue to guide management of the project area. No hazard tree removal, fuels reduction, or additional storm-damage clean-up activities would be implemented to accomplish project goals.

The Proposed Action

The actions proposed by the Forest Service to meet the purpose and need would remove hazard trees, reduce fuels, and clean-up storm damage across approximately 935 acres in the West Fork area (Figures 6 and 7, Table 3). No activities are proposed in the Absaroka-Beartooth Wilderness, parklands, prime farmlands, wild and scenic rivers, or ecologically critical areas. Descriptions of Treatment Type Numbers are provided in Table 4. Proposed treatments for individual units vary from simple single prescription treatments to more complex multiple prescription treatments. In all units, potentially hazardous burned trees that could fall on Forest visitors, roads, recreation sites, and infrastructure would be cut and either removed or left on the ground. All units would have prescribed amounts of slash remaining. This slash would either be left on the ground or a grapple type skidder would be used to haul back and spread out this material from the landing to meet the desired 7 to 9 tons per acre of coarse down woody material, to provide a future seed source, seedling protection, and/or to provide erosion prevention. There would be no retained down wood within 30 feet of buildings and cabins and 1 to 3

tons less than 3 inches diameter from 30 to 100 feet. All slash and woody debris pile burning would occur under prescribed conditions under an approved burn plan.

Table 3. Proposed West Fork treatment units.

Unit #	Acres	Burned in Cascade fire?	Proposed Treatment Category and Treatment Type Numbers	Opportunity for Merchantable Products[1]	Proposed Treatment Methods
1	33	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine
2	20	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12, 20	Yes	Hand and/or Machine
3	27	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12, 20	Yes	Hand and/or Machine
4	19	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4, 7	Yes	Hand and/or Machine
5	13	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 7, 12, 20	Yes	Hand and/or Machine
6	14	No	**Hazardous Fuels Thinning –** 2, 3, 7, 8, 16, 20	Yes	Hand and/or Machine
7	15	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 7, 12, 20	Yes	Hand and/or Machine
8	21	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine
9	19	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12, 20	Yes	Hand and/or Machine
10	5	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4, 7	Yes	Hand and/or Machine
11	2	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12, 20	Yes	Hand and/or Machine
12	2	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12/13, 20	Yes	Hand and/or Machine
13	26	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 7, 12, 20	Yes	Hand and/or Machine
14	6	No	**Hazardous Fuels Thinning –** 2, 3, 8, 16, 20	Yes	Hand and/or Machine
15	3	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine
16	3	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12, 20	Yes	Hand and/or Machine
17	5	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine
18	6	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 7, 12, 20	Yes	Hand and/or Machine
19	6	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine

Unit #	Acres	Burned in Cascade fire?	Proposed Treatment Category and Treatment Type Numbers	Opportunity for Merchantable Products[1]	Proposed Treatment Methods
20	2	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12	Yes	Hand and/or Machine
21	2	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine
22	96	Yes	**Post Burn Fuels Treatment –** 1, 2, 3, 4, 12, 20	Yes	Hand and/or Machine
23	2	Yes	**Post Burn Fuels Treatment -** 1, 2, 3, 4	Yes	Hand and/or Machine
24	2	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 10, 12, 14, 15, 16, 20	Yes	Hand and/or Machine
25	3	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 10, 12, 14, 15, 16, 20	Yes	Hand and/or Machine
26	3	No	**Hazardous Fuels Thinning –** 2, 3, 9	No	Hand
27	2	No	**Hazardous Fuels Thinning –** 2, 3, 9	No	Hand
28	1	No	**Hazardous Fuels Thinning –** 2, 3, 9	No	Hand
29	5	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 10, 12, 14, 15, 16, 20	Yes	Hand and/or Machine
30	17	No	**Hazardous Fuels Thinning –** 2, 3, 8	Yes	Hand and/or Machine
31	8	No	**Hazardous Fuels Thinning –** 2, 3, 8	Yes	Hand and/or Machine
32	25	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 10, 12, 14, 15, 16, 17, 20	Yes	Hand and/or Machine
33	13	No	**Hazardous Fuels Thinning –** 2, 3, 8, 16, 17, 20	Yes	Hand and/or Machine
34	9	No	**Hazardous Fuels Thinning –** 2, 3, 8	Yes	Hand and/or Machine
35	77	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 10, 7, 12, 14, 15, 16, 17, 18, 20	Yes	Hand and/or Machine
36	3	No	**Hazardous Fuels Thinning –** 2, 3, 9	No	Hand
37	64	No	**Hazardous Fuels Thinning –** 2, 3, 10, 17	Yes	Hand and/or Machine
38	6	No	**Hazardous Fuels Thinning –** 2, 3, 8, 16, 20	Yes	Hand and/or Machine
39	3	No	**Hazardous Fuels Thinning –** 2, 3, 8	Yes	Hand
40	61	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 7, 10, 12, 14, 15, 16, 20	Yes	Hand and/or Machine
41	54	No	**Hazardous Fuels Thinning –** 2, 3, 10	Yes	Hand and/or Machine
42	16	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 8, 12, 15, 16, 20	Yes	Hand and/or Machine
43	51	No	**Hazardous Fuels Thinning –** 2, 3, 8	Yes	Hand and/or

Unit #	Acres	Burned in Cascade fire?	Proposed Treatment Category and Treatment Type Numbers	Opportunity for Merchantable Products[1]	Proposed Treatment Methods
					Machine
44	29	No	**Hazardous Fuels Thinning –** 2, 3, 4, 5/6, 10, 12, 14, 15, 16, 20	Yes	Hand and/or Machine
45	5	No	**Hazardous Fuels Thinning –** 2, 3, 8	Yes	Hand
46	3	No	**Hazardous Fuels Thinning –** 2, 3, 17	No	Hand and/or Machine
47	3	No	**Hazardous Fuels Thinning –** 2, 3, 17	No	Hand and/or Machine
48	1	No	**Hazardous Fuels Thinning –** 2, 3, 17	No	Hand and/or Machine
49	2	No	**Hazardous Fuels Thinning –** 2, 3, 17	No	Hand and/or Machine
50	39	No	**Hazardous Fuels Thinning –** 2, 3, 19	Yes	Hand and/or Machine
51	42	No	**Hazardous Fuels Thinning –** 2, 3, 7, 8, 17	Yes	Hand and/or Machine
52	41	No	**Hazardous Fuels Thinning –** 2, 3, 11, 17, 19	Yes	Hand
	935	**Total Unit Acres**			

[1]Merchantable products may include firewood (personal use, commercial), post and poles, sawlogs, house logs, boughs or other material suitable for marketing.

Table 4. Proposed West Fork treatment descriptions.

Proposed Treatment Type Number	Proposed Treatment Description
1	**Fuels Slashing.** Fell all fire damaged trees (meeting any specific design criteria for retention trees, stump heights and safety concerns) and lop/buck as necessary to pile. Slash would be left on site to naturally decompose. Tree boles 6" and greater would be cut to 6 foot lengths and all slash would be lopped to be within 18 inches of the ground.
2	**Hand or Machine Pile** down to desired fuel loads. Hand piles should be compact, maximum 8 feet high, 6 to 8 feet in diameter, and 10 to 15 feet from live trees or identified snags to minimize damage to retained trees. Machine piles should be compact a minimum 20 feet from live trees, utilizing openings or clearing small openings and limited in height to minimize damage to live trees or identified snags. Small openings may be created to accommodate piles and reduce any tree mortality during pile burning.
3	**Pile Burn.** When weather and fuel conditions allow, piles would be burned.
4	**Natural Regeneration.** A new stand of trees would be established from the onsite seedbed

Proposed Treatment Type Number	Proposed Treatment Description
	and seed trees.
5	**Site Preparation.** Machinery would be used to expose 15 to 30% bare mineral soil to ensure favorable conditions for adequate seedling establishment.
6	**Site Preparation.** Prescribed burning (pile burning) would be used to expose 15 to 30% bare mineral exposure to ensure favorable conditions for adequate seedling establishment.
7	**Infrastructure Fire Protection.** Around facilities (recreation residences or campground facilities) all combustible material would be removed within three feet of buildings. All trees and down woody material would be removed in the first 13 feet. From 13 feet out to 30 feet, trees would be thinned to 10 feet between crowns; limbs would be pruned up to 15 feet or 1/3 the total live crown height, surface vegetation would be maintained at 3 inches or less, and all down woody surface fuels would be removed. From 30 feet to 100 feet from the buildings, trees would be thinned to 10 feet between crowns, limbs pruned to 15 feet or 1/3 total live crown height, and woody fuel more than 3 inches in diameter removed. From 30 to 100 feet, 1 to 3 tons of down fuel in the < 3 inch size class would be retained and no fuels in the larger than 3 inch size class.
8	**Type 1 Fuels Thinning/Slashing.** Selective tree cutting would thin from below to remove ladder fuels and retain a 10 foot crown spacing (approximately 20 to 30 feet tree bole spacing in trees greater than 5" diameter at breast height (dbh) and 15 to 25 feet in trees less than 5" dbh).
9	**Type 2 Fuels Thinning/Slashing.** Selective tree cutting and slashing would remove storm damaged material (wind thrown, uprooted and standing trees that have broken tops, major bole damage or are leaning). Live trees would be cut to thin from below and retain a12 to 20 feet tree bole spacing.
10	**Type 3 Fuels Thinning/Slashing.** Storm damaged material (wind thrown, uprooted and standing trees that have broken tops, major bole damage or are leaning) would be slashed. Live trees would be cut to thin from below to remove ladder fuels and retain a 10 foot tree crown spacing (approximately 20 to 30 feet bole spacing in trees greater than 5" dbh and 15 to 25 feet in trees less than 5" dbh).
11	**Type 4 Fuels Thinning/Slashing.** Thin from below up to 8 inches dbh to create a more open stand to enhance winter elk range.
12	**Fire Salvage.** Fire damaged merchantable products would be cut and removed. **Clearcut.** In unburned treatment units, all trees would be removed on up to 10% of the area for stand replacement and within stand diversity. Individual opening size would not exceed 2 acres.
13	**Fire Salvage.** Fire damaged merchantable products would be cut and removed. Individual trees or groups of trees that are not expected to die from fire damage would be retained.
14	**Salvage.** Storm damaged trees (wind thrown, uprooted, and standing trees that have broken tops, major bole damage or are leaning) would be cut and removed.
15	**Liberation –** In previously harvested or disturbed stands (approximately 10% of area) overstory trees would be removed to free sapling trees from competition. Understory trees would be thinned out to approximately 12 to 20 foot bole spacing.
16	**Commercial Thin –** Trees would be cut to thin from below to remove ladder fuels and

Proposed Treatment Type Number	Proposed Treatment Description
	create a 10 foot tree crown spacing (approximately 20 to 30 feet bole spacing in trees greater than 5" dbh and 15 to 25 feet in trees less than 5" dbh).
17	**Aspen Treatment** – In decadent aspen areas, all conifers and aspen would be cut. In healthy aspen areas, all conifers would be cut.
18	**Willow Treatment –** All decadent willows would be cut by hand to rejuvenate and re-sprout this area. Half of the area would be fenced for protection from browsing animals.
19	**Conifer Colonization Treatment –** For big game winter range improvement, all conifers would be cut in sagebrush areas. Cut materials would be felled and lopped and bucked as needed to pile.
20	**Whole Tree Log.** Non merchantable material would be removed and piled down to desired fuel loads. Slash would be left on site - tree boles 6" and greater would be cut down to 6 foot lengths and all slash would be cut down to an 18 inch slash height above the ground.

Tree removal could begin as early as summer 2009 and continue for up to 5-10 years as timber is sold under contract and/or as funding becomes available to treat areas with lesser amounts of merchantable timber. All work would be dependent upon the timber market and/or availability of funding. Piles would be burned under prescribed conditions under an approved burn plan. Prescribed burning could take several years depending on burning factors like fuel moisture, weather conditions, etc.
Due to variability in wind damage, topography, equipment operability considerations, streamside management zones, and current road locations, treatments would vary within each unit.

Per Forest Plan standards (page 14), because it has been determined that, under the proposed action, retention VQO would not be met in burned portions of MA F and MA R (see Appendix B, Visuals Specialist Report), the proposed action includes a project specific Forest Plan amendment. The Forest Plan would be amended as follows:

> In areas that were burned by the 2008 Cascade fire and within 300 feet of West Fork Rock Creek Road #2071, the Visual Quality Objective (VQO) will be modification for approximately three years and partial retention VQO for an additional seven years after Beartooth Front Storm Damage Clean-up and Fuels Reduction Project activities are completed in the West Fork Rock Creek. Ten years after project activities are completed, the VQO will be retention and partial retention.

Appendix M provides further detail regarding this proposed Forest Plan amendment and its significance.

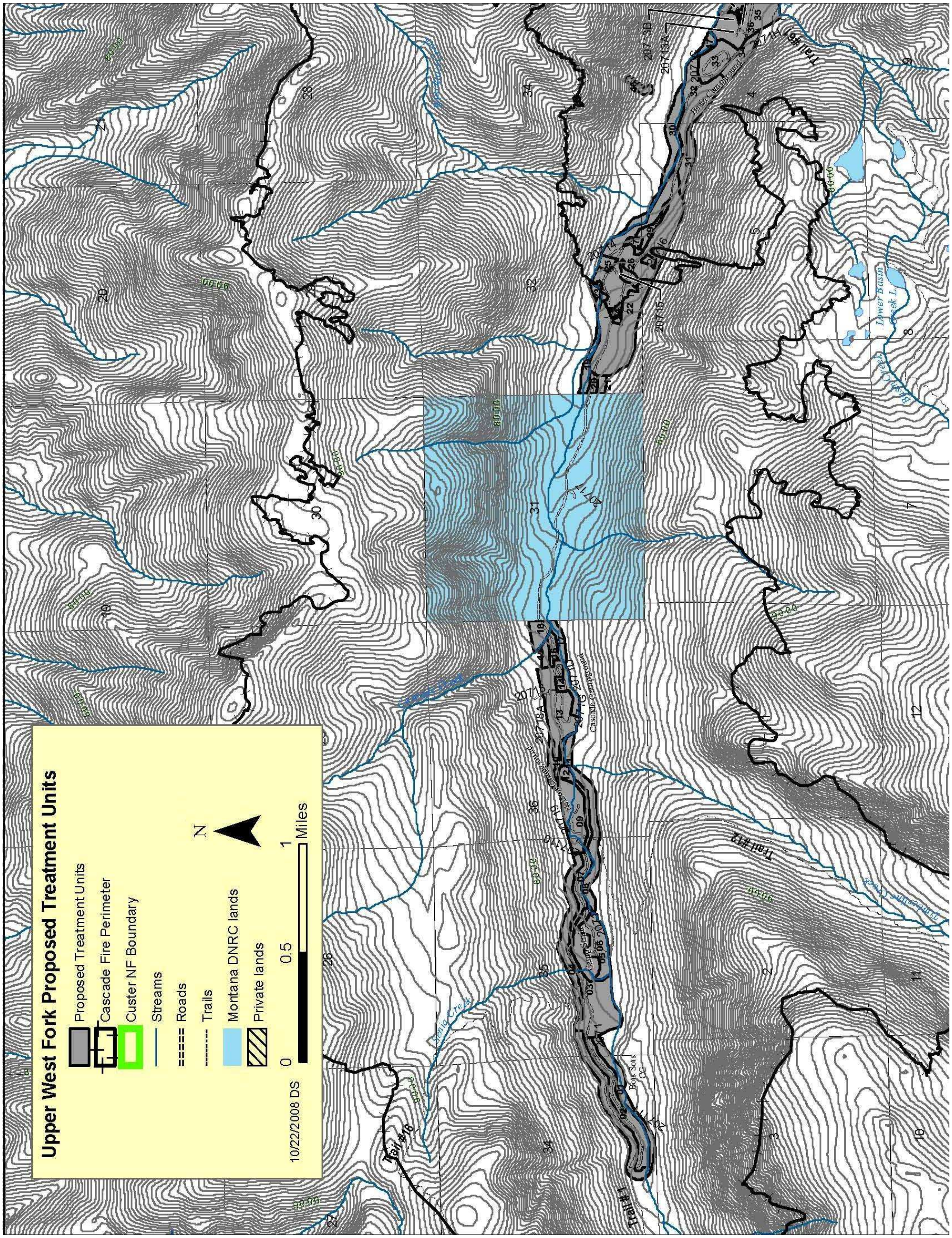

Figure 6. Map of proposed units – Upper West Fork area.

