Chapter 3: Affected Environment and Environmental Consequences

3.1 INTRODUCTION

This chapter describes the affected environment, methodology for analysis, and the direct, indirect and cumulative effects of the alternatives. The resource summaries focus on those aspects of the physical, biological, and human environment most likely to be affected by the alternatives. More detailed information on certain resources, where necessary to more fully can be found in the resource specialist's reports in the project record.

3.1.1 DIRECT AND INDIRECT EFFECTS

Direct effects are caused by an action and occur at the same time and place. Indirect effects are caused by an action and occur later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1500-1508). Direct and indirect effects analysis for each alternative and each resource area are based on the factors outlined in alternative descriptions of the alternatives provided in Chapter 2.

3.1.2 CUMULATIVE EFFECTS

Cumulative impacts on the environment result from the incremental impact of actions when added to other past, present, and reasonably foreseeable future actions. For each resource, an analysis area was identified and used to adequately measure cumulative effects of the proposed alternative. Unless otherwise stated, the cumulative effects area, or the geographic scope, is the District. For temporal scope, a ten year timeframe for project implementation is used.

3.1.2.1 Past, Present, and Reasonably Foreseeable Activities

Past Actions are addressed by the Council on Environmental Quality[1] (CEQ) in the following manner, "Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."[2] In other words, the effects of all past actions have created the current affected environment/existing condition, consequently specific past actions do not need to be identified for the cumulative impacts analysis. However, in general, past actions include grazing, timber harvest, mining and exploration, recreational camping, prescribed burning, and small product removal (i.e., post and poles, and firewood).

Present Actions are typically ongoing activities and are treated similarly to past actions. Anticipated future changes in these activities are included under reasonably foreseeable actions.

Reasonably Foreseeable Actions are those which are formal proposals or decisions not yet implemented at the time of the analysis. Activities that add to the effects of designated travel routes

[1] CEQ is the agency responsible for promulgation of regulations and guidance for the National Environemental Policy Act.
[2] CEQ's June 24, 2005 Memo

include wildfires, timber harvesting, fuel reduction, livestock grazing, and recreational uses (hunting, hiking, motorized recreation, etc.). These activities will continue to influence the landscape. These reasonably foreseeable and ongoing (previously planned) activities on NFS lands are considered in the effects analysis shown in the following two Tables.

Table 3-1. Reasonably Foreseeable Activities[3]

Project Name	Type of Project
East Pryor Interagency Communications Site	Facility Management
Grizzly Peak Fuel Management	Fuels Management
Piney Creek Pool Enhancement	Fisheries Habitat Management
Beartooth Front Grazing Allotment Planning	Grazing Management
Sage Creek Assessment	Grazing Management
Big Ice Cave Mineral Withdrawal	Minerals Withdrawal
Stillwater Mining Company, Closure and Post Closure	Minerals Management
Pryor Mountain Aspen Regeneration & Restoration	Wildlife Management
Crooked Creek Road Improvement Project	Road Management
Initial Creek ROW and Trail Construction	Trails Management
Pine Grove Campground Cleanup	Recreation Management
Red Lodge Crk, Butcher Crk, East and West Rosebud Crks Allotment Management Planning	Grazing Management
Recreation Residence Deck Construction	Recreation Management
Senia Creek Trail Re-Alignment	Trail Management
Skyline Guest Ranch and Guide Service SUP	Recreation Management
Beartooth Unit Wind Event Cleanup (Outside Campgrounds)	Fuels Management
Recreation Residence Permit Reissuance	Recreation Management

Table 3-2. Ongoing / Upcoming Activities Considered in Cumulative Effects

Project Name	Type of Project
Beartooth Aspen Treatment	Wildlife Management
Locatable Minerals Development; Stillwater Mine Company operations	Mineral Management
Plan of Operations - Stillwater Complex (~ 3 three annually) for locatable minerals	Mineral Management
Pryor Mtn reclamation of two abandoned uranium mines (Sandra and Old Glory)	Mineral Management
Gas exploration /development – Line Creek Face (WY)	Mineral Management – Shoshone NF and adjacent Private land
Private, adjacent to NFS - Pryor Mtn. Limestone Existing Operations (~ 200 Ac) and potential expansion (~300 Ac)	Mineral Management
Recreational Use – hunting, camping, viewing, etc.	Recreation Management
Weed Treatment – District-wide	Weed Management
Fuels Treatments (acres)	Fuels Management
Permitted Grazing (~54,000 suitable acres)	Grazing Management
Interagency Wild Horse Herd Management Area Plan Revision	Wild Horse Management

[3] Source: April 2008 Quarterly Schedule of Proposed Actions (SOPA), Custer National Forest. Projects that were fully implemented after distribution of the SOPA, but prior to publishing this document have been dropped since the table is intended to identify future actions.

Table 3-2. Ongoing / Upcoming Activities Considered in Cumulative Effects

Project Name	Type of Project
Acton Recreation Area OHV Travel Management (BLM)	Travel Management
Horsethief High Priority Area OHV Travel Management (BLM)	Travel Management
Shepard An Nei OHV Travel Management (BLM)	Travel Management
Helena Travel Planning – North Belts	Travel Management
Helena Travel Planning – South Belts	Travel Management
Gallatin Travel Planning – Forest-Wide	Travel Management
Lewis and Clark Travel Planning – Rocky Mountain District, Birch Creek South	Travel Management
Lewis and Clark Travel Planning – Little Belt, Castles, and North Half Crazy Mountains	Travel Management

Use of travel routes will continue on privately-owned and public lands within and adjacent to the Custer National Forest. Government agencies such as the National Park Service, Bureau of Land Management, Gallatin National Forest, Shoshone National Forest, Bighorn National Forest, Montana Fish, Wildlife and Parks, Montana Department of Transportation, Montana Department of Natural Resources, local municipalities, Stillwater, Park, Carbon, and Sweet Grass counties of Montana, all travel routes, and to varying degrees, manage them to different standards and restrictions.

3.1.2.2 Activities Considered But Dropped As Reasonably Foreseeable Future Actions

The following activities were considered during identification of reasonably foreseeable future actions. However, each was determined to be "speculative" at this point in time. Items were determined to be speculative if a formal proposal has not been developed for activities that would require NEPA, or the proposal has not otherwise been sufficiently developed to identify effects. Projects include the Custer NF Recreation Site Facility Master Planning 5-Year Proposed Program of Work; Bureau of Land Management Travel Management Planning – Pryor Area; Red Lodge Trail Planning; Lilly Pad Trail Planning; and Beartooth Recreational Trail Association - Red Lodge Creek Trail Planning.

3.1.3 ENVIRONMENTAL JUSTICE

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low Income Populations" requires all Federal agencies to incorporate environmental justice into their mission. No effects to the well-being and the health of minorities and low income groups were identified during scoping and the proposed action would not disproportionately affect minority or low-income populations. Three Indian Reservations are located within the region. No issues of disproportionate distribution of project impacts were found regarding any racial minorities or impoverished populations within the project area that might be affected by implementation of this project. Minority and low income populations will be treated the same as all with respect to travel opportunities.

3.1.4 NATIVE AMERICAN TREATY RIGHTS

Many tribes have aboriginal ties and use area within the Custer National Forest, including Crow, Northern Cheyenne, Assiniboine, Shoshone, Arapahoe, Shoshone-Bannock, and Three Affiliated and the Great Sioux Nation. The Crow have treaty rights under the Fort Laramie Treaties to use the National Forests for hunting and gathering. None of the alternatives would affect these treaty rights.

3.1.5 UNAVOIDABLE ADVERSE EFFECTS (40 CFR 1502.16)

Chapter 3 of this EIS addresses the potential environmental consequences of the alternatives for Travel Management on the District. In general, any adverse "environmental" effects can be avoided through increased restrictions on human use. However, increased restrictions also limit recreation opportunities. The alternatives were created, in part, to address issues and provide a clear basis for comparison. Adoption of Beartooth Ranger District Travel Management direction does not necessarily mean that adverse environmental effects cannot be avoided. However, some resource impacts may be determined to be acceptable in light of providing for a variety of recreation uses. No unavoidable adverse effects to the various resources that are located within or adjacent to the project area were found. Implementation of any of the alternatives is not expected to move any sensitive wildlife species toward federal listing or threatened/endangered species to be in jeopardy.