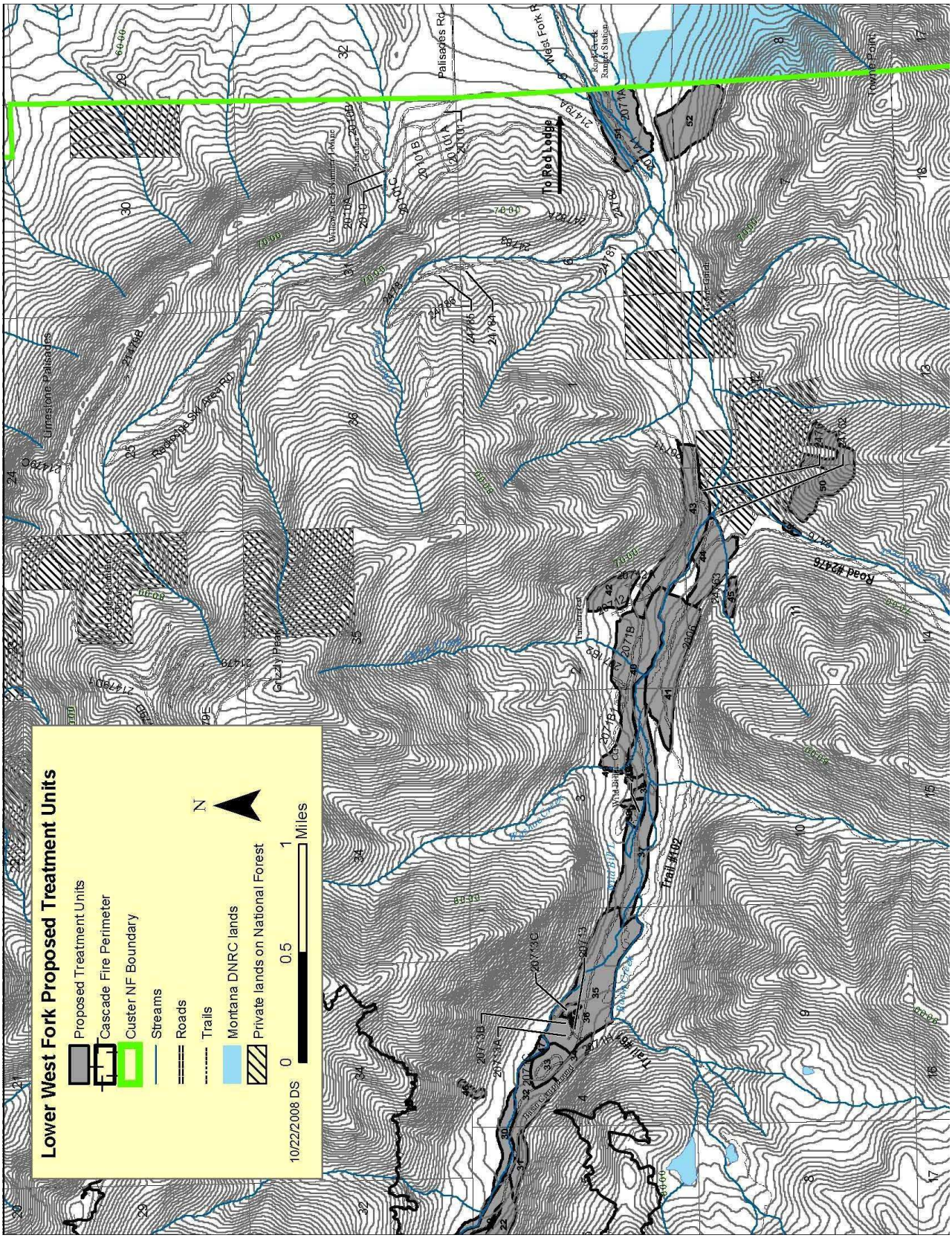

Figure 7. Map of proposed units – Lower West Fork area.

Action Alternative Design and Mitigation Measures ____

In response to public comments on the proposal, design and mitigation measures in Table 5 were developed to address Key Issues and to ease some of the potential impacts the action alternative may cause. These measures also address some concerns identified as Comments for Analysis and ensure compliance with applicable law, regulation, and policy. The measures in Table 5 are included as part of the Action Alternative.

Table 5. Action Alternative Project Wide and Site Specific Design & Mitigation Measures.

Potential Concerns	Design features included in proposal
Impacts of personal use firewood harvest to soils, water quality, visual quality, and wildlife habitat.	To protect resources, the Cascade fire area has been closed to personal use firewood cutting. Where trees in the Cascade fire area are not sold under contract, areas burned by the fire would be opened to personal use firewood harvest with specific design features. These same design features would apply to all non-commercial units burned by the fire. Design features for personal use firewood harvest would be: • Personal use firewood cutting would occur only in designated units during designated times of year. Once cutting is completed in the designated unit(s), an additional unit would be designated. • Designation would occur through marking personal use firewood areas with tree-marking paint, flagging, and/or signs. Additional signs indicating all other burned areas are off-limits to firewood harvest would be placed along West Fork Road #2071. • No personal use firewood cutting would occur within 100 feet of streams. • No personal use firewood cutting would occur on steep slopes (>35%) between West Fork Road #2071 and the West Fork Rock Creek. • Off-road vehicle/ATV travel for firewood retrieval in burned areas would occur only on identified routes within personal use firewood cutting units. Forest Service personnel would identify and mark such routes prior to designating areas for cutting. Designated retrieval routes would be either existing system and non-system roads. • Firewood cutters would be required to lop and scatter slash so that it is not placed in roads, road cutslopes and ditches, and streams. • To protect wet meadows and drainages, no personal use firewood or post/pole cutting would occur in unit 9.
Effects to recreational users.	Routes or access points used in the treatment of units in the West Fork of Rock Creek where the routes or dispersed recreation sites are identified for closure in the Beartooth Travel Plan (USDA 2008d) would be rehabilitated and physically blocked off at the end of the project. Signing, news releases and field level contacts to inform and educate the public regarding dispersed recreation opportunities or restrictions would form the basic plan to raise public awareness. Interpretive education efforts focusing on forest health, fuel reduction and minimum impact camping would raise public awareness to the goals and objectives of the proposed project and management standards for the area.

Potential Concerns	Design features included in proposal
	Mitigation measures during the summer use season to minimize impacts would include: Allow for utilization of roads, trails, developed recreation sites, dispersed recreation sites, outfitted or guided activities, access to recreation residences and public access in the project areas to the extent possible while not compromising safety of the public or workers. Operations would be limited to weekdays to minimize impacts and avoid higher use of the area by recreation users on the weekends unless the work could occur without risk to the public. Limiting operations and log hauling to week days whenever possible would reduce impacts to adjacent land owners during evening hours and weekends. Special orders closing operating areas to the public Monday – Friday during project activities would be implemented for public safety when necessary. During the winter use season from December 1st to April 15th on the West Fork of Rock Creek would maintain the road to the end of the project area to provide weekend access for winter recreation users from that point on up the road. A mitigation measure for loss of winter trail grooming would temporarily permit winter trail grooming in the Main Fork of Rock Creek during project implementation in the West Fork of Rock Creek. A mitigation measure for recreation residences to address visibility concerns related to vandalism would be to work with home owners collaboratively when identifying trees for treatment around the homes. The operator would be required to reclaim or repair impacts to roads, trails, or routes. In units 35, 37, 41, and 44, tree removal or thinning along Silver Run National Recreation Trail #102 and #102A, cross country ski trail loops, and Silver Run Road # 2006 would occur so as to better accommodate future cross-country ski trail grooming. This would be accomplished by concentrating thinning along existing ski trails and utilizing these trails for travel corridors for implementation equipment when possible.
Effects to water quality.	Apply State of Montana Best Management Practices for Forestry (DNRC 2002) (available online at http://dnrc.mt.gov/forestry/Assistance/Practices/Documents/2001WaterQualityBMPGuide.pdf). Comply with State of Montana Streamside Management Zone (SMZ) rules (ARM 2007), These are available online at http://data.opi.state.mt.us/bills/mca_toc/77_5_3.htm). In order to meet SMZ retention requirements within the fire area, where West Fork Road #2071 is within the SMZ: • All trees leaning towards the stream would be retained, • Only hazard trees within one tree length leaning towards the road would be removed, • Dead non-commercial material would be lopped and scattered, and • Where less than 10 trees per 100 linear feet remain standing within SMZ's, an alternative practice will be applied for through MTDNRC.

Potential Concerns	Design features included in proposal
Effects to water quality.	In units 02, 03, 09, 13, 18 and 22: • No treatment would occur in SMZs. • Treatment in areas adjacent to SMZs would occur only under frozen or dry conditions. • All skid trails upslope of SMZs would be heavily slashed or mulched to roads/landings in lieu of constructing waterbars. The following would be applied for treatments within all other fire salvage units: • No treatment would occur in SMZs. • All skid trails upslope of SMZ to roads/landings would be covered with slash or mulch in lieu of constructing waterbars, unless surface is >50% rock. • Any excess tops not used for slashing skid trails would be left within treatment units for 50' upslope from SMZ, unless surface is >50% rock. Log landings would be located on uphill side of roads where feasible. All landings would be placed on high ground versus swales or flow concentration points. Locations with high surface rock content downslope would be favored. Site reclamation and monitoring at log-landings and burn pile locations would be required. If fuel treatments involve mechanical equipment operation adjacent to SMZs and winter operations do not occur over snow, there would be no equipment operations in SMZs and equipment operation elsewhere only under dry conditions. All major equipment tracks would be slashed upslope of SMZ in fuel treatment units. Fuel and equipment storage standards and a spill containment and reporting plan would be required for mechanized equipment use.
Effects to air quality	Pile burning would be conducted under an approved burn plan in compliance with State air quality requirements.
Effects to wildlife.	All project workers, contractors, etc. would comply with the Grizzly Bear Food Storage order. Active treatment areas would be inspected for the presence of active ruffed grouse nests and drumming logs. If any are found, individuals implementing the activity will stop work within 300 feet of the nests or drumming logs until July 1. If an active raptor nest is found during unit layout, it would be protected and buffered from planned activities. If an active goshawk nest is discovered within a stand prior to or during treatment activities work would be halted and the wildlife biologist would be notified immediately to determine steps to resolve the situation, maintain habitat, and minimize human disturbance. Steps would include maintaining habitat specific for Northern goshawk (e.g., crown cover, snags, interlocking tree crown patches) over the long term.

Potential Concerns	Design features included in proposal
Effects to wildlife.	Management activities within ¼ mile (125 acres) of any known goshawk nest would be restricted from March 1 through August 31 to reduce potential human disturbance during the breeding/nesting period. An exception may be made if surveys confirm that goshawks are not nesting or within the area. A wildlife biologist may fit the acreage zone or polygon to the topography to best reduce potential human disturbance around the nest. To promote aspen clone vigor and improve wildlife habitat by reducing overtopping competing conifers, existing aspen clones within the proposed treatment areas would be treated to remove all coniferous trees within one conifer tree length from the aspen. If fawns and/or calves are found in active treatment units from the third week of May through the first week of July, individuals implementing the activity (Forest Service/contractor) would coordinate options with the project leader or District wildlife biologist to work in other areas within the vicinity until the young are removed from the area. To comply with Forest Plan Lynx standards, no pre-commercial thinning would be allowed to occur in mapped potential lynx habitat within the project area (USDA 2007). To maintain hiding cover, the small unburned area immediately southwest of the West Fork Trailhead parking area in the west end of Unit 1 would not be treated.
Effects to snag habitat	In burned treatment areas (Table 3), the following would be applied: • At the stand scale (a stand may include areas outside proposed treatment areas) an average of at least 5-10 snags/acre would be retained where available. • Snags retained would be greater than or equal to 12" diameter, greater than 75 feet from roads and/or private property, and would not pose a safety hazard during project implementation. • Leave largest snags available. • Leave Douglas fir when available. • Snags within the SMZ may count towards the snag retention number. • Snags retained outside the SMZ should be left in clumps when possible. In unburned treatment areas (Table 3) (except units 46, 47, 48, 49, 50, 51, and 52 and aspen portions of 29, 32, 33, 35, 37, and 52) the following would be applied: • At the stand scale (a stand may include areas outside proposed treatment areas) an average of at least 5-10 snags/acre would be retained where available. • Snags retained would be greater than or equal to 12" diameter, greater than 75 feet from roads and/or private property, and would not pose a safety hazard during project implementation. • Leave largest snags available. • Leave Douglas fir when available. In treatment units 46, 47, 48, and 49 and aspen portions of 33, 37, and 52, all aspen snags

Potential Concerns	Design features included in proposal
	that are not a safety hazard during project implementation would be retained. In treatment units 50, 51, and 52, all snags that are not a safety hazard during project implementation would be retained.
Effects to archaeological resources.	Treatment areas would be inventoried prior to any ground disturbance and locations/operations would be adjusted to ensure no impacts occur and/or so that treatments address concerns over potential fuel loading or effects of future wind damage at heritage resource sites.
Effects to Inventoried Roadless Areas	While portions of proposed hazard tree removal and fuel reduction treatments are in Inventoried Roadless Areas, proposed treatments would occur near and adjacent to existing roads and facilities. No new permanent roads or facilities would be constructed.
Effects to visual resources.	Due to the need for hazard tree removal, the Retention VQO would not be met and a Forest Plan amendment would be included as part of the project. Treatments would include varying spacing between trees and varying the size of trees retained in high-visibility areas, such as areas adjacent to roads, campgrounds and other recreation sites. Feather edges of fuel reduction areas to meet partial retention VQO requirements. In unburned areas where terrain allows, stumps would be flush cut in high visibility areas, such as areas adjacent to roads, campgrounds and other recreation sites. If terrain makes this infeasible, stumps would be cut as low as possible. Where available, some isolated unburned trees would be retained between and near lease cabins and campground campsites to provide screening, shade, and privacy. Where possible, outer unit boundaries would be tied to natural landform and vegetation edges.
Effects to soil quality and site productivity.	Timber harvest equipment operation areas, such as corridors, skid trails, and log landings, would be located in a manner that minimizes disturbance and impact to the ground. Timber harvest equipment would be operated only when soils are dry or when soils are frozen and covered with snow. If log landings are constructed, top soil material would be salvaged, stockpiled and replaced at the end of the project. These areas would be scarified and mulched at the completion of the project. If logging over snow is not an option, equipment operations on and cable corridors in burned soils would be mulched with fine organic material and larger coarse woody debris (3 inches and greater) would also be placed on top of the fine organic mulch. The mulch could be noxious weed free straw mulch or wood mulch from local chipped non-merchantable material. The large material would act as an anchor for the fine material.

Potential Concerns	Design features included in proposal
Effects to soil quality and site productivity.	After approximately 3 to 5 years, the Forest Soil Scientist would determine if adequate revegetation has re-established in burned treatment units and whether this mitigation would still be needed. Approximately 7 to 9 tons per acre of coarse woody material would be retained within treatment units (except within 100 feet of buildings, where no coarse woody material would be retained).
Noxious weed spread.	All project equipment would be washed and inspected for noxious weed seed. Treatment units would be designed to minimize ground disturbance. Areas of ground disturbance would be restored and revegetated. Site reclamation and monitoring would occur with appropriate follow-up treatment of any noxious weeds.
Provide forest products to local communities.	Log decks of non-commercial products would be made available to firewood and post and pole removal. Some post and pole harvest areas would be designated for personal use. Opportunities for commercial firewood harvest would be made available.

Effects Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. Table 6 provides an overall summary of this section of the EA as it relates to Key Issues.

Table 6. Effects comparison summary of Alternatives for Key Issues.

Key Issues	Effects of No-Action Alternative	Effects of Action Alternative
Effects to visual resources, particularly visual appearance around recreational residence cabins and compliance with Forest Plan Visual Quality Objectives.	Would be consistent with Forest Plan goals, standards, and guidelines for visual resources.	Would be consistent with Forest Plan goals, standards, and guidelines for visual resources in unburned areas. Would not be consistent with Forest Plan goals, standards, and guidelines for visual resources in burned areas. A Forest Plan amendment would be required for project implemenation in burned areas.

Key Issues	Effects of No-Action Alternative	Effects of Action Alternative
Effectiveness of fuels treatments in decreasing fire risk and improving firefighter and public safety.	Fuels within the project area would continue to accumulate. Under the current fuel loading and stand conditions, there is potential to have stand replacement fire. Fire behavior would be crown fire with 44.1 foot maximum flame lengths and 344.12 chains per hour (CPH) maximum rates of spread (one chain is 66 feet). In areas not damaged by wind, maximum fire suppression line construction rates would be 15 to 24 CPH for hand crews and engines and 105 to 120 CPH for heavy equipment, such as bulldozers. Maximum line construction rates in wind damaged areas would be 4 to 10 CPH for hand crews and 40 to 55 CPH for heavy equipment.	Thinning would reduce ladder fuels, increase canopy base height and reduce canopy bulk densities. Ignition potential from any source, fire intensity, and fire duration within treatment units would be reduced. In unburned treatment units, fire behavior would be surface fire (rather than crown fire) with 2 foot maximum flame lengths and 6.33 CPH mph maximum rate of fire spread. In unburned treatment units, maximum construction rates for fire suppression line would be 15 to 16 CPH for hand crews and engines and 125 to 145 CPH for heavy equipment. While post-treatment fire behavior in burned areas was not modeled due to a lack of data, reducing fuel loading and fuel continuity should increase firefighter effectiveness and reduce fire behavior.
Effects of project implementation (including road closures) to summer and winter recreational users (including effects to recreational residence permit holders and potential for future off-road or camping use of skid trails and landings).	Reduced recreation opportunities because blown down trees and hazard trees reduce access for recreation in these areas. Would not be consistent with applicable Forest Plan recreation goals, objectives, and standards.	Loss of use or access to recreation opportunities during implementation. In the long-term, removal of the blown down trees would restore and maintain recreational use by dispersing users. Would be consistent with applicable Forest Plan recreation goals, objectives, and standards.

Key Issues	Effects of No-Action Alternative	Effects of Action Alternative
Identification of a need for commercial and personal forest product harvest opportunities, including sawlogs, houselogs, firewood, and post and poles.	No log decks or slash piles would be provided for firewood opportunities. Because personal use firewood harvest in the burned area would not meet Forest Plan VQOs, the Cascade Fire Area would remain closed to personal use firewood harvest.	Log decks and slash piles would be provided for firewood opportunities for a one year period. Forest Plan would be amended to change VQO's. This would allow for extensive personal use firewood harvest in the burned area. Such firewood harvest would be managed through application of mitigations to reduce or eliminate potential environmental effects.
Effects to water quality, including adequacy of streamside woody debris retention.	Existing fire and wind damage may cause short-term increasese in water and sediment yield.	Existing fire and wind damage may cause short-term increasese in water and sediment yield. Low risk of treatments influencing on water and sediment yield. From a cumulative effects watershed scale perspective, the proposed action effects would not be substantially different than the no action alternative.

Key Issues	Effects of No-Action Alternative	Effects of Action Alternative
Effects to fisheries, including adequacy of streamside woody debris retention.	Existing fire and wind damage may cause short-term increasese in water and sediment yield, which could potentially impact aquatic habitats and species adjacent to and downstream of the fire area. May have a negative impact on wild trout populations, nonsensitive native amphibian species, and their habitats as risk to riparian and aquatic environments is expected to remain at current levels or increase.	Existing fire and wind damage may cause short-term increasese in water and sediment yield, which could potentially impact aquatic habitats and species adjacent to and downstream of the fire area. Mitigations and design features would ensure the physical integrity of riparian areas, wetlands, and stream courses and direct mortality of individual aquatic species as a result of this action is expected to low to nonexistent. Tree thinning is expected to reduce high intensity wildfire potential, decrease risk of streambed and bank scour, and allow for faster regeneration on stream banks and riparian buffer areas.
Effects of project implementation to noxious weed proliferation and post-project weed monitoring needs.	The likelihood rating and consequence of noxious weed establishment would be low to moderate.	The likelihood rating and consequence of noxious weed establishment would be moderate.
Effects to snag habitat and snag associated species.	Recommendations in the Northern Region snag management protocol (USDA 2000) would be met.	Recommendations in the Northern Region snag management protocol (USDA 2000) would be met.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the environments of the affected project areas and the potential changes due to implementation of the alternatives as they relate to Key and Analysis issues. It also presents a summary of the scientific and analytical basis for comparison of alternatives presented in Table 6. Additional information specific to each issue or resource area can be found in project Specialist Reports, which are appendices to this EA and are available in electronic version on the Custer National Forest's webpage at: http://www.fs.fed.us/r1/custer/. Printed or electronic copies of Specialist Reports are available upon request. The Environmental Consequences section and related EA appendices also provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. Additional supporting documentation and reference materials are in the Project Record, which is on file at the Beartooth Ranger District and available for public review upon request.

Fuels

Effectiveness of fuels treatments in decreasing fire risk and improving firefighter and public safety is a key issue. The measurement indicator used to display effects of alternatives is qualitative change and quantitative change in future fire behavior within the treatment areas based on modeling results. The Beatooth Front Storm Damage Clean-Up and Fuels Reduction Project Fuels Report (Appendix A) discloses the effects of this project to fuels and potential fire behavior. Following is a brief summary of the report:

Affected Environment

To assess potential fire behavior, proposed treatment areas were assigned fuel models based on current and predicted stand characteristics (Table 7). Most of the West Fork outside of the Cascade fire and proposed treatment areas has substantial ladder fuels from regeneration, with heaviest concentrations in the upper half of the project area. Wind damage and snow damaged tops are prevalent, adding to available ladder fuels. Un-burned forested areas consist mostly of even-aged lodgepole pine which is subject to crown fires. Crown fires are generally considered the primary threat to ecological and human values and are the primary challenges for fire management (Rothermel 1983). Fire behavior and suppression capabilities under existing conditions in the West Fork are described under the Effects of the No-Action Alternative subsection.

There are a number of values at risk due to hazardous fuels within and adjacent to the West Fork of Rock Creek. Red Lodge Mountain Ski area, the city of Red Lodge, and outlying subdivisions at the mouth of the canyon could be impacted by wildfires. There are several buildings on National Forest land along the canyon bottom adjacent to Road #2071 within proposed treatment areas. These include: 31 recreation residences at Camp Senia, 4 recreation residences along Road # 2071, and 34 structures at Timbercrest Girl Scout Camp (Figures 6 and 7). Forest Service infrastructure within the canyon bottom and the project area includes 9 structures at West Fork of Rock Creek Work Center, horse pasture and corrals, 6 trailheads, Cascade campground in the upper canyon, and Basin campground in the lower. Wild Bill Lake, a day use area is also located in the lower end of the canyon. Some structures at

Timbercrest Girl Scout Camp and some of the summer homes have had previous fuels treatment, and may be defendable in the event of a surface fire. Under current conditions, an active crown fire in the unburned east end of the West Fork of Rock drainage could limit access to firefighting and emergency resources to prepare or defend structures. Current fuel loads in conjunction with structure conditions in un-burned areas, could make many structures in the proposed treatment units un-defendable and reduce survivability.

Effects of the No-Action Alternative

In the absence of wildfire or any fuels treatment, fuel loading would continue to increase. Severe fires would be most likely to occur where dead fuels have accumulated. With concentrations of dead fuels, individual trees or groups of trees may torch, and fire could continue through the crowns aided by high winds. No action fire behavior characteristics are detailed in Table 7. Further detail regarding fire behavior characteristics and terminology is in Appendix A.

Table 7. No action alternative modeled fire behavior characteristics in Proposed Treatment Units.

Proposed Treatment Areas Fuel models	Fuel model percent of total proposed treatment area	Fire Type	Rates of fire Spread (Chains/Hour)	Flame Lengths (Feet)	Fireline Intensity (BTU/ft)	Crowning Index (miles per hour)
FM 1	9%	Surface	344.12	8.6	605	n/a
FM 2	2%	Surface	175.99	13.8	1710	n/a
FM 8	44%	Conditional Surface	109.37	44.1	3276	23.3
FM SB2	9%	Passive	98.2	37.9	3080	28
FM SB3	1%	Surface	124.5	19.1	3459	n/a
LP0	35%	Surface	82.2	5.9	n/a	n/a

Predicted fire behavior under extreme conditions along the corridor could preclude direct firefighter initial attack and potentially limit access and egress. Local initial attack forces generally consist of engine crews, handcrews and bulldozers. Under current conditions, fireline production rates in the project area would be slower due to the 2007 wind event and potential windfall from the Cascade fire. Fire line production rates in FM 8 would be 15 to 24 chains per hour (CPH) for crews and engines, and 105 to 120 CPH for equipment (one chain is 66 feet). Fire line production rates in blowdown FM SB2 and FM LP0 would be 4 to 10 CPH for crews and engines, and 40 to 55 CPH for equipment. With the exception of a surface fire in FM 8 and LP0, predicted flame lengths would preclude direct attack by local resources. Potential increase of downed timber due to wind fall and snow damage in burned areas could limit safety zones and escape routes for firefighting and emergency equipment and personnel.

Under the current fuel loading and stand conditions, there is potential to have stand replacement fire. With future regeneration and blowdown of standing (future down) and down burned material, this would create a scenario for another overwhelming hazardous fuels situation with little opportunity for a solution (USDA 2008b). Based on past burn areas with similar landscapes there would be approximately 30 to 100 thousand stems per acre with fuel loading in excess of 100 tons per acre (Figure

5). Probabilities of acres burned infer that, through a single fire event or through cumulative fire events, there is the potential for large areas or portions of the drainages to burn in the next 15 years. Ignitions from human caused fires represent the highest percentage of fire cause in the project area. Road improvements have occurred, and are ongoing in the West Fork of Rock Creek. Road improvements within the project area may increase accessibility to the areas by forest visitors, and thus, increase the annual probability of human caused fires. Effects would be highest where stand replacement high intensity fires occur.

Effects of the Action Alternative

The proposed action would reduce fuels in both burned and unburned areas by removing crowns of standing trees and down and dead fuels within the project area. All treated unburned units would be converted to a FM 8 with an open canopy. Reduced fuel loading in unburned areas would reduce fire behavior. Modeled fire behavior in FM 8 where fuel reduction has occurred would be a surface fire in the project area, with 6.33 CPH rates of fire spread, 2 foot flame lengths, 25 BTU/foot fireline intensity, and a crowning index of 31.3 mph. This should allow for safer egress and access, and increased initial attack efficiency and firefighter production. Post-treatment fire line production rates would be 15 to 16 CPH for crews and engines, and 125 to 145 CPH for equipment. All treated burned units would be converted to a FM LP0. While post-treatment fire behavior in FM LP0 was not modeled due to a lack of data, reducing fuel loading and fuel continuity should increase firefighter effectiveness and reduce fire behavior. It is estimated that to maintain treatment effectiveness in reducing fire behavior, new tree regeneration ladder fuels in treatment units would need to be treated again within 12-15 years.

Prescribed burning of piles would put smoke into the air that could affect the City of Red Lodge. It is expected that residents near the actual burn area might see or smell smoke; however, it is expected that most impacts would be in the form of “nuisance” smoke and/or smell but would meet all the ambient air quality standards established by the Environmental Protection Agency. To limit the potential effects of inversions, the Montana/Idaho State Airshed Group would only allow burns to be conducted when good or excellent dispersion conditions are indicated. Compliance with burning regulations would assure that standards are met.

Structures would be treated using Montana Fire Protection Guidelines for Wildland Residential Interface Development standards (DNRC 1993) to reduce flame impingement and help increase survivability in the absence of suppression resources (Scott 2003, Cohen 1999).

Proposed treatment areas and past timber harvest have and would only change a small portion of the total fuel loads present within the West Fork drainage. The proposed action would reduce the potential for ignitions from any source to result in undesirable effect within the project area. The potential exists for more burning of large acreages within the drainage (Appendix A). The highest percentage of ignitions within the proposed project units are from human causes. Fuels treatments within the West Fork of Rock Creek are proposed in the valley bottom. Proposed treatments would limit fire intensity and duration within the valley, which would be less impactive to riparian areas and soils, and potentially allow these areas to recover faster.

Visuals Resource

A key issue for the Beartooth Front Storm Damage Clean-up and Fuels Reduction Project is the effects to visual resources, particularly the visual appearance around recreational residence cabins and those areas with retention visual quality objective. The analysis indicator and threshold for this issue are the visual quality objectives assigned to the project area by the Forest Plan (USDA 1986). The Visuals Resource (Scenery) Specialist Report (Appendix B) describes the existing condition of the scenic resources within the project area and evaluates the potential effects of the alternatives on scenic resources. Following is a brief summary of that report:

Affected Environment

Immediately after a stand replacing, high burn severity fire, the changes viewed on the landscape are often abrupt, leaving some viewers with a feeling of loss. Over the next few years, visitors may feel that the landscape is very stark until new grasses and shrubs reestablish and begin to soften the effects of the fire. Even though the effects will be softened in the next few years, the form and line of the landscape will be dominated by the vertical line of tree trunks until the trees have fallen and new growth sprouts around them. The landscape aesthetics will improve as changes occur and the effects of the fire will fade with time.

Where the Cascade Fire burned around recreation residences and recreation sites, scorched timber has altered the forested setting, changing the sense of place for permittees, homeowners, and visitors in the area. The desired landscape character, a forested landscape with large, character trees, has been lost for 20 to 30 years until the re-growth of vegetation begins to develop characteristics of a closed canopy and the valued landscape character attributes return.

In unburned areas, wind damage begins to be noticeable from West Fork Road near Wild Bill Lake and continues sporadically along the rest of the route. Trees with broken tops also are noticeable throughout the wind-damaged areas. The needles on these damaged and fallen trees will eventually turn red and fall to the ground. Downed trees will continue to dominate the landscape being viewed until new growth sprouts around them.

Effects of the No-Action Alternative

This alternative proposes no human caused changes to the visual quality of the project area. However, the Cascade Fire has caused conditions that will create effects to scenery resources in the future. In high burn severity, where most trees are dead or will die, the visual condition is not preferred. Large amounts of dead woody material are perceived negatively by viewers regardless if the tree died due to harvesting or natural forces (Ryan 2005). Standing dead trees eventually fall to the ground resulting in increased downed fuel with a jack straw appearance on the forest floor. High amounts of standing and down fuels may prevent regeneration and do not create visually preferred open stands with high visual access and a clear forest floor.

The No Action would meet Forest Plan VQOs throughout the project area as it does not create any unnaturally appearing elements of form, line, color, or texture. Large amounts of dead trees in high burn

severity areas would continue to dominate the landscape being viewed. Changes to the scenic quality would be initiated by natural processes only.

Effects of the Action Alternative

The majority of effects to scenery resources are short term in duration with long term benefits which would help re-establish and maintain the valued landscape character and valued cultural attributes. Short-term visual effects of salvage harvest and fuels reduction activities are often most noticeable in foreground views until the growth of grasses and shrubs begin to soften the effects of these activities. For this analysis, short-term refers to a five to ten year period after all harvesting and slash treatment activities in an area are complete.

Proposed activities in burned portions of MAs F and R would not meet retention VQO as it is anticipated that such activities would be evident to the casual Forest visitor until grasses, forbs, and shrubs reestablish and begin to soften the effects to visual resources. It is anticipated that burned area activities would meet modification VQO one to three growing seasons after salvage activities are complete, partial retention VQO three to five growing seasons after salvage activities are complete, and retention VQO in five to ten growing seasons after activities in the burned area are complete.

Where project activities do not meet MA specific standards for scenery resources in burned portions of MAs F and R, a Forest Plan amendment would be needed which would amend the visual standard of the MA to allow the lands in the Beartooth Front Storm Damage Clean-up and Fuels Reduction Project area to deviate from retention VQO to modification VQO for approximately three years and partial retention VQO for an additional seven years after project activities are complete. EA Appendix M lists this Forest Plan Amendment and provides a significance determination.

In unburned areas, all other proposed management activities would be consistent with Forest Plan standards and guidelines for visuals. Activities in unburned areas would meet retention and partial retention VQOs in the short term (about one to three growing seasons) after project activities are complete. The Action Alternative would help rehabilitate scenery resources in the landscape by beginning to reestablish scenic qualities that move the area to the desired landscape character.

No direct, indirect, or cumulative effects to scenery resources are expected in the long term from the salvage harvest and fuels reduction activities.