3.1.6 RELATIONSHIP BETWEEN SHORT TERM USE AND LONG TERM PRODUCTIVITY (40 CFR 1502.16)

Chapter 3 of this EIS discusses the potential resource impacts of each of the alternatives including the potential consequences to soil, vegetation, water quality and biological diversity. Otherwise human travel within the Beartooth Ranger District would not be considered a short-term consumptive use such as timber harvest or mining. In general travel would not affect the ability of the land to produce continuous supplies of other Forest resources. Selection of any of the alternatives considered in this analysis is expected to affect the long term productivity of the soil and vegetation resources within system route prisms while they are in use. Soil and vegetation function and productivity on roads and trails can be recovered if at some future time it is deemed as a need.

3.1.7 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES (40 CFR 1502.16)

An "irreversible" commitment of resources results from a decision to use or modify resources that are renewable only over a long period of time. Non-renewable resources, such as minerals, are an irreversible commitment if used. An "irretrievable" commitment of resources refers to resources, resource production or the use of renewable resources that are lost because of land allocation or scheduling decisions. Proposed actions can result in certain effects to various resources which are described throughout Chapter 3 of this EIS. The decision for Beartooth District Travel Management would not result in any irreversible commitment of resources. The decision for Beartooth District Travel Management could result in irretrievable commitment of soil and vegetation resources for as long as the road or trail exists.

3.1.8 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL (40 CFR 1502.16)

The Forest determined that the action alternatives would not affect energy consumption. People will continue to recreate on the District and consume energy for that purpose. The alternatives are not anticipated to change the amount of motorized or non-motorized use of the District, and therefore there would be no change in the amount of energy consumption due to the alternatives. Use on the Distict is anticipated to increase based on other factors, such as increases in population, but these factors would not be influenced by the alternatives.

3.2 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES – SIGNIFICANT ISSUES

The affected environment and environmental consequences (direct, indirect, and cumulative effects) for each alternative are organized by issue topic area and are addressed below.

3.2.1 RECREATION

This topic addresses general recreation, which focuses on opportunities for recreational activities, potential for travel planning to impact the human environment and discusses the potential for noise to impact the quality of various recreation activities.

3.2.1.1 Affected Environment – Recreation

Overview of Changes from the Draft to the Final EIS

- In response to public comment, the analysis identifies effects by land unit and the District, wherever possible.
- The analysis has been more sharply focused on the indicators related to recreation issues. This has allowed some of the affected environment text to be eliminated or moved to the project record, as well as a more concise presentation in the environmental consequences section.

Introduction

Comments related to recreation on the Beartooth Travel Management Proposal could generally be categorized as issues associated with the loss of recreation opportunities or activities, or issues associated with reduced quality of recreation experiences. Losses of opportunities were typically portrayed as loss of opportunities for family experiences, solitude, adventure, and connections with places that are special to individuals. Specifically, there were concerns about loss of motorized recreation, OHV use opportunities, non-motorized recreation, dispersed vehicle camping, hunting, hiking, horseback riding, target shooting and firewood cutting. Concerns about the reduced quality of experience related to the potential for loss of opportunities for family experiences, increased congestion, and loss of solitude.

Regulatory Framework

The Custer Forest Plan identifies both Forest-wide and management area-specific direction for recreation management. The Forest-wide goal "is to provide a broad spectrum of recreation experience opportunities". The more specific guidance provided in the management area direction of the Plan reflects this goal and represents providing a broad range of differing recreation opportunities.

Effects Analysis Methodology

Motorized and non-motorized recreation opportunities were evaluated based on the acres available in each Recreation Opportunity Spectrum (ROS) setting by season of use for the Pryor and the Beartooth Units, as well as the miles of motorized and non-motorized routes available by alternative for each unit.