Water Resources

Potential effects to water quality have been identified as a key issue for this project. Sub-issues include water and sediment yield, and channel, floodplain and wetland function. The unit of measure used to display effects on water yield is equivalent clearcut area (ECA) acres. The effects on other sub-issues are discussed qualitatively. The Water Resources analysis (Appendix C) discloses effects to water quality. Following is a brief summary of that report:

Affected Environment

Past and present land management activities along with recent natural events have influenced hydrologic processes in watersheds that encompass the project area. Equivalent clearcut area (ECA) analysis involving past timber harvest, road construction, and wildfire and wind events suggests that the existing amount tree canopy removal in the West Fork watershed (at the confluence with Rock Creek) may cause short-term increases in water and sediment yield (Troendle 1983, Stednick 1996). The primary causes are the 2008 Cascade Fire and the 2007 wind event. Water and sediment yield increases will gradually decrease over the long-term as the landscape revegetates and recovers from these natural events.

Aquifers and springs in the West Fork serve as source areas for drinking water and are high quality and free of contaminants (Stimson 2003, Swierc 2003, Stimson and Simons 2004). The West Fork is the municipal watershed for the City of Red Lodge community water system and contains public water systems at campgrounds and Timbercrest Girl Scout Camp. The primary drinking water source for the City of Red Lodge municipal water supply system is a shallow well with hydrologic connectivity to surface waters of the West Fork. Snowmelt runoff from the Main Fork and West Fork Rock Creek watersheds is probably the dominant source of recharge for the aquifer used by the city of Red Lodge (Stimson 2003). The City of Red Lodge previously used surface water from the West Fork for municipal purposes until 2006, at which time they switched to two municipal wells as their sole domestic source. They do however, still maintain the infrastructure, permits and water rights necessary to divert West Fork surface waters again in the future. Drinking water sources in the West Fork are highly susceptible to contamination because they draw water from springs or shallow unconfined aquifers. State of Montana Surface Water Quality Standards require that land management activities must not generate pollutants in excess of those that are naturally occurring, regardless of the stream's classification.

Effects of the No-Action Alternative

In the short-term, as burned timber stands deteriorate, large woody debris (LWD) would increase on streambanks and in channel. In most cases, this LWD would add obstructions to streamflow, which would reduce flow velocity and add armoring to streambanks, thereby improving bank stability. In some cases this LWD would become more mobile and result in new log jams, or increase the size of existing log jams. Overall, the function of stream channels, floodplains and streamside wetlands are expected to be maintained or improved.

By not reducing fuels through the proposed treatments, risk of human caused fire starts along the valley bottom road corridor may increase and success of initial attack may decrease (See Appendix A, Fuels Report). However, from a watershed scale perspective under a stand replacement wildfire scenario that begins in the headwaters, not reducing fuels in the valley bottom would have little to no affect on the size or landscape effects of such an event.

Effects of the Action Alternative

The proposed treatments would have a very low risk of influencing water and sediment yield for several reasons. 1) Hydrologic processes have already been affected by the loss of timber canopy from the

recent wildfire and wind events. Proposed treatments of burned or windthrown timber would not further reduce timber canopy to any substantial degree; 2) The amount of green timber treated that could further reduce timber canopy is a very small percentage of the West Fork watershed; 3) The majority of the green timber prescriptions involve thinning saplings and post/pole sized trees, which would have minimal affect on timber stand canopy; 4) Implementing BMPs and other design criteria, and complying with SMZ regulations would ensure sediment production and delivery to streams, and effects to floodplains and wetlands would be minimized. From an ECA standpoint, the proposed treatments would affect less than one percent of the upper or entire West Fork watershed (Appendix C, Table 5).

From a cumulative effects standpoint, the proposed treatments would have a very low risk of further elevating water and sediment yield over the existing levels to any measurable degree. Considering the potential for additional future wildfire, the proposed treatments would help to reduce the potential for human caused fire starts along the valley bottom road corridor and improve initial attack success. However, from a watershed scale perspective under another stand replacement wildfire scenario, the proposed treatments would not be expected to substantially reduce the risk of landscape scale effects to hydrologic processes. Therefore, from a cumulative effects watershed scale perspective, the proposed action is not substantially different than the no action alternative.

The proposed treatments would comply with state and federal regulations and Forest Plan Standards and Guidelines concerning water quality, floodplains and wetlands, assuming adequate implementation of BMPs and SMZ regulations occurs.

Recreation

Effects of project implementation to summer and winter recreational users is a key issue. This includes effects of road closures, effects to recreational residence permit holders, and potential for future off-road or camping use of skid trails and landings. The issue indicator is consistency with applicable Forest Plan recreation goals, objectives, and standards.

Comments for analysis related to recreation are: 1) Effects of increased cabin visibility to cabin vandalism; 2) Effects of logging truck traffic and associated safety concerns; 3) Effects of project activities to subdivisions adjacent to the Forest boundary.

Identification of a need for interpretive education associated with project was also an analysis issue. This analysis issue is addressed through proposed action mitigation measures (see above) that include interpretive education.

The Recreation Specialist Report (Appendix D) analysis describes the existing condition of the recreation resources within the project area and evaluates the potential effects of the alternatives on recreation resources. Following is a brief analysis of effects to recreation resources based on that report:

Affected Environment

The affected environment includes the roads, trails, developed recreation sites and recreation residence tracts in or accessed through the proposed treatment units (Figures 6 and 7). There are permitted

summer homes on Forest Service lands in the Camp Senia, Porcupine Creek, Cascade Creek, Basin Creek and Dutch Creek Recreation Residence Tracts. The Timbercrest Girl Scout camp is on the east end of the drainage. The 2008 Cascade fire burned trees in and around the Camp Senia, Porcupine Creek and Cascade Creek recreation residences and burned trees near Basin Creek recreation residences. The fire destroyed two Camp Senia and two Porcupine Creek recreation residence cabins. The fire burned trees around the following trailheads: West Fork Trail #1, Senia Creek Trail #13, Timberline Trail #12, and Basin Lakes National Recreation Trail #61. West Fork trailhead was reconstructed prior to the fire, which removed standing trees within the vicinity of the trailhead. Due to post-fire erosion concerns (USDA 2008a and 2008b), the first 0.91 miles of Senia Creek Trail #13 will be relocated to share a trailhead with West Fork Trail #1. Silver Run National Recreation Trail #62 is within several proposed unburned treatment units. Cascade Campground was burned in the fire and contains many trees that will likely die due to underburning. Dispersed recreation use and vehicle use for firewood cutting is allowed within 300 feet of the designated roads in the project area as long as it is also at least 100 feet away from live steams. Currently, there is limited recreational access and use of roads, trails, developed recreation sites, dispersed recreation sites, and recreation residences blocked by blown down timber, post fire hazard trees and hazard trees. At developed recreation sites burned by the fire, such as recreation residences, Cascade Campground, and trailheads, and dispersed campsites along West Fork Road, there are dead trees burned by the fire that will begin to fall as they decay, creating hazards for recreational users. Other unburned developed recreation sites include Wild Bill Lake picnic area and Basin Campground.

Effects of the No-Action Alternative

The No Action alternative would reduce recreation opportunities because the blown down trees, post fire hazard trees and hazard trees would continue to reduce recreation access in dispersed use and developed use areas. Increased use focused into nearby areas without blown down, post fire hazard trees and hazard trees would concentrate recreation users and degrade the recreation opportunities in those areas. The increased risk of wind-throw of post fire hazard trees would increase risk to recreation users inside the Cascade Fire perimeter. Increased resource damage and exposure to potential liability due to a lack of clearing standards and resource protection measures would be likely due to recreation users clearing trees or creating new user routes around down trees. The increased risk of and decreased ability to suppress a fire event would increase risk to recreation users in the event of a fire outside of the Cascade Fire perimeter.

No noise, dust, smoke, equipment traffic and the associated safety concerns would affect recreation users or adjacent subdivisions. No increase in visibility or vandalism of recreation residence cabins would occur beyond naturally occurring events.

Forest-wide Management Standards for Recreation, Trails, Trail Management would not be met because the Forest trail system within the project area would not be managed to provide for public safety, accessibility, user distribution, a variety of travel opportunities, and further management area goals. Forest-wide Management Standards for Facilities, Transportation System Operation and Maintenance, and Forest Transportation System would not be met because the roads within the project area would not be managed to provide for administration and protection of the resources and the needs, health, and safety of the public. MA F Management Standards for closing facilities would be met if facilities are

closed due to public safety not being provided. MA F Management Standards for vegetation management in developed recreation sites would not be met.

Effects of the Action Alternative

Removal of blown down trees, post fire hazard trees and hazard trees limiting some access would restore and maintain opportunities for recreation users to nearly those available before the storm event and fire. There would be some loss of use and access for recreation users during project implementation. Logging traffic and associated safety concerns may affect recreation users by displacing them or making travel through the area more difficult. The greatest impact to recreation users would be during the summer season (which is the highest season of recreational use in the West Fork). Users would be temporarily displaced to other areas, which could create a temporary concentration of users in those areas.

Removal of screening provided by hazard trees, burned trees, and ladder fuels would increase cabin visibility and potentially increase cabin vandalism. Such effects would be minimized by working with cabin owners to identify specific trees to remove or retain around cabins.

Project implementation noise, dust, smoke, and traffic would be heard and observed by residents of adjacent private lands and subdivisions. All property boundaries adjacent to proposed treatment units would be surveyed and marked prior to implementation to ensure no activities occur on private lands.

Identification of a need for interpretive education associated with this project was identified as a comment for analysis. This comment is addressed through project specific mitigations detailed in the Action Alternative Design and Mitigation Measures section of this EA. With application of prescribed design and mitigation measures, these there would be no significant direct, indirect, or cumulative effects to resources associated with interpretive education.

Applicable Forest Plan Forest-wide and MA standards would be met.

Wildlife

Effects to snag amount and distribution is a Key Issue. The measurement indicator is the average minimum number of snags retained per acre, with the threshold being determined by recommendations in the Northern Region Snag Management Protocol (USFS 2000).

Numerous Analysis Issues were identified relative to wildlife (Effects to: snag habitat, snag-associated species; wildlife habitat diversity; Management Indicator Species (MIS); old growth habitat and species; Threatened, Endangered, and Sensitive wildlife species; moose; pine marten; and lynx).

Project analysis and effects determinations for wildlife issues are disclosed in the Biological Evaluation and Assessment for Threatened, Endangered, Sensitive and Management Indicator Species/Key Species for Beartooth Front Storm Damage Clean-Up and Fuels Reduction Project – West Fork Rock Creek (Appendix E). Following is a brief summary of that report:

Affected Environment

Snag habitat and snag-associated species: Snags are essential for both primary and secondary cavity users. Site specific snag densities and sizes are not available for the project area, but snag densities based on 1997 Forest Inventory and Assessment (FIA) samples are available for the entire Beartooth Ranger District. Snag densities > 10.0 inches diameter at breast height (dbh) are 12.7 per acre for the Beartooth District. Data indicates large diameter snags > 20 inches dbh are relatively rare in watersheds where treatment are proposed (0.3 snags >20 inches dbh per acre). Due to several wildfires since 2000 that have killed trees and increased the number of snags on the District, 1997 FIA snag estimates are likely low.

Wildlife habitat diversity: The diversity of forest stand structure in the project area is decreasing due to the current successional pathway and disturbance patterns. This has led to a gradual elimination of the more open, fire maintained stands of larger diameter coniferous trees and healthy aspen stands. Lack of low-intensity fire disturbance has resulted in increased tree density in the overstory; abundant tree regeneration and shrub development in the understory on wet sites; little tree regeneration or shrub development in the understory on dry sites; and a buildup of ground fuels (both larger diameter and litter layers). This has resulted in pole to mid aged/sized contiguous tree stands that are more prone to stand replacing fire because of increased fuel loading.

Old growth habitat and species; Threatened, Endangered, Sensitive, and Management Indicator wildlife species; moose; pine marten; and lynx: The Northern Goshawk is the Custer National Forest's habitat indicator species for old growth timber (USDA 1986, page 18). Habitat indicator species "are species whose population changes are believed to indicate effects of management on other species of a major biological community or on water quality. The forest will provide for the maintenance and improvement of habitats for these indicator species." (USDA 1986, pages 17-18). The affected environment and environmental effects to old growth habitat and species is thereby reflected in the analysis for the Northern Goshawk. Suitable habitat for and documentation of occurrence of various wildlife species in the project area are summarized in Tables 8, 9, 10, and 11.

Table 8. Threatened, Endangered, or Proposed Wildlife Species Considered for Analysis

Species[1]	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	No Action Determination of Effect[2]	Proposed Action Determination of Effect[2]	Basic Habitat Description[3]
Canada Lynx (*Lynx Canadensis*)	Yes	No	NE	NLAA	Spruce/fir, high alpine, and habitats with high horizontal cover
Gray Wolf (*Canis lupus*)	Yes	Yes	NE	NJ	Remote, well connected forested generalist

[1] Federally listed species based on USFWS Threatened, Endangered and Candidate Species for the Custer National Forest (USFWS 2009). The determination of effects for federally listed species (threatened or endangered) is limited to: (1.) NE: No effect; (2) NLAA: May effect - Not likely to adversely affect; (3) LAA: * May effect - Likely to adversely affect; and (4) BE: Beneficial effect. * = Considered a trigger for a significant action. Options in determination of effects for proposed federally listed species are: (1.) NE: No effect; (2.) NJ: Not likely to jeopardize the continued existence of the species or result in destruction or adverse modification of proposed critical habitat; (3.) LJ: Likely

to jeopardize the continued existence of the species or result in destruction or adverse modification of proposed critical habitat.
[2] The determination is based on the presence of suitable habitat.
[3] Montana Natural Heritage Database. 2008. http://www.mtnhp.org/animalguide/

Table 9. Region 1 Sensitive Species considered for Analysis.

Species[1]	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	No Action Determination of Effect[2]	Proposed Action Determination of Effect[2]	Basic Habitat Description[3]
American peregrine falcon *(Falco peregrinus anatum)*	No	No	N/A	N/A	Cliff habitat over 200' high with suitable ledges for nest construction
Baird's sparrow *(Ammodramus bairdii)*	No	No	N/A	N/A	Prefers native prairie but structure is more important so may nest in tame grasses
Bald Eagle (*Haliaeetus leucocephalus*)	No	No	N/A	N/A	Nesting structure near a large water-body (lake or river) to provide sufficient forage
Black-backed woodpecker (Picoides arcticus)	Yes	No	NI	NI	Primary habitat is recently burned forested areas, secondary habitat is spruce/fir forests
Blue-gray gnatcatcher *(Polioptila caerulea)*	No	No	N/A	N/A	Open stands of juniper and limber pine with intermixed sagebrush
Burrowing owl *(Athene cunicularia)*	No	No	N/A	N/A	Open grasslands, nesting and roosting in burrows dug by mammals or owls
Grizzly Bear (*Ursus horribilis*)	Yes	Yes	NI	MIIH	Remote, well connected forested generalist
Greater sage grouse *(Centrocercus urophasianus)*	No	No	N/A	N/A	Sagebrush with intermixed grasslands
Harlequin duck *(Histrionicus histrionicus)*	No	Yes	NI	NI	Inhabit fast moving, low gradient clear mountain streams
Loggerhead shrike *(Lanius ludovicianus*	No	No	N/A	N/A	Grassy pastures that are well grazed, nest in shrubs or small trees, preferably thorny such as hawthorn
Long-billed curlew *(Numenius americanus)*	No	No	N/A	N/A	Open grasslands or prairie usually near water
Long-eared myotis *(Myotis evotis)*	Yes	No	NI	MIIH	Use a variety of habitats but are strongly associated with coniferous forests
Long-legged myotis *(Myotis volans)*	Yes	No	NI	MIIH	Primarily a coniferous-juniper forest bat found at moderate elevations (≥6000 ft) but may also inhabit riparian cottonwood bottoms and desert areas

Species[1]	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	No Action Determination of Effect[2]	Proposed Action Determination of Effect[2]	Basic Habitat Description[3]
Pallid bat *(Antrozous pallidus)*	No	No	N/A	N/A	Arid deserts and grasslands with rock outcrops
Spotted bat *(Euderma maculatum)*	No	No	N/A	N/A	Desert to montane coniferous forests
Townsend's big-eared bat *(Corynorhinus townsendii)*	No	No	N/A	N/A	Cave and cave-like structures along with forested foraging habitat
Black-tailed prairie dog *(Cynomys ludovicianus)*	No	No	N/A	N/A	Relatively flat grasslands with diggable soils, throughout the central plains
White-tailed prairie dog *(Cynomys leucurus)*	No	No	N/A	N/A	Xeric sites with mixed stands of shrubs and grasses from the Bighorn Basin in Montana to Utah
Wolverine *(Gulo gulo)*	Yes	Yes	NI	NI	Remote subalpine and spruce/fir forested areas

[1] Species listed as sensitive on the 2008 Forest Service Northern Region Sensitive Species List (USDA 2008e). Options in determination of effects: (1) NI: No impact; (2) MIIH: May impact individuals or Habitat, but is not likely to cause a trend to Federal listing or loss of viability; (3) LAA: Likely to result in a trend to Federal listing or loss of viability; and (4) BI: Beneficial impact. There would be "no impact" to sensitive species determined to be absent from the project area and not included in this table.

[2] The determination is based on the presence of suitable habitat.

[3] Montana Natural Heritage Database. 2008. http://mtnhp.org/speciesofconcern/

Table 10. Custer National Forest Habitat Indicator Species (MIS) and Key Wildlife Species Considered for Analysis.

Species	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	No Action Description of Effects[3] + = Positive 0 = Neutral - = Negative	Proposed Action Description of Effect[3] + = Positive 0 = Neutral - = Negative	Basic Habitat Description[4]
MIS[1]					
Northern goshawk *(Accipiter gentilis)*	Yes	No	0	0	Mature forest generalist
White-tailed deer (*Odocoileus virginianus)*	Yes	Yes	0	0	Grassland to montane conifer forest
Ruffed grouse *(Bonasa umbellus)*	Yes	Yes	0	0	Primary habitat includes dense early seral staged forests dominated by aspen, secondary habitat includes other dense deciduous or conifer woodland areas
Western kingbird	No	No	N/A	N/A	Open or partially open country with

Species	Suitable Habitat w/in Project Area	Species Documented w/in Cumulative Effects Area	No Action Description of Effects[3] + = Positive 0 = Neutral - = Negative	Proposed Action Description of Effect[3] + = Positive 0 = Neutral - = Negative	Basic Habitat Description[4]
(Tyrannus verticalis)					scattered trees, including agricultural lands
Bullock's (Northern) oriole *(Icterus bullockii)*	Yes	No	0	0	Open deciduous woodland and riparian areas
Yellow warbler *(Dendroica petechia)*	Yes	No	0	0	Brushy riparian especially with willows
Ovenbird *(Seiurus aurocapillus)*	Yes	Yes	0	0	Mid-late successional, closed-canopied deciduous or deciduous/conifer forests with limited understory
Spotted (Rufous-sided) towhee *(Pipilo erythrophthalmus)*	No	No	N/A	N/A	Shrubby riparian areas, woody draws, and woodland undergrowth
Brewer's sparrow *(Spizella Breweri)*	No	No	N/A	N/A	Strongly associated with sagebrush, but also uses other areas with scattered shrubs and short grasses
Sharp-tailed grouse *(Tympanuchus phasianellus)*	No	No	N/A	N/A	Mosaic of dense grass and shrubs with forbs for nesting, woody riparian areas in winter
KEY SPECIES [2]					
Elk *(Cervus Canadensis)*	Yes	Yes	0	0	Grassland to forested alpine areas
Golden eagle *(Aquila chrysaetos)*	No	No	N/A	N/A	Open hilly to mountainous areas
Merlin *(Falco columbarius)*	No	No	N/A	N/A	Patchy shrub/grassland habitats with large trees to support nesting (secondary nester)
Mule deer *(Odocoileus hemionus)*	Yes	Yes	0	0	Rugged grassland to forested alpine areas
White-tailed deer	Yes	Yes	0	0	Grassland to montane conifer forest
Bighorn sheep *(Ovis canadensis canadensis)*	No	No	N/A	N/A	Remote, steep, rugged terrain, such as mountains, canyons, and escarpments where precipitation is low and evaporation is high
Pronghorn antelope *(Antilocapra americana)*	No	No	N/A	N/A	Rolling grasslands to mixed sagebrush shrublands
Sharp-tailed grouse	No	No	N/A	N/A	Mosaic of dense grass and shrubs with forbs for nesting, woody riparian areas in winter

[1] Management Indicator Species include the categories of Habitat Indicator and Key (Major Interest) Species. Habitat Indicator species are based on the Custer Forest Plan (USDA 1986, p. 18).

[2] The Key (Major Interest) Species are based on the Custer Forest Plan (USDA 1986, pages 17 and 180). Management Indicator Species include the categories of Habitat Indicator and Key (Major Interest) Species.

[3] The determination is based on the presence of suitable habitat.
[4] Montana Natural Heritage Database. 2008.

Table 11. Wildlife Species of Local Public Concern Considered for Analysis.

Species[1]	Description of No-action Effect[2]	Description of Proposed Action Effect[2]	Basic Habitat Description[3]
Moose (*Alces alces*)	Neutral	Neutral. See white-tailed deer, mule deer and elk section for effects and rationale.	Variable: summer, mountain meadows, river bottoms, wet areas; winter, willow flats, mature coniferous forests. Willows are an important habitat component.
Pine martin (*Martes Americana*)	Neutral	Neutral. See goshawk section for effects and rationale.	Boreal preferring mature conifer or mixed wood forests. Uses deadfall and snags as den sites.

[1] The Wildlife Species of Local Public Concern are based on public comments received during the public scoping period (January 2008).
[2] The determination is based on the presence of suitable habitat.
[3] Montana Natural Heritage Database. 2008. http://www.mtnhp.org/animalguide/

Effects of the No-Action Alternative

Snag habitat and snag-associated species: There would be no effects to Snag habitat or snag associated species. Recommendations in the Northern Region snag management protocol (USFS 2000) would be met.

Wildlife habitat diversity: The diversity of forest stand structure in the project area would continue to decrease due to the current successional pathway and disturbance patterns.

Species Viability: No significant adverse effects to persistence or species viability would occur.

MIS; old growth habitat and species; Threatened, Endangered, and Sensitive wildlife species; moose; pine marten; and lynx: The effects determination for Federally threatened and endangered species are summarized in Table 8. The effects determination for USFS sensitive species with habitat or known occurrence in the project area are summarized in Table 9. The description of effects for other Management Indicator Species and "Key species" with habitat or known occurrence in the project area are shown in Table 10. Table 11 displays the description of effects for wildlife species of local public concern.

Effects of the Action Alternative

Snag habitat and snag associated species: The proposed action would remove snags on approximately 328 acres of burned area. Other snags may potentially be removed on the remaining 307 acres, including in areas with trees damaged by the November 2007 storm event. Many of the wind damaged trees do not have commercial value due to fracturing, or are not easily accessible, so they would remain

on the landscape to provide snag habitat. The majority of the Cascade fire area would not be treated and would continue to provide snags. In addition, beetle-killed trees occur in the West Fork Rock Creek drainage and also provide snags. Application of SMZ requirements, BMPs, and snag retention project design features (Table 4) would ensure that specific numbers and size classes of snags and live trees for future snag recruitment are retained within the project area.

Cumulative effects of past, present, and reasonably foreseeable future actions are expected to be small. Although snags would be removed for timber harvest and for safety reasons during project implementation, existing snags would be retained in the majority of the cumulative effects analysis area. The proposed action and existing condition are expected to meet regional snag management recommendations (USDA 2000).

Implementation of the proposed action would have a neutral effect on snag habitat becasue: 1) the proposed action would meet the regional snag management recommendations; 2) the proposed action has a project design feature that would retain snags in the project area (maintaining an average of at least 5 to 10 snags, where available, per acre that are greater than or equal to 12" diameter, which are greater than 75 feet from roads and/or private property, and are not a safety hazard during project implementation, would maintain essential habitat for cavity users); and 3) the project is small in scale where less than 2% of the cumulative effects analysis area would receive fuel treatments.

Wildlife Habitat Diversity: The project would not cause direct effects to wildlife habitat diversity. Treatments that open the timber canopy would result in increased development of shrub, grass and/or forb understory on some sites. Treatments that improve the health and increase acreage of aspen would lead to increased wildlife habitat diversity over short and long term time frames.

Species Viability: On the Custer National Forest, all of the species considered in Appendix E occur over a geographical area encompassing several states. Because their distribution is so large, the viability of the species is not tied to actions occurring only on a small portion of their natural range such as the Custer National Forest. Therefore, one could argue that viability at the Forest scale is not an issue. Even so, it is recognized that adverse actions occurring within a small portion of the range, if extended out to their entire range, could lead to problems in species viability over time. Therefore, it is important to assess how the actions within a portion of a species range contribute to the viability across the range. To address this, activities are evaluated in terms of their effect on habitat, at the project level, landscape level, and planning unit, if needed. At the project and forest level, the analysis focuses upon the likelihood of the species or its habitat "persisting" within the analysis area over time. No significant adverse effects to persistence or species viability would occur (see Appendix E).

MIS; old growth habitat and species; Threatened, Endangered, and Sensitive wildlife species; moose; pine marten; and lynx: The habitat, effects determination, and determination rationale for Federally threatened and endangered species with habitat or known occurrence in the project area are summarized in Table 8. The habitat, effects determination, and determination rationale for USFS sensitive species with habitat or known occurrence in the project area are summarized in Table 9. The habitat, presence, and description of effects for other Management Indicator Species and "Key species" with habitat or known occurrence in the project area are shown in Table 10. Table 11 displays the habitat, presence, and description of effects for wildlife species of local public concern.

Additional background information and rationale for the determination of effects for these species is in the Biological Evaluation and Assessment for Threatened, Endangered, Sensitive and Management Indicator Species/Key Species for Beartooth Front Storm Damage Clean-Up and Fuels Reduction Project – West Fork Rock Creek (Appendix E). Effects to old growth habitat and species are disclosed in the analysis for the goshawk (Table 10).

Conclusions:
With application of prescribed design features and mitigations detailed in the Action Alternative Design and Mitigation Measures section of this document, the Action Alternative would not result in significant direct, indirect, or cumulative effects to wildlife resources.

Fisheries

Effects to fisheries, including adequacy of streamside woody debris retention is a key issue. There are two primary concerns associated with this issue: 1) Storm/Fire damage cleanup and fuel reduction could increase sediment delivery to stream channels and degrade water quality and aquatic habitat; and 2) Storm/Fire damage cleanup and fuel reduction could influence riparian and wetland integrity and streambank stability and reduce the amount of LWD available for recruitment to stream channels. The issue indicator is: Potential for riparian, streambank stability and LWD related effects to aquatic species and habitat, accounting for aquatic mitigation measures. Units of measure utilized to display effects are ECA, number of stream crossings, and miles of new or temporary roads. Effects to Sensitive wildlife species and MIS were identified as comments for analysis.

The Fisheries Report and Biological Evaluation (Appendix F) analysis describes the existing condition of fisheries and amphibian resources within the project area and evaluates the potential effects of the alternatives on these resources. Following is a brief summary of that report:

Affected Environment

The 2007 windfall and the Cascade Fire of 2008 have dramatically altered riparian areas along the West Fork Rock Creek drainage. Fish bearing streams and lakes occurring within and immediately adjacent to the proposed salvage areas include: West Fork Rock Creek, Wild Bill Lake, the lower reaches of Basin and Dutch creeks, and a lower reach of Timberline Creek. Yellowstone cutthroat trout (YCT) are the only sensitive fish species known to be present in the project area. YCT were sporadically stocked in the mainstem of West Fork Rock Creek from 1928 through the early 1970's. To date, YCT numbers are relatively low in the West Fork mainstem and the fishery is primarily comprised of nonnative wild trout including brook, brown, and rainbow. Wild Bill Lake is a 3 acre recreational fishery the lies immediately north of the mainstem West Fork Rock Creek near Basin Camp Ground. Wild Bill Lake is stocked annually with rainbow trout and YCT (YCT stocking will start in 2009) and provides excellent recreational fishing opportunities.

Amphibian habitats present within the treatment areas include several isolated wetlands in riparian areas along West Fork Rock Creek and Wild Bill Lake. Potential sensitive amphibian species within the project area include the Northern leopard frog (*Rana pipiens*) and Western toad (Boreal toad) (*Bufo boreas*). Non-sensitive native amphibians present in the project area include the Columbia Spotted frog

(*Rana luteiventris*), Boreal Chorus frog (*Pseudacris maculate*), and Tiger salamander (*Ambystoma tigrinum*).

Table 12 summarizes the potential effects to aquatic sensitive species and Management Indicator Species in the project area. Additional discussion of and rationale for effects is provided in the subsections below and in Appendix F.

Table 12. Potential effects of the alternatives on sensitive and management indicator (MIS) aquatic species and wild trout in the project area.

SENSITIVE AND MIS SPECIES	NO-ACTION ALTERNATIVE AND ACTION ALTERNATIVE
Yellowstone cutthroat trout	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.
Northern leopard frog	No impact.
Western (Boreal) toad	No impact.
Wild Trout	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.

Effects of the No-Action Alternative

Burned timber stands and blowdown would deteriorate and some of the large wood would be recruited to streambanks and to the stream channel of the West Fork Rock Creek. In general, this wood would benefit aquatic species by forming pools, adding nutrients for aquatic insects, aiding in the sorting of sediments and retention of spawning gravels, and providing overhead cover and overwintering habitats. However, not reducing fuels through the proposed treatment areas would increase the risk of future high severity riparian wildfires, which if extreme, could be detrimental to aquatic species and their habitats. Additionally, an overabundance of in-channel large woody debris could lead to substantial and numerous log jams that may produce dramatic channel alterations and could initiate road failure in areas close to the stream and produce excessive sediment delivery to the West Fork of Rock Creek.

ECA estimates (Appendix C) indicate that the Upper and Lower West Fork Rock Creek watersheds are at or slightly above ECA forest canopy reduction levels that could produce measurable changes in annual water yields and possibly streamflows. Such change could potentially impact aquatic habitats and species as discussed above. However, most of these acres are associated with the Cascade Fire area of 2008 and subsequent impacts to fish and amphibian populations would likely be localized to areas adjacent to and downstream of the fire area and would not impact populations as a whole.

The cumulative effects of the No Action Alternative on aquatic resources, when combined with past activities and natural processes, may have a negative impact on wild trout populations (sensitive and MIS), nonsensitive native amphibian species, and their habitats as risk to riparian and aquatic environments is expected to remain at current levels or increase. Adverse cumulative effects from this Alternative are possible because indirect effects associated with excessive windfall and burned trees (primarily in riparian areas) could impact fish and amphibian populations, thereby compounding the effects of past activities and natural processes on the aquatic ecosystem.

Effects of the Action Alternative

Direct and indirect effects to aquatic habitat and species under the Action Alternative could result from sediment produced from proposed activities that utilize machinery. However, protection measures included in the proposed action would ensure the physical integrity of riparian areas, wetlands, and stream courses and direct mortality of individual aquatic species as a result of this action is expected to be low to nonexistent. Although, adverse indirect effects to aquatic species are not expected from the proposed treatments, long-term beneficial effects are. A reduction in timber canopy has already occurred as a result of the windfall and fire events and thinning in these areas is expected to reduce the potential for high intensity wildfire, decrease the risk of streambed and bank scour, and allow for faster regeneration on stream banks and riparian buffer areas. Cumulative effects of the proposed actions to aquatic species and their habitat are anticipated to be negligible to nonexistent.

Adverse indirect effects are not expected from the proposed treatments, but long-term beneficial effects are. A reduction in timber canopy has already occurred as a result of the windfall and fire events and thinning in these areas is expected to reduce the potential for high intensity wildfire, decrease the risk of streambed and bank scour, and allow for faster regeneration on stream banks and riparian buffer areas. Additionally, proposed activities will affect a minimal amount of actual timber canopy across a minimal amount of watershed area, and therefore also have little additional influence on aquatic species and water.