The ROS under this analysis includes the following settings: rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive. Full definitions of each of the ROS settings are provided later in this section. For this analysis, the Forest Service began by assigning ROS classifications using the National ROS Inventory Mapping Protocol dated 07/01/2003 and based on

type of travel (motorized wheeled vehicle versus non-motorized horse/hike/bike travel) allowed on each road and trail. The protocol assigns a one half mile width along each side of motorized wheeled vehicle routes to include in the total acres as the area utilized by motorized activities primarily due to noise.

The miles available for motorized recreation opportunities by alternative were used to determine potential for congestion effects.

Evaluation of opportunities for specific activities involved quantitative consideration of miles of roads and trails available, as well as ROS class acres, by season of use for the Pryor and the Beartooth Units, for each alternative. In addition, trends associated with specific types of recreation and the most current estimates of activity types occurring on the Forest were considered.

The Recreation Setting

The District can be described as a land of peaks and plateaus, lakes and canyons representing a wide range of eco-systems from the desert/sagebrush of the Pryor Mountains to the sub-alpine tundra and glaciers of the Beartooth Mountains. The majority of recreation activities occur in conjunction with the motorized and non-motorized travel corridors on the District.

The Beartooth Mountains and the A-B Wilderness are a part of the Greater Yellowstone Area and are important to the local communities as well as being nationally and internationally recognized for the outdoor recreation opportunities they provide. Fifty-five percent of the District lies within the Absaroka-Beartooth Wilderness (332,490 acres). The A-B Wilderness is one of the most heavily used Wildernesses in the Northern Region of the Forest Service. Red Lodge, Montana serves as the northeast gateway to this country and on to Yellowstone National Park via the Beartooth Highway (U.S. 212), an All American Road Scenic Byway.

The terrain of the Beartooth Mountains dictates where most of the roads and trails are located. The roads along the Beartooth front run up most of the major drainages terminating at trailheads that provide access into the A-B Wilderness. Most trails run up drainages and over high mountain passes or plateaus in between. Thirty-four trailheads provide access to 279 miles of trail. The lakes are located on the plateaus and in the drainages and are major attractions for fishing, backpacking and horse pack trips. They also serve as base camps for off-trail hiking and climbing expeditions. Eighteen permitted outfitter/guide operations provide a wide range of services to the public from fly fishing to technical rock climbing. Fifteen campgrounds, four picnic grounds, ninety-nine recreation residences and three organization camps provide accommodations and access to the Beartooths for the public as well.

The Beartooths provide a unique recreation opportunity to experience a combination of high alpine lakes, plateaus, and dramatic glacial valleys with lakes and waterfalls not found elsewhere in the Greater Yellowstone Area, especially with easy access to a paved highway.

During the past 15 years, use of the Main Fork of Rock Creek Road #2421 corridor for dispersed camping has greatly increased. Associated with that activity are impacts such as: loss of vegetation, unauthorized motorized routes, soil disturbance, spread of noxious weeds, accumulation of litter and human waste, and the development of numerous fire rings. Those impacts have, to some extent, degraded the scenic and aesthetic qualities along portions of the Main Fork of Rock Creek.

The terrain of the Pryor Mountains also dictates where most of the roads are located. The roads accessing the western slope lie along the base of the mountains primarily on Bureau of Land Management administered lands with primitive native surfaced roads providing access onto the National Forest. Both system and unauthorized routes run into the canyons or up the ridgelines. Sage Creek Campground provides twelve units to accommodate overnight developed recreation. Big Ice Cave picnic Ground is a day use developed site with six tables and pedestal grills. A parking lot and vault toilet also serve the public accessing the Big Ice Cave, which has a developed pathway and stairs leading down to a viewing platform at the mouth of the cave. Dispersed camping occurs along the Pryor Mountain Road #2308, Crooked Creek Road #2085 and in the Tie Flats area as well as others scattered throughout the Pryors. People picnic, car-camp and stage daylong recreational activities, including off-highway vehicle (OHV) riding, hunting, mountain biking, target practicing, bird watching, hiking, and cave exploration in mostly dispersed recreation settings.