Forest Vegetation

Three comments for analysis were identified relative to forest vegetation: 1) Wind damage potential from effects of tree thinning; the issue indicator is the level of risk of wind damage; 2) Bark beetle potential in areas of wind damaged trees; the issue indicator is increased population levels over the next 2 years; 3) Effects of post treatment regeneration on fire potential; the issue indicator is potential future fire type (surface, passive crown, active crown or running crown). Following is a summary of the Forest Vegetation analysis in Appendix G:

Affected Environment

The predominant forest cover in the West Fork drainage is lodgepole pine (spruce, sub alpine fir and Douglas fir occur as smaller components). The existing condition has resulted in, part from lack of disturbance (management or natural). Subsequent development of high tree densities promotes insect infestations and disease infections, which result in tree growth reductions, physical deformities, and mortality. These factors have reduced the health, vigor, and productivity of the forested ecosystems. High tree densities have increased natural fuel loading, and the risk of stand replacing wildfires. The lack of disturbance in some cases has fostered the development of multi-storied and/or dense, full canopied stands, which causes a decline in the understory shrub, herb and grass species. The West Fork drainage last burned in the early 1900s.

The Cascade Fire resulted in about 65% of the forested area being deforested due to direct mortality from the fire. Four thousand seven hundred and forty seven acres were classified as high intensity burn that exhibited greater than 80% mortality. Extensive understory burning occurred in other areas that will

likely to result in significant indirect mortality. Twenty one of the proposed treatment units were burned over during the Cascade fire and experienced high burn intensity. Anticipated tree survival in the burned units is expected to be very low. Thirty one of the units were untouched by the fire.

Wind damage potential: The West Fork drainage bottom parallels the predominant wind pattern. Wind and resultant tree damage is a natural function of these ecosystems that will continue in the project areas. Major wind events and resultant widespread wind damage like that of 2007 are rare but could happen in the future whether the proposed action or no action is implemented. Experience from past fires show that 90% or more of the fire killed trees will be on the ground within 10 years. Because the fire has removed the live crown, wind resistance in these burns stands has been greatly altered. The live stands (Units 24, 25, 26, 27, 28, 29, 30, 31, and 32) adjoining burned stands would have a greater potential for wind damage (uprooting, partial uprooting, leaning, and wind snapped trees).

Bark beetle potential in areas of wind damaged trees: Beetles are a component and function of the forested ecosystem and are one of the primary recycling agents in forested stands. Bark beetle tree mortality is currently at endemic levels, killing incidental individuals or groups of 5 to 10 trees within the project area. Beetle mortality is closely associated with overstocked, continuous stands, drought periods and secondary damaging agents such as snow or wind damage. Recent storm damage mortality is likely to be infested with beetles. Dependent on weather, vigor of trees and population levels beetles could infest live trees. The wind damaged trees had no insect activity observed in spring 2008 (Gibson 2008).

Effects of post treatment regeneration on fire potential: Three scenarios were modeled (no action, proposed action with no thinning, and proposed action with thinning) for two stands to compare the potential fire type between the no action and the proposed action alternative (see Appendix G). Current stand conditions are a range of 1,422 to 2,836 trees per acre of small-diameter lodgepole pine with crown cover greater than 70%. For comparison purposes a wildfire was modeled in 2026 for all scenarios. Without some stocking control in the regeneration treatments, over time, the stands would likely develop into existing conditions we have today.

Effects of the No-Action Alternative

The no action alternative has limited activities that could alter the project area landscape from existing to desired stand and fuel structures. Tree densities, ladder fuels, surface fuels and crown canopies are expected to increase with continued fire suppression and limited management. This would increase the risk for large stand replacement disturbances (wild fires, insects, diseases) reducing the ability to sustain the forest.

Wind Damage potential: Wind damage is a natural process and will continue across the treatment area landscapes. Small scale wind damage would continue with areas having concentrated damage due to strong frontal passages and high impact storm events (i.e. thunderstorms). Wind events like that of 2007 on the Beartooth District are not common, but can happen in the future and would likely see similar wind damage. Under the No-action alternative (not including 2007 type events), the treatment areas landscapes would likely remain in a lowlow risk for additional wind damage.

Bark beetle potential in areas of wind damaged trees: Recent mortality is likely to be infested with beetles. Dependent on weather, vigor of trees and population levels beetles could infest live trees.

Weather conditions into 2010 are likely the main factor that will determine which direction the population will go. If weather conditions stay cool and wetter, under both the no action and the proposed action it can be expected that endemic populations would persist in the wind damaged trees over the next few years with continued activity across the treatment area in live trees as seen over the past years. Dryer than normal conditions would increase population growth potential.

Effects of post treatment regeneration on fire potential: Modeled simulations (see Appendix G) for the no action alternative predicted both an active crown fire and a running crown fire under severe conditions and a surface fire under moderate conditions. Simulations show that the no-action would result in higher fire severity and higher predicted tree mortality potential under severe fire conditions than would occur under the proposed action. Simulated fire (under very dry conditons) in year 2026 would kill all trees.

Effects of the Action Alternative

There is a need to reduce tree densities, ladder fuels and crown canopy within the conifer dominated forested stands to decrease the risk of fire reaching the overstory canopy and being sustained as a crown fire, resulting in a large stand replacement event. Achieving these conditions would reduce competition of light, nutrients and water and restore the diversity, vigor, composition and structure of the forested stands, while maintaining endemic levels of insect and disease. The desired condition is to reduce tree densities, remove the stagnant forested understory, and decrease the risk for epidemic insect infestations and disease infections. This condition would promote a healthy, structurally diverse, productive and vigorous growing forested ecosystem. The reduction of crown canopy would also promote the release of the browse component.

Fuel reduction within the project area would not “fireproof”, “insect proof” or “windproof” the environment, but rather would reduce the likelihood of stand-replacement disturbances such as wild fire or epidemic beetle mortality. Fires, insect damage and wind damage would still continue but the cumulative effects of regeneration harvest, thinning from below, fuels rearrangement, and aspen and willow stand enhancement combined with treating the resultant activity fuels can reduce future fire and beetle effects. The proposed action would decrease tree densities, ladder fuels, surface fuels and crown canopy which decrease the risk for large stand replacement disturbances, thus increasing the ability to sustain the forest.

Wind Damage: When considering species susceptibility, treatment intensity, creation of openings, topographic position and the prevailing winds the direct effects of the proposed treatments in the unburned units would increase the risk for wind damage. Species susceptibility and treatment units lying in the drainage bottom that parallels the predominate wind pattern has put the post treatment West Fork wind damage risk at moderatelow.

Bark beetle potential in areas of wind damaged trees: The proposed action if implemented would reduce bark beetle potential in the treatment units for two reasons. First, removal of infested downed trees (large slash and cull material) removes the potential brood sites for the beetle. Second, the proposed thinning and regeneration harvests will change stand conditions (stocking density) not conducive to beetle infestations. Stand alterations to reduce beetle infestation susceptibility are well documented as discussed in Appendix G.

Effects of post treatment regeneration on fire potential: Modeled simulations (Appendix G) showed that implementing the proposed action would lower fire severity and the predicted potential tree mortality under severe fire conditions.

Heritage Resources

Project compliance with National Historic Preservation Act was identified as a comment for analysis. There was also a request to work with Carbon County Historic Preservation Officer in ensuring project compliance. A Cultural Resource Specialist Report was prepared but it is not included as part of this Environmental Assessment. Pursuant to the Freedom of Information Act and various cultural resource protection laws and regulations, information contained in this report is considered confidential and cannot be released to the general public. The following is a summary of this report that does not include confidential information:

The proposed project falls under the CNF Site Identification Strategy (SIS) known as the *Wildland Urban Interface and Large Scale Hazardous Fuels Reduction SIS* (USDA 2005) to address landscape scale (500 acres or greater) hazardous fuel reduction projects proposed under the Healthy Forest Restoration Act of 2003 and the "Healthy Forest Initiative". This strategy allows for proactive site treatment to reduce hazard fuels, making cultural resources more fire resistant, rather than leaving untreated islands within project areas.

In 1999, the CNF identified sites that met the national criteria for "priority heritage assets". Priority asset sites are those sites that have had a significant value investment; and/or are eligible for nomination to the National Register of Historic Places (NRHP); and/or are considered "at risk" due to substantial effects to site integrity. Culturally sensitive sites are defined as "Cultural resources associated with traditional Indian ceremonies, cultural practices and important events in tribal history…" and include "…burials, rock art, stone circles of greater than 7m in diameter, monumental rock features, fasting structures, eagle catching pits, sweat lodges, wooden structures, Sun Dance lodges and grounds, offering and prayer locales and historic battle sites."

Affected Environment

Over half of the project area has been previously inventoried for the presence of cultural resources. The un-inventoried acres consist primarily of hazardous areas that are currently unsafe to enter due to high amounts of congested windfall debris that resulted from a fall 2007 high-wind storm event or contain hazard trees from the 2008 Cascade Wildfire. Some areas exhibit steep slopes that are considered low probability for the presence of cultural resources or exhibit rocky or densely vegetated surfaces. Thirty-two recorded sites and four historic trails are present within the project area. One site is listed on the NRHP. Ten are recommended eligible for nomination to the NRHP and 21 are presently undetermined. One of the NRHP eligible sites, consisting of a historic scaleer shack, was consumed during the 2008 Cascade Wildfire and will not be further discussed.

Effects of the No-Action Alternative

Under the No-action Alternative no direct effects would occur at ten sites due to scheduled routine maintenance or prior clean-up activities. Unburned fuels accumulation, post-fire fuels accumulation and tree falling/uprooting may affect 25 sites. While there would be no ground disturbing activities associated with the No-action Alternative, the probability of future catastrophic wildfires in the project area would be likely (see Appendix A). Hazardous fuels would continue to accumulate across the project area.

In terms of indirect effects, 25 cultural resource sites may be damaged or consumed by wildfire or by wildfire suppression activities (including the use of bulldozers). Some of these sites contain combustible materials, buildings and features that may be consumed by fire. Stone features may be damaged by intense heat resulting in spalling or exfoliation of the stone surfaces. Improved ground surface visibility may lead to the discovery of known or new cultural resources and subsequent illegal artifact collecting, damage or vandalism. This situation has already been documented at one historic site located along the West Fort Rock Creek. Erosion, due to loss of vegetation cover, may also result in damage to cultural resources.

The cumulative effect of the No-action Alternative would be the continued buildup of hazardous fuels and tree uprooting/falling with an increased potential for multiple damaging effects to cultural resources. The opportunity to treat cultural resources, with the goal to make them more “fire resistant” or to insure their continued historic use would not be realized.

Effects of the Action Alternative

Proposed treatment—utilizing hand or mechanized equipment and prescribed burn piling—would occur on six sites but would have no direct effect to the sites, rather the treatment would benefit the site. Three of these sites are priority assets and one contains a culturally sensitive cairn. All structures and features would be avoided.

Proposed treatment—utilizing hand equipment and prescribed burning—would occur on, or adjacent to, 27 sites and four historic trails but would have no direct effect to the sites, rather the treatment would benefit the site. Ten of these sites are culturally sensitive. All structures and features would be avoided.

The proposed treatment plans for these 33 sites would be reviewed by the Montana State Historic Preservation Officer (MT SHPO). An archaeologist would identify all site locations and/or structures to be treated and would monitor all treatment activities. The culturally sensitive site may require consultation with the Crow Tribe in order to verify their significance and to insure their respectful consideration and treatment.

The historic West Fork Rock Creek Road #2017 would be routinely maintained and used during the proposed project. Routine maintenance would serve as a beneficial activity by providing for the continued use of this NRHP eligible cultural resource.

Four historic trails would be researched and formally recorded prior to project implementation. All new cultural resources discovered during project implementation would immediately be brought to the attention of the Forest Archaeologist and plans designed to avoid, reduce further disturbance or mitigate existing disturbance would be formulated in consultation with the MTSHPO and, if needed, the Crow Tribe.

All proposed activities located outside the units that may involve ground disturbance (e.g. log landings, access roads, proposed temp roads and skid trails, equipment/machinery storage areas, prescribed burn piles and existing road use) would be inventoried by an archaeologist prior to implementation in order to insure no cultural resources are disturbed.

The cumulative effect of the Action Alternative would be the restoration of the Project Area to a more desired condition and the protection and preservation of cultural resources, through fuel load reduction, making them more fire resistant.

Soils

Effects of project to soil productivity and compliance with Region 1 Soil Quality Standards was identified as a comment for analysis. The issue indicator is a qualitative discussion of soil productivity, soil erosion, and mass failure or soil stability. The Beartooth Front Storm Damage Cleanup and Fuels Reduction project area was surveyed to detail existing condition and determine potential effects to the soil resource and a Soils Specialist Report (Appendix H) was prepared. Following is a brief summary of this report:

Affected Environment

The project area field review consisted of traversing representative units and assessing soil parameters as well as visually estimating existing disturbance. It is estimated that less than 53% of the area was detrimentally disturbed before the Cascade Fire. Proposed units within the Cascade Fire (units 1-23) nearly all experienced some degree of burning, with much of the litter layer consumed. Field review confirmed the findings in Cascade BAER report (USDA 2008a), that even in high burn intensity areas, high soil burn severity was generally less than 20% of the area. The Cascade BAER report estimates erosion will be greater for the first few years following the fire, though should approach pre-fire conditions within 3 to 5 years.

The majority of the soils on sampled sites are coarse textured, having a high cobble and gravel content. This is a sign that they will resist erosion. A majority of these sites also have subangular blocky or granular structures. This is an indicator that these sites do not have residual compaction or detrimental effects from historic management. For the unburned condition, there is very little bare ground, a sign of resistance to erosion and most sites have high coarse woody debris content, reflecting a historic buildup of woody material from fire exclusion. No mass failures areas have been identified in the project area. This suggests that the area has a low mass failure risk.

Effects of the No-Action Alternative

There would be no short-term effects on the soil resource over and above the existing condition. Natural processes would continue until another major disturbance such as another fire or a windstorm opens the tree canopy and speeds up the recycling process again.

An intense wildfire or reburn is a possibility at some time in the future. An extreme wildfire followed by a severe rain event could lead to accelerated erosion and sedimentation, and possible mass wasting. Soil erosion rates would fluctuate with natural changes in vegetation. Historically, on the Beartooth

Ranger District, forests generally recover in 5 to 20 years following wildfires. Depending on the severity of the fire the time frame could be as long as decades.

Effects of the Action Alternative

Long term impacts to soils are not anticipated from the proposed treatments. The soil analysis indicates that all alternatives and all activities proposed would meet the Region 1 Soil Quality Standards (USDA 1999) through the implementation of management practices outlined in Design Criteria and restoration of landings and heavily used skid trails, if needed, to reduce the total amount of detrimental soil impacts. The existing condition indicates there is little detrimental soil disturbance throughout the project area. All Forest Plan management direction would be met by the proposed action.

Based on field reconnaissance, review of literature, and GIS analysis, impacts to long term soil productivity are not anticipated from any of the proposed activities. Mechanical treatments would not exceed Region 1 Soil Quality Standards assuming existing routes are maximized and dry conditions exist. No adverse impacts from hand piling/burning would occur. There is some existing disturbance associated with dispersed camping and other recreational activities. Where routes and dispersed campsites are closed by the Beartooth Travel Management Plan (USDA 2008c), this disturbance is expected to naturally recover. Where these areas remain open, such disturbance would be expected to remain dependent upon continuation of recreational use. Long term cumulative effects to soils in proposed treatment areas are not anticipated since regrowth of the grassland/shrubland understory is expected to be high and that mechanical fuels treatments would maximize use of existing travel routes to limit disturbance.

Noxious Weeds

Effects of project implementation to noxious weed proliferation and post-project weed monitoring needs was identified as a key issue. The indicator for this Key Issue is the noxious weed risk rating (USDA 2001). Following is a brief summary of the Noxious Weeds Report (Appendix I):

Affected Environment

Spotted knapweed is adjacent to and within some of the treatment units and is scattered along the West Fork Road #2017 and along Silver Run Trail #102. Scattered Canada thistle and houndstongue plants may be found along Road #2017 as well. Just outside the project area, yellow toadflax and leafy spurge are present. A small infestation of field bindweed is present at Red Lodge Mountain Ski Area. The likely primary vectors for spread of spotted knapweed and Canada thistle are vehicles and wind. The vectors for leafy spurge are birds and wind, and the vectors for hound's-tongue are livestock, birds, wildlife and people. Yellow toadflax may be an escaped ornamental from a nearby garden. Any ground or severe vegetation disturbing activity, such as hazard tree removal, fuel reduction and pile burning, has the potential to increase the spread of noxious weeds. This risk comes from: 1) potential for people, vehicles, and heavy equipment to spread existing plants and seed as well as bring noxious weed seed into an area; and, 2) the reduction and/or temporary elimination of the vegetation cover, providing a scarified seed bed and less vegetation competition, resulting in a higher chance of weed seed germination and weed establishment.