Motorized Recreation

Implementation of the 2001 Tri-State OHV decision restricted motor vehicles to existing roads and trails (USDA Forest Service 2001). Some OHV opportunities on the District are located on existing but unauthorized routes (non-system). Non-system routes are roads and trails that were not designed, constructed, identified or managed as a part of the forest transportation system. Some local four-wheel drive enthusiasts seek challenging motorized opportunities, but there are few existing routes in the Beartooth or the Pryor Units that provide the experience desired.

National Forest system roads are only open to highway legal OHVs and highway legal vehicles. Currently, some unlicensed off-highway vehicles travel on forest designated roads from dispersed campsites and parking areas to specific trail destinations. These same roads may also connect OHV trail segments. While riding on forest designated roads with unlicensed vehicles is common, it is not consistent with state and federal regulations. Under specific circumstances, system roads could be designated as dual use for both licensed and unlicensed vehicles. However, the dual use designation can only be authorized on individual roads following an analysis and evaluation of the risks involved. The opportunity to mix highway legal and unlicensed vehicles has not been evaluated on the District in the past.

Three system motorized trails are currently designated for motorized travel in the analysis area: Lodgepole Trail #22 and Meyers Creek Trail #27 are open to Motorcycle only travel. A portion of Lodgepole Trail was utilized for fire line construction and re-routed into a new alignment during the Derby Fire in 2006. The new section was constructed to a motorized single track standard. Lower Parkside Trail #106 (#23461) is open to OHV less than 50 inches. There are also numerous non-system trails in the analysis area where motorized use occurs.

Resource damage directly attributable to OHV use is readily apparent on certain trails and in some areas, but has not been quantified for the analysis area. Forest road and trail condition information in the INFRA database and Forest Roads Analysis primarily concerns the infrastructure itself rather than its effect on other resources. Non-system OHV routes continued to expand prior to the restriction of cross-country travel.

Off-Route Motorized Travel

The 2001 Tri-State OHV decision and subsequent regulations implemented in 2001 allow motorized travel up to 300 feet off existing motorized routes but only to access dispersed campsites. Prior to that decision, cross-country motorized travel was allowed in the Iron Mountain and Benbow Mine areas on

the District and restricted elsewhere.

Existing system road mileages by type of restriction are shown in Chapter 2, Tables 2-7 thru 2-9. The table shows there are 280 miles of road open at least part or all of the year in the analysis area. Currently, system roads can be used by OHVs (motorcycles and ATVs) if they are street legal. It is not necessary on motorized trails to have street legal vehicles.

Existing trail mileages by type of restriction are shown in Chapter 2, Tables 2-7 thru 2-10. The table shows 97 percent of the existing 279 mile long trail system in the analysis area only allows for non-motorized uses. Three percent of the trail system allows for motorized use.

Dispersed Vehicle Camping

Dispersed vehicle camping occurs throughout the roaded parts of the District. Dispersed vehicle camping is currently allowed within 300 feet of motorized routes (system or non-system). On the Beartooth Unit, heaviest use occurs along the Main Fork and West Fork of Rock Creek. At times during the summer season, dispersed camping along portions of these drainages can look and feel congested. Field review in July 2007 identified over 160 dispersed vehicle sites on the Main Fork drainage between Greenough Campground and the Glacier Lake trailhead. In the Pryor Unit, use tends to be much more dispersed, although certain areas such as Tie Flat, do see relatively more use than other general forest areas in the Pryor Unit.

Other Recreation Activities

The public identified concerns with travel management planning impacts on other recreation uses, including: firewood cutting, target shooting, and non-commercial and commercial hunting opportunities. Specific use rates are not available for these activities, with the exception of commercial hunting which can only be conducted under an outfitter/guide permit.

Firewood cutting occurs throughout most of the roaded, non-Wilderness portions of the District. Firewood cutting is authorized through permits sold to individuals and authorize permit holders to travel cross country 300 feet to collect firewood.

There are no Forest Service authorized target shooting facilities on the District. Target shooting tends to be concentrated in a few informal sites, such as on the West Fork of Rock Creek near Silver Run, as well as having dispersed use on the District. Generally, target shooting is adjacent to or in close proximity to motorized routes.

Hunting locations vary depending on the game species. Motorized routes provide hunters with access, with some hunters using this access to seek areas more removed from motorized influences, while other hunters may select to hunt along or near motorized routes.

Recreation Opportunity Spectrum

Forest Service recreation management is guided by the Recreation Opportunity Spectrum (ROS), which allocates and manages outdoor recreation opportunities and activities by natural resource setting. The Forest Service published an ROS Users Guide in 1981 along with an updated Primer and Field Guide in 1990. A National ROS Inventory Mapping Protocol was implemented in 2003. ROS has been used by the Forest Service nationwide for recreation planning and management to provide opportunities and settings consistent with public expectations to realize a desired set of experiences.

Within the District, ROS settings vary from areas dominated by roads classified for highway vehicle use (Roaded Natural), to areas through which high clearance roads and motorized trails pass (Semi-primitive Motorized), to areas away from the sights and sounds of civilization (Semi-primitive Non-motorized and Primitive). The following are definitions and examples of each setting on the District:

"Rural" settings are characterized by a highly modified natural environment where the sights and sounds of humans are readily evident. This ROS setting is available to both non-motorized and motorized recreation. Quiet trails and opportunities for solitude would be hard to find during much of the year. Developed areas such as Red Lodge Mountain Ski Area and concentrations of recreation residences fit the definition of a rural setting.

"Roaded Natural" settings extend about one-half mile on each side of a road used by standard highway-type vehicles. All roads used by the public or permittees, and all roads used by private landowners outside the Forest boundary were considered as affecting the recreation setting. Non-motorized recreation is available on trails and other areas in this setting. Quiet trails and opportunities for solitude would be hard to find during the summer and fall. Primary access roads for passenger cars and trailer-towing vehicles include, for example, Highway 212 and the West Fork of Rock Creek Road, the road to Sage Creek Campground, etc. Forest development roads and well-used private roads typically are examples of roaded-natural corridors.

"Semi-Primitive Motorized" settings extend about one-half mile on each side of a road or trail where high clearance vehicles or motorized OHVs are legal to be used. The lack of vegetative screening or the influence of intervening ridges may allow the zone to be wider or narrower than one-half mile. This ROS setting is available to both non-motorized and motorized recreation. By definition, quiet trails and the opportunity for solitude would not occur in this setting during the time of year the roads or trails are open to motorized travel.

"Semi-Primitive Non-Motorized" settings denote areas where stock, hiking, and/or bicycling are the predominant modes of travel (OHVs would not be legal to operate in this setting and motorized travel corridors would be at least half mile distant). The lack of terrain screening or vegetative screening may occasionally allow the sights and sounds of humans within three miles to influence the setting. The area does not meet the size, distance, or lack of human disturbance criteria established for "primitive" settings. By definition, this would be a primary area for quiet trails and an appropriate setting to provide opportunities for solitude.

"Primitive" settings denote large areas (generally greater than 5,000 acres in size) that are more than three miles from trails or roads open to motorized use, and where there is little evidence of human disturbance. In this analysis it was impossible or difficult to find acreages more than about two miles from trails or roads open to motorized use in some settings, but topography was considered adequate to screen sights and sounds of motorized areas to create a primitive setting. Additionally, not all primitive settings were 5,000 acres or more in size; OHVs would not be legal to operate in this setting. By definition, this would be the best area for quiet trails and the best setting to provide opportunities for solitude.

Pryor Unit ROS

The No Action Alternative distribution of ROS settings in the analysis area are shown in the following table. The range of ROS settings in the Pryor Unit falls into two classifications due to its distance from and proximity to urban and rural areas, and the absence of motorized trails. ROS data illustrates

that 57% of the Pryor Unit is in a Roaded Natural setting. The Pryor Unit also includes a Semi Primitive Non Motorized setting that makes up 43% of that land unit.

Beartooth Unit ROS

Data for the Beartooth Unit illustrates a wider range of ROS settings due to its distance and proximity to urban and rural areas. As shown in the previous table, ROS data illustrates the majority of the analysis area in the Beartooth Unit is in a Primitive setting and shows that the A-B Wilderness influences 62% of the project area. The Semi-Primitive Non Motorized setting makes up 25% of the project area. These two classifications predominate in the Beartooth Unit, because of the Wilderness and Inventoried Roadless Areas. The data shows a total of 13% of the Beartooth Unit is influenced by roads or motorized trails largely due to the topographic constraints inherent to the landscape of the Beartooth Unit.

District-Wide ROS

Added together, the data in the following table shows that 19% of the analysis area is influenced by motorized use. The Pryor Unit has roughly 10,000 more acres in a motorized setting than in a non-motorized setting. The Beartooth Unit has roughly 383,000 more acres in a non-motorized setting than in a motorized setting.

Table 3-3. Current (No Action) ROS Classification by Acres and Percent[4]

ROS Classification	Acres	Percent
Pryor Unit		
Rural	0	0%
Roaded Natural	44,055	57%
Semi Primitive Motorized	0	0%
Semi Primitive Non Motorized	33,913	43%
Primitive	0	0%
Beartooth Unit		
Rural	12,676	2%
Roaded Natural	51,830	10%
Semi Primitive Motorized	6,715	1%
Semi Primitive Non Motorized	127,283	25%
Primitive	327,120	62%
District-Wide		
Rural	12,676	2%
Roaded Natural	95,885	16%
Semi Primitive Motorized	6,715	1%
Semi Primitive Non Motorized	161,196	27%
Primitive	327,120	54%

Recreation Activities – National Visitor Use Monitoring

The Custer National Forest conducted a National Visitor Use Monitoring (NVUM) survey in 2001-2002 with the data resulting from the survey compiled and made available in 2003. The NVUM

[4] Calculations were based on National Forest system lands within the District boundary. Acres were derived from GIS mapping. All numbers were rounded to the nearest whole percent.

protocol is designed to be repeated every 5 years. Locations for surveys are established by the Forest based on field observation of potential sites to interview visitors about their activities as they exit the forest, a trail, or developed recreation site. The survey dates, times and places are assigned on a random basis and capture a range of use levels at different sites and areas across the Forest. The schedule is assigned to the Forest by the national NVUM working group. The interviews conducted are voluntary on the part of the participants and confidential regarding identity. The activities and their participation rates are for the Custer National Forest. No further breakdown of this information to portray use at the Ranger District level or to show use differences between the Pryor and Beartooth units is available.

Given the variables involved, random time/location and voluntary participation, activities that are known to occur on the Forest but at relatively minor levels, such a cabin rentals, may not have any identified use percentage.

The following table displays the percentage of use by recreation facility from the NVUM 2003 report.

Table 3-4. Percentage Use of Facilities and Specially Designated Areas on Custer NF

Facility/Area Type	Percent who said they used the Custer NF (% Visits)
Hiking, biking, or horseback trails	22.2
Picnic area	17.4
Other forest roads	15.8
Developed campground	15.0
Downhill ski area	14.5
Designated Wilderness	14.4
Developed fishing site/dock	14.4
Scenic byway	13.3
Visitor center, museum	5.5
Forest Service office or other info site	2.0
Motorized developed trails	1.9
Boat launch	1.6
Swimming area	1.1
Organization camp	0.4
Interpretive site	0.3
Recreation residence	0.1
Designated Off Road Vehicle Area	-
Designated snowmobile area	-
Nordic ski area	-
Lodges/Resorts on National Forest System land	-
Fire Lookouts/Cabins Forest Service owned	-
Designated snow play area	-

Recreation Trends

Recreational OHV use in Montana grew by 40% in the last decade and is expected to continue to grow (Montana Fish, Wildlife and Parks 2000). Similarly, the analysis area has experienced additional use over the last decade.