The Beartooth District Weed Control Program is actively monitoring and treating noxious weeds annually on all of the known weed infestation within the project area. This activity, as authorized by the 2006 Custer National Forest Final EIS for Weed Management (USDA 2006) will continue regardless of whether a decision is made to conduct all, or part, of the storm clean-up and fuel treatment. The goal for noxious weed management in the project area is to prevent noxious weeds from going to seed, reducing the number of acres infested with noxious weeds, and to eradicate, and reduce, all new starts as soon as they are found.

Effects of the No-Action Alternative

The likelihood rating and consequence of noxious weed establishment would be low to moderate. Noxious weeds are present in limited quantity in the project area, and could spread even with the current level of monitoring and treatment. Cumulative effects on the native plant community are likely, but are limited with continued monitoring and treatment. Current activities in the area can spread spotted knapweed, Canada thistle, and sulfur cinquefoil and the potential new noxious weed species within the project area either through moving noxious weed seeds from on site plants, or from bringing seed and reproductive plant parts of the same or new species into the project area. Because proposed fuels treatments and storm-damage clean-up would not occur under the No Action Alternative, suppression capability would not be improved and the likelihood of a large wildfire and subsequent potential for weed infestation and proliferation would be increased.

Effects of the Action Alternative

The likelihood rating and consequence of noxious weed establishment would be moderate. Noxious weeds are present in limited quantity within the project area, and could spread even with the current level of monitoring and treatment. Project activities, especially in treatment units where logging equipment and vehicles are used off main roads, are likely to result in some areas becoming infested with undesirable plant species even when preventative management actions are followed. Control measures are essential to prevent the spread of undesirable plants or noxious weeds within the project area. Development of preventative management measures for the proposed project is required to reduce the risk of introduction or spread of undesirable plants into the area.

Cumulative effects on the native plant community are likely, but are limited with continued monitoring and treatment. Logging equipment and vehicles can spread spotted knapweed, Canada thistle, and sulfur cinquefoil and potential new noxious weed species within the project area either through moving noxious weed seeds from on site plants, or from bringing seed and reproductive plant parts of the same or new species into the project area.

Sensitive Plants

Effects to sensitive plants were analyzed to meet legal and policy requirements for protecting plants listed by the Forest Service as sensitive. Following is a brief summary of the Sensitive Plants Report (Appendix J):

Affected Environment

Based on review of potential habitat, there is low to moderate potential for occurrence of the following Forest Service Region 1 sensitive plants (USDA 2004) in the project areas: Musk-root, Small yellow lady's slipper, Giant helliborine, Hiker's gentian, Beartooth goldenweed, Hall's rush, Mealy Primrose, Threeranked humpmoss, Jove's buttercup, Barratt's willow, and Shoshonea. Cursory field surveys have been conducted within or adjacent to the project area and no new populations of sensitive plants have been found (see Appendix J, Sensitive Plants Report). There is one population of Threeranked humpmoss in a wet meadow near proposed treatment unit 2.

Effects of the No-Action Alternative

There are no known sensitive plants or sensitive plant populations that would be affected by the No-Action Alternative. Implementation of the No-action alternative would not be anticipated to move any sensitive plant species within the project area toward federal listing under ESA.

Effects of the Action Alternative

There are no known sensitive plants or sensitive plant populations that would be affected by the Action Alternative. There is one known sensitive plant population (Threeranked humpmoss) adjacent to and upslope from the project area. Activity within these wetland habitats would not occur under the Action Alternative. The effects determination is No Impact for each listed sensitive plant species. Any unknown populations that might exist in the project area would have low vulnerability to proposed activities. Proposed activities are not expected to impact individuals or habitat. Implementation of the Action Alternative would not be anticipated to move any sensitive plant species within the project area toward federal listing under ESA.

Although adverse indirect effects are not anticipated from these proposed treatments, long-term beneficial effects are anticipated. Removal of storm and fire damaged trees and associated slash, combined with thinning to reduce green fuels would reduce the potential for high intensity/long duration fire in localized riparian areas, thereby reducing the magnitude of adverse impacts to streams, wetlands, floodplains, and overall water quality (see Appendix C, Water Quality Report).

Inventoried Roadless Areas, Wilderness, & Un-roaded Areas____

Effects of the project to "un-inventoried" and Inventoried Roadless Areas (IRAs) was identified as an analysis issue. Effects to the Absaroka-Beartooth Wilderness (A-B Wilderness) are also disclosed. Following is a brief summary of the Inventoried Roadless Area and Wilderness Characteristics Report (Appendix L):

Affected Environment

The West Fork project area consists of a relatively narrow valley bottom surrounded to the south, west, and north by the Absaroka-Beartooth (A-B) wilderness, Burnt Mountain and Red Lodge - Hellroaring IRAs and adjacent un-roaded areas. No project treatments are proposed in the A-B Wilderness. Project treatments are proposed in the Burnt Mountain and Red Lodge - Hellroaring IRAs, in un-inventoried IRAs (un-roaded areas), and in the vicinity of the A-B Wilderness. Wilderness characteristics are at

generally high levels in the A-B wilderness and in the interior portions of the Burnt Mountain and Red Lodge - Hellroaring IRAs. There are existing developed areas (roads, campgrounds, and recreation residences) in the outer edges of these IRAs, which results in decreased levels of wilderness characterisics in these areas. Wilderness characteristics are at relatively low levels in un-roaded areas in the project area due to proximity of developments (roads, campgrounds, recreational residences, Red Lodge Mountain Ski Area, etc.) and the relatively small size of most of these un-roaded areas.

Effects of the No-Action Alternative

There would be no direct, indirect or cumulative effects of the No-Action alternative on any IRAs, un-roaded areas, or the Absaroka-Beartooth Wilderness.

Effects of the Action Alternative

Within untreated portions of IRAs and un-roaded areas and the entirety of the A-B Wilderness, there would be no change to the existing Natural Integrity and Natural Appearance. Untreated areas would continue to appear as if they have been affected primarily by the forces of nature at current levels. Short-term impacts in the A-B wilderness and untreated portions of IRAs and un-roaded areas would consist of potential for sights, smells, and sounds of project implementation to be experienced by forest visitors and a potential for decreased Natural Opportunity for Solitude and Primitive Recreation Opportunities while the project is being implemented. Sights, smells, and sounds of project implementation may be indiscernible from other ongoing activities, such as road reconstruction or recreational use in the project area.

There would be limited, short-term and longer-term effects to character of IRAs and un-roaded areas within the project area, in the form of physical disturbance, sights, sounds, and smells decreasing opportunity for solitude and primitive recreation. These effects would be low intensity, site specific (local), temporary, and transient (moving from unit to unit as operations are implemented). Stumps, skid trails, landings, and burn/scorch marks may be visible in the short-term, but would be obscured by revegetation and/or fade and decay over time. Treatment activities proposed in ≤1% of the Burnt Mountain and Red Lodge Hellroaring IRA acreages and in portions of un-roaded areas would not preclude consideration of these areas for wilderness at some future time.

Other Issues

A planning specialist report was compiled to address issues not covered by other resource specialists. Identification of a need for commercial and personal forest product harvest opportunities, including sawlogs, houselogs, firewood, and post and poles was identified as a Key Issue. The measurement indicator is qualitative descriptions of existing and predicted harvest opportunities.

Analysis Issues considered in the Planning Specialist Report are:

- Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging.
- Effects of project implementation to West Fork Road.
- Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations.

- Effects of this project on climate change. This issue is analyzed in terms of carbon storage and release, hereafter referred to as carbon flux.

Following is a brief summary of the Planning Specialist Report (Appendix L):

Affected Environment

Identification of a need for commercial and personal forest product harvest opportunities: Public comment expressed a need for providing commercial and personal forest product harvest opportunities during implementation of this project. It is important to note that the purpose of this project is to improve public and firefighter safety by removing hazard trees and reducing fuels in the project area. Providing opportunities for forest product harvest is not the purpose of this project. Forest product harvest is a tool that can be utilized to meet the project purpose and need. Analysis for this issue discloses potential for the proposed action and no-action alternatives to provide forest product harvest opportunities. Due to close proximity to Red Lodge, West Fork Rock Creek is a popular personal use firewood collection and Christmas tree harvest area. The Cascade Fire area is currently closed to personal use firewood harvest through a special Forest Order. Personal use post and pole harvest also occurs in the drainage in specific areas. Some commercial bough harvest occurs along Ski Run Road #21479, just north of the West Fork Rock Creek. No other commercial or personal use forest product harvest opportunities are currently in place in the West Fork Rock Creek.

Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging: The affected environment is areas near and adjacent to West Fork Road #2071 where forest products are available proximal to the road.

Effects of project implementation to West Fork Road: The only road leading into and out of the West Fork of Rock Creek is Forest Road # 2071. Under the Beartooth Travel Management Plan (USDA 2008), West Fork Road #2071 is open to motorized use April 15 to December 1 to allow for non-motorized winter recreation opportunities. The affected environment of and effects to recreational users of West Fork Road and various other resources associated with or near the road are considered in project specialist reports (see EA and project record).

Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations: Forestry and fuels reduction employment plays a small role in the local and regional economy. For the first 3 quarters of 2008, less than 1% of employment was in Forestry and Logging and the Agriculture & Forestry Support Industry in all the Montana counties surrounding the Beartooth District (MTDLI 2009). There is no local or regional industry or employer that depends upon fuels reduction or wood product removal on the Beartooth Ranger District. Similar Beartooth District projects implemented in the past relied on contract workers from other parts of Montana or Wyoming. Any jobs generated by this project would be short-term (1 to 5 years in duration) employment in timber extraction or fuels reduction activities, primarily heavy equipment or chainsaw operation, and would most likely rely on workers from outside Carbon County.

Effects of project on carbon flux: Carbon is continuously cycled among aboveground and belowground biomass, dead wood, forest litter, and soil organic matter and between forest ecosystems and the atmosphere as a result of biological processes in forests (e.g., photosynthesis, respiration, growth, mortality, decomposition, and disturbances such as fires or pest outbreaks) and anthropogenic activities

(e.g., harvesting, thinning, clearing, and replanting). Because of the extensive tree mortality from the recent wind and fire events, approximately two-thirds of the proposed treatment area is estimated to currently be a net carbon source. That is, the tree mortality from these events have changed forest conditions from a situation where more carbon was being removed from the atmosphere then was being emitted (sink) to forest conditions that are emitting more atmospheric carbon through decay than is being absorbed through tree growth (source). Those forest stands not affected by these recent disturbance events are likely net carbon sinks at this point in their development. Over the long-term (centuries) net carbon storage is often zero, if stands regenerate, because re-growth of trees recovers the carbon lost in the disturbance and in decomposition of trees killed by the disturbance (Kashian et al. 2006). Forests of the United States store approximately 66,600 Mt (million metric tons) of carbon (Birdsey et al 2007). Forest carbon stocks of the entire Custer National Forest are estimated from forest inventory plots to be less than five one hundredth of a percent (0.0005) of total U.S. forest carbon stocks. The West Fork Rock Creek Project would affect only a tiny percentage of the forest carbon stocks of the Custer National Forest, and an infinitesimal amount of the total forest carbon stocks of the United States.

Effects of the No-Action Alternative

Identification of a need for commercial and personal forest product harvest opportunities: Firewood harvest would continue to occur only in unburned portions of the West Fork. No additional areas would be made available.

Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging: Existing personal use post and pole harvest areas would remain available for harvest using small equipment. No additional potential areas would be made available.

Effects of project implementation to West Fork Road: Dead trees, dying trees, and burned hazard trees would remain immediately adjacent to the road. As these trees deteriorate or if future wind events occur in the drainage, they could fall onto the road, blocking access or egress, damaging road infrastructure (culverts, ditches, bridges, the road surface, etc.), and potentially injuring or killing forest visitors (Figure 8). There would be no potential damages from project implementation equipment (see effects discussion for Proposed Action alternative below). The No Action would not comply with Forest Plan Forest Transportation System management standards.

Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations: The No Action Alternative would not have measurable effects to the local economy.

Effects of project on carbon flux: Areas disturbed by the 2007 storm event and the 2008 Cascade fire would remain a net source of carbon to the atmosphere until carbon uptake by new trees exceeds the emissions from decomposing dead organic material, likely within several years to several decades. Rates of sequestration would gradually increase then eventually taper off (although likely remain net positive) as stands age and growth slows (Pregitzer and Euskirchen 2004). Carbon sequestered in these regenerated forests would eventually be released when a new disturbance (fire, wind, insect infestations, etc.) occurs and the forest stands revert to net sources of atmospheric carbon. Those forest stands not affected by these recent disturbance events are likely net carbon sinks at this point in their development.

Under the No Action alternative, they would continue as sinks until the next disturbance event (fire, wind, insect infestation, etc.) occurs.

Figure 8. Vehicle damaged by 11/2007 wind event on West Fork Road #2071. No injuries occurred.

Effects of the Action Alternative

Identification of a need for commercial and personal forest product harvest opportunities: The Proposed Action would result in additional opportunities for forest product harvest. This would include commercial harvest opportunities for firewood and posts and poles. Burned areas would be opened to personal use firewood harvest with specific mitigation measures (see Action Alternative Design and Mitigation Measures section of this document). Proposed thinning and removal of ladder fuels would likely reduce the overall area near West Fork Road #2071 where Christmas trees are currently available. Additional firewood and bough material would be made available as live trees are cut and log decks of non-merchantable material are provided for collection.

Concern about use of heavy equipment and suggestion for use of smaller equipment, such as horse logging: Treatment areas could be made available to potential treatment using smaller equipment if such equipment could meet the contractual terms and conditions and applicable environmental protection measures.

Effects of project implementation to the West Fork Road: Dead, dying, and burned hazard trees would be removed from areas adjacent to and near West Fork Road, thereby reducing the potential for such trees to fall onto the road, blocking access or egress, damaging road infrastructure (culverts, ditches, bridges, the road surface, etc.), and potentially injuring or killing forest visitors. Project implementation traffic on the road would impact the road surface and infrastructure due to potential transport of implementation personnel, wood products, transport of heavy machinery, and winter snowplowing. Contractors would be responsible for repair of any wear and tear or damages they cause. The Proposed Action would comply with Forest Plan Forest Transportation System management standards.

Effects to local economy, with consideration of viability of forest products and costs/benefits of mitigations: Results of the economic analysis completed for the project indicate that this project is not economically feasible. The timber sale appraisal shows a negative value for the proposed harvest of timber (see project record). At an estimated cost of $900 per acre for non-commercial fuels treatments, this project becomes less economically feasible. Treatments would be prioritized and accomplished as appropriated funding is made available or as contracts can be sold. In the event that contracts are sold or funding becomes available for the Proposed Action, project implementation would temporarily create some new jobs and/or support existing jobs. Because less than 1% of employees in the local and regional economy are in the Forestry and Logging and the Agriculture & Forestry Support industries, any support of existing jobs or temporary jobs generated by the proposed action would not noticeably affect the local or regional economy.

Effects of project on carbon flux: Areas not proposed for treatment would have effects similar to those described under the No Action alternative (see above). Within proposed treatment areas, harvest of live and dead timber and other fuel reduction activities, including prescribed burning, would temporarily alter carbon stores and carbon flux rates by removing some carbon stored in biomass. Removal of dead wood in burned and wind damaged areas would reduce onsite carbon stores. The portion removed as wood products may partially delay carbon release relative to on-site decay rates. The portion burned in piles would hasten release of that carbon to the atmosphere compared to on-site decay rates. Treated burned and wind-damaged stands would continue to emit more carbon than they absorb, but to a lesser extent than under the no-action alternative. Treated burned and wind-damaged stands would remain net carbon sources until trees that sequester additional carbon are well established. Where thinning of live trees is the predominant activity to occur, areas could temporarily move from a carbon sink to a carbon source. As stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive (Pregitzer and Euskirchen 2004). Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances. These local changes are similar to those that occur under natural forest disturbance events such as fire, wind, or insect epidemics. Although thinning and pile burning under the proposed action would reduce standing carbon stocks and result in atmospheric emission of carbon, compared to the no action alternative, these treatments would reduce the amount of carbon likely to be released to the atmosphere due to future fire disturbance (Finkral and Evans 2008). The proposed action is consistent with research recommendations (Krankina and Harmon 2007) for protecting carbon gains against the potential impacts of future climate change by reducing fuel loads through thinning. The short-term change in carbon stocks and sequestration rates resulting from the proposed action are imperceptibly small on global and national scales, as are the potential long-term benefits. In conclusion, the project would have no discernable impact on atmospheric concentrations of greenhouse gases, or global warming.