The Forest Service produced a national report on OHV use titled *Off- Highway Vehicle Use on National Forests: Volume and Characteristics of Visitors, Special Report to the National OHV Implementation Team - 5 August 2004*. Data used in this analysis come from the National Visitor Use Monitoring (NVUM) program. The research methodology for this program is documented in a General Technical Report (English, et al., 2002). The first sampling cycle occurred from January 1, 2000 to September 30, 2003. During that period, on-site surveying occurred on nearly 23,000 sample days around the country. Over 90,000 visitors finishing a recreation visit were interviewed about their activities, experiences, length of stay, and demographic characteristics. The survey data shows that OHV use is a specialized use of forests and not a major recreational use for most forests. Slightly more than 2,000 of surveyed visitors indicated OHV use was a primary activity, and a little less than 5,400 indicated participation in OHV activity during their visit.

Nationally, about 2.5% (5.2 million visits) of the 205 million recreational visits identified National Forest OHV use as their primary activity[5]. A slightly larger percentage (3.1%) has OHV use as a secondary activity. That is, about 6.3 million visitors reported participating in OHV use, but not as their primary activity. These would include people who engaged in OHV riding during their visits, but who came to the forest primarily for some other activity.

The total numbers of National Forest visits that have OHV use as either a primary or secondary activity is about 11.5 million. The estimates of primary OHV use visitation are similar for most National Forest regions (range 12 – 16% of the national total), except Region 1 and 10. Only 5% (about 274,000 visits) of the total primary OHV use for all National Forests occurs on forests in Region 1. None of the visitors surveyed in Region 10 (Alaska) indicated that OHV use was their primary recreational activity.

The following table displays the OHV participation visitation and percentage rates for all forests in Region 1 as taken from the subject report. The most recent percentage of OHV use for the Custer National Forest is 3.16% of the total recreation use.

Table 3-5. OHV Participation (Visitation and Rates) by Northern Region Forest

Northern Region Forest	OHV Primary		OHV Participation	
	Visits	%	Visits	%
Beaverhead Deerlodge	50,116	4.26	75,099	6.39
Bitteroot	2,358	0.32	19,199	2.61
Clearwater	38,829	3.56	214,628	19.67
Custer	15,850	1.98	25,263	3.16
Dakota-Prairie	10,134	1.54	25,443	3.88
Flathead	2,611	0.2	12,412	0.93
Gallatin	23,078	1.14	67,719	3.34
Helena	19,735	3.75	51,867	9.85

[5] Percentages presented here include visitors who did not provide information on their primary and/or secondary recreation activities. Using just those who did provide that information as a base yields primary OHV use at 3.0%, and those listing OHV as a secondary activity at 3.5%. (English: Off- Highway Vehicle Use on National Forests: Volume and Characteristics of Visitors, Special Report to the National OHV Implementation Team - 5 August 2004)

Table 3-5. OHV Participation (Visitation and Rates) by Northern Region Forest

Northern Region Forest	OHV Primary		OHV Participation	
	Visits	%	Visits	%
Idaho Panhandle	49,094	5.63	132,547	15.19
Kootnai	13,925	1.02	23,870	1.75
Lewis and Clark	7,556	1.36	39,675	7.13
Lolo	21,484	1.48	57,407	3.96
Nez Perce	19,665	3.12	83,756	13.3
Northern Region Total	274,434	2.08	828,885	6.27

In 2001, the Greater Yellowstone Coordinating Committee commissioned an Interagency Working Group made up of recreation and resource specialists from the six National Forests, two National Parks and two National Wildlife Refuges that make up the Greater Yellowstone Area (GYA) to develop a report on the recreation use for the GYA. The GYA includes the Bridger-Teton, Caribou-Targhee, Gallatin, Shoshone National Forests, portions of the Beaverhead-Deerlodge and Custer National Forests, Grand Teton and Yellowstone National Parks, Red Rock Lakes and National Elk Wildlife Refuges.

Recreation in the Greater Yellowstone Area: A Technical