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Forest Service Interdisciplinary (ID) Team Members and other Forest Service personnel involved in this project are listed in Table 12.

Table 12. ID Team Members.

Position Title	Person	Project Responsibilities
Forest Supervisor / Responsible Official	Mary Erickson	Responsible Official.
District Ranger	Traute Parrie	Public collaboration. Project management oversight. Project record review.
ID Team Leader	Dan Seifert	IDT Leader. Public collaboration. Writer-editor. GIS support. Project record documentation. Inventoried Roadless Areas, A-B Wilderness & Un-roaded Areas input. Planning specialist input.
Engineering	Arlin Krogstad	Engineering / transportation input. Property boundary surveys.
Fisheries	Darin Watschke	Fisheries input.
Fuels	Mark Hale	Fuels and fire suppression input.
Fuels	Jeff Stockwell	Fuels oversite. Fire suppression input.
GIS Support	Mary Gonzales	GIS analysis.
Heritage	Mike Bergstrom	Heritage input.
Heritage consultation	Halcyon LaPoint	Heritage input review and approval. Coordination with tribes and Montana SHPO.
Hydrologist	Mark Nienow	Water resources input.
Landscape architect	Nicole Hill	Visuals/landscape architecture input.

Noxious weeds and Range	Terry Jones	Noxious weeds and range input.
Planner	Mark Slacks	36 CFR 218 objection process coordination.
Planner	Pete Zimmerman	Carbon flux analysis.
Planner	Jim Morrison	Carbon flux analysis.
Recreation	Jeff Gildehaus	Recreation input. Unit design at/near developed recreation sites.
Sensitive Plants	Kim Reid	Sensitive plants input and biological evaluation.
Silviculture	Dennis Sandbak	Forest Vegetation and silviculture input.
Soils	John Lane	Soils input.
Timber	Eric Stiefvater	Timber input. GIS support. Logging systems & timber unit layout.
Timber	John Clark	Timber review & oversight. Timber sale appraisal.
Wildlife biologist	Barb Pitman	Wildlife input and biological evaluation & assessment. USFWS informal consultation.
Wildlife biologist	Tom Whitford	Wildlife input. Biological Evaluation review and approval.

FEDERAL, STATE, AND LOCAL AGENCIES:

Federal:

Lou Hanebury and Mark Wilson, U.S. Fish and Wildlife Service.

State:

Dick Moore, Fred Bicha, and Bob Moorehead, State of Montana Department of Natural Resources and Conservation.

Jeremiah Wood and Shawn Stewart, State of Montana Fish Wildlife and Parks.

Mark Baumler, Montana State Historic Preservation Officer.

Local:

Carbon County Commissioners.

Carbon County Historic Preservation Officer.

Stillwater County Commissioners.

Stillwater County Sheriff and Coroner.

Mayor Betsy Scanlin, City of Red Lodge.

City Council, City of Red Lodge.

Tom Kuntz, Red Lodge City/Rural Fire Department

Nye Volunteer Fire Department.

TRIBES:

Crow Tribe.

Eastern Shoshone Tribe.

REFERENCES CITED

ARM 2007. Administrative Rules of Montana, Title 36 – Natural Resources and Conservation, Chapter 9 – Forestry, Subchapter 3 - Streamside Management Zone Rules. Helena, MT. Available online at: http://www.mt.nrcs.usda.gov/technical/ecs/forestry/technotes/forestryMT18/

Birdsey, R.A., J.C. Jenkins, M. Johnston, E. Huber-Sannwald, B. Amero, B. de Jong, J.D.F. Barra, N. French, F. Garcia-Oliva, M. Harmon, L.S. Heath, V.J. Jaramillo, K. Johnsen, B.E. Law, E. Marin-Spiotta, O. Masera, R. Neilson, Y. Pan, and K.S. Pregitzer. 2007. North American Forests. In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle.* A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, RA Houghton, G Marland, AZ Rose, and TJ Wilbanks (eds.)]. National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, pp. 117-126.

Carbon County 2005. Carbon County Pre-Disaster Mitigation/Community Wildlife Protection Plan. Available online at: http://dma.mt.gov/DES/Counties/carbon/index.asp

City of Red Lodge 2008. 2008 Red Lodge Growth Policy. Available online at: http://www.cityofredlodge.com/downloads/DevCode/2008%20Red%20Lodge%20Growth%20Policy%20071208%20no%20maps.pdf

Clark, Dr. Wilson F. 1982. A General History of the Custer National Forest. Unpublished report on file at Custer National Forest offices.

Cohen, Jack D. 1999. Reducing the wildland fire threat to homes: Where and how much?. In: Gonzales-Caban, Armando; Omi, Philip N., technical coordinators. Proceedings of the Symposium on Fire Economics, Planning, and Policy: Bottom Lines; 1999 April 5-9. San Diego, CA. Gen. Tech. Rep.

PSW-GTR-173. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. p. 189-195. Available online at: http://treesearch.fs.fed.us/pubs/5603

Connaughton 2002. Council on Environmental Quality December 9, 2002 memoradum. Subject: Guidance for environmental assessments of forest health projects. Available online at: http://ceq.hss.doe.gov/nepa/regs/guidance_for_environmental_assessments.pdf

DNRC 1993. Montana Department of Natural Resources and Conservation Fire Protection Guidelines for Wildland Residential Interface Development. Montana DNRC, Forestry Division, Missoula, MT. Available online at: http://dnrc.mt.gov/forestry/Fire/Prevention/documents/WUIrewrite/protguwp.pdf

DNRC 2002. Montana Department of Natural Resources and Conservation. Best management practices for forestry in Montana. MTDNRC, Forestry Division, Missoula, MT. Available online at: http://dnrc.mt.gov/forestry/serviceforestry/ForestryBestManagementPractices/BMPs.pdf

Federal Register 2001. Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire; Notice. Published in Federal Register: August 17, 2001, Volume 66, Number 160, Page 43384. Available online at: http://www.gpoaccess.gov/fr/

Finkral, A.J. and Evans, A.M. 2008. The effects of a thinning treatment on carbon stocks in a northern Arizona ponderosa pine forest. Forest Ecology and Management 255: 2743-2750.

Gibson, Ken. 2004. Mountain Pine Beetle Management. March 2004, 4.1. USDA Forest Service Regions 1 and 4 Forest Health Protection. Missoula, MT. 16 p.

Gibson, Ken. 2008. Trip Report MFO-TR-08-03, Blowdown on Beartooth Ranger District, Custer National Forest, May 20-21, 2008. USDA Forest Service, Intermountain and Northern Regions Forest Health Protection. Unpublished report. 13 p.

Graham R. T. Jain T. B. and McCaffrey S. January 2004. Science basis for changing forest structure to modify wildfire behavior and severity. General Technical Report RMRS-GTR-120. Fort Collins CO: USDA Forest Service Rocky Mountain Research Station. 49 pp. Available online at: http://www.fs.fed.us/rm/pubs/rmrs_gtr120.pdf

Hann et. al. 2008. Interagency and The Natural Conservancy fire regime condition class website. USDA Forest Service, US Department of the Interior, The nature Conservancy and Systems for Environmental Management. *Available online at:* Available online at http://www.frcc.gov. Accessed July, 2008.

Healthy Forest Restoration Act of 2003. Available online at: http://www.fs.fed.us/biology/wildecology/HFRA.pdf

Kashian, DM; WH Romme; DB Tinker; MG Turner; and MG Ryan 2006. Carbon storage on landscapes with stand-replacing fires. BioScience 56: 598-606. Available online at: http://www.bioone.org/doi/pdf/10.1641/0006-3568%282006%2956%5B598%3ACSOLWS%5D2.0.CO%3B2

Krankina ON and ME Harmon 2006. Forest Management Strategies for Carbon Storage. In Forests, Carbon and Climate Change: A Synthesis of Science Findings, a report by The Oregon Forest Resources Institute, Oregon State University College of Forestry, and Oregon Department of Forestry: 79-92.

Meyer GA and JL Pierce. 2003. Climatic controls on fire-induced sediment pulses in Yellowstone National Park and central Idaho: a long-term perspective, Forest Ecology and Management, Volume 178, Issues 1-2, The Effect of Wildland Fire on Aquatic Ecosystems in the Western USA., 3 June 2003, Pages 89-104.

Miller Eric, Rebecca J. Seifert, Scott A. Weyenberg, Sean C. McEldery, Andy C. Oestreich, Shawn J. Jackson, Emily R. Moss, Victoria A. Pecha, Roy A. Renkin, and Steve Petrick-Underwood 2004. A Fuel Appraisal Photoseries and Fuel Model for Early Post-fire Lodgepole Pine Forests in Yellowstone National Park. Abstract published in *Rx Effects, Volume 1, Issue 4, Spring 2004* by US Department Of Interior, National Park Service Fire Effects Monitoring Program. Photoguide and fuel models are presented on a separate CD ROM.

Miller WW, DW Johnson, TM Loupe, JS Sedinger, EM Carroll, JD Murphy, RF Walker and D Glass. 2006. Nutrients flow from runoff at burned forest site in Lake Tahoe Basin. California Agriculture, Volume 60, Number 2. Available online at: http://calag.ucop.edu/0602AMJ/pdfs/3_BurnRunoff.pdf

Montana Bureau of Mines and Geology 2008. Lab analysis results of ash and soil samples from the 2008 Cascade Fire, Custer National Forest. Excel spreadsheet.

Montana Natural Heritage Program 2008. Online Natural Heritage Program Species of Concern database. Available at http://mtnhp.org/speciesofconcern/

Montana State Water Conservation Board 1966. Water Resources Survey, Carbon County Montana (Resurvey). Published by State Water Conservation Board, Helena, MT June 1966.

MTDLI 2009. Montana Department of Labor and Industry Research and Analysis Bureau website queries *for* first 3 quarters in 2008 in Bighorn, Carbon, Park, Stillwater, Sweetgrass, and Yellowstone County employment *for* Forestry and Logging occupations and Agriculture and Forestry Support occupations and *for* Total average county employment. Databse is available for query online at: http://www.ourfactsyourfuture.org/

Pregitzer KS and ES Euskirchen 2004. Carbon cycling and storage in world forests: biome patterns related to forest age. Global Change Biology 10: 2052-2077. Available online at: http://www3.interscience.wiley.com/journal/118805398/abstract?CRETRY=1&SRETRY=0

Rothermel R 1983. How to Predict the Spread and Intensity of Forest and Range Fires. USDA Forest Service Intermountain Research Station, Research Paper, INT-143, 161p.

Ryan Robert L. 2005. Social Science to improve fuels management: a synthesis of research on aesthetics and fuels management. Gen. Tech. Rep. NC-261. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 58 p.

Samman Safiya and Logan, Jesse, tech. eds. 2000. Assessment and response to bark beetle outbreaks in the Rocky Mountain area. Report to Congress from Forest Health Protection, Washington Office, Forest Service, U.S.Department of Agriculture. Gen. Tech. Rep RMRS-GTR-62. Ogden, UT: U.S. Department of Agriculture, ForestService, Rocky Mountain Research Station. 46 p. Available online at: http://www.fs.fed.us/rm/pubs/rmrs_gtr62.pdf

Scott Joe H 2003. Canopy Fuel Treatment Standards for the Wildland –Urban Interface, RMRS-P-29. Missoula, MT: USDA Forest Service Proceedings. 9p. Available online at: http://www-laep.ced.berkeley.edu/classes/tool_time/fire_lab/lab7/farsite_readings/rmrs_p029_029_038.pdf

Stednick John D. 1996. Monitoring the effects of timber harvest on annual water yield. Journal of Hydrology. 176:79-95.

Stimson, Jim 2003. Montana DEQ Source Water Delineation and Assessment Report for City of Red Lodge. Available online at: http://www.deq.mt.gov/ppa/swp/nrisreports/MT0000314.htm

Stimson, Jim and M. Simons 2004. Timbercrest Girl Scout Camp Source Water Delineation and Assessment Report. Available online at: http://www.deq.mt.gov/ppa/swp/nrisreports/MT0002507.htm

Swierc, James. 2003. Basin Campground Source Water Delineation andAssessment Report. Available online at: http://www.deq.mt.gov/ppa/swp/nrisreports/MT0062235.htm

Troendle Charles A. 1983. The Deadhorse Experiment: A Field Verification of the Subalpine Water Balance Model. U.S. Dept. of Agriculture - Forest Service, Research Paper RM425. Rocky Mountain Forest and Range Experiment Station. Fort Collins, CO. 7 p.

USDA 1986. Custer Forest Plan. US Forest Service, Northern Region, Custer National Forest. Available online at: http://www.fs.fed.us/r1/custer/projects/environmental/index

USDA 1999. Forest Service Manual, 2550 - Soil Management. Region 1 Supplement 2500-99-1. Missoula, MT. Available online at: http://www.fs.fed.us/im/directives/field/r1/fsm/2500/2550.rtf

USDA 2000. Northern Region Snag Management Protocol. USDA Forest Service, Northern Region. Missoula, MT. Available online at:
http://www.landsinfo.org/ecosystem_defense/science_documents/USDA_Forest_Service_2000d.pdf

USDA 2001. Forest Service Manual 2080, Region 1 Supplement Number R1 2000-2001-1. Noxious Weed Management Northern Region (Region 1)
Missoula, MT. Available online at:
http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsm?2000

USDA 2004. List of USDA Forest Service, Region 1 Sensitive Plant Species for the State of Montana. 10/28/2004. Unpublished list from Region 1 Regional Office, Missoula, Montana. 4 pages.

USDA 2005. Wildland Urban Interface and Large Scale Hazardous Fuels Reduction Site Inventory Strategy. Unpublished report, Custer National Forest, Billings, MT. 14 pages.

USDA 2006. Custer National Forest Weed Management Final Environmental Impact Statement. US Forest Service, Northern Region, Custer National Forest. Available online at:
http://www.fs.fed.us/r1/custer/projects/planning/weedwebdocs/index.shtml

USDA 2007. Custer Forest Plan Amendment 41 - Northern Rockies Lynx Management Direction Record of Decision. March 2007. National Forests of Montana, and parts of Idaho, Wyoming, and Utah. 67 pages.

USDA 2008a. Cascade Fire BAER report and summary. Unpublished report and maps. Custer National Forest, Red Lodge, MT.

USDA 2008b. Cascade Fire LaSER report and appendices. Unpublished report and maps. Custer National Forest, Red Lodge, MT.

USDA 2008c. Custer National Forest Fire Management Plan. US Forest Service, Northern Region, Custer National Forest. Unpublished report on file at Custer National Forest offices.

USDA 2008d. Beartooth Travel Management Plan. US Forest Service, Northern Region, Custer National Forest. Available online at: http://www.fs.fed.us/r1/custer/projects/planning/nepa/d2_travel_mgmt/index.shtml

USDA 2008e. Threatened, Endangered, And Sensitive Species Lists For Wildlife And Fish Threatened And Endangered Species List For Plants. October 2008. Unpublished list from USFS Region 1 Regional Office, Missoula, Montana. 7 pages.

USFWS 2009. United States Department Of The Interior Fish and Wildlife Service Threatened, Endangered And Candidate Species For The Custer National Forest 3/19/2009. Available online at: http://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species/Forests/Custer_sp_list.pdf

Western Governor's Association 2006. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-year Strategy Implementation Plan. Available online at: http://www.forestsandrangelands.gov/plan/documents/10-YearStrategyFinal_Dec2006.pdf

Westerling,AL, HG Hidalgo, DR Cayan, and TW Swetnam 2006. Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity (18 August 2006) Science 313 (5789), 940. Accessed online 4/24/08 at: http://www.sciencemag.org/cgi/reprint/313/5789/940.pdf

Wondzell SM and JG King. 2003. Post-fire erosional processes in the Pacific Northwest and Rocky Mountain region. Forest Ecology and Management 178:75-87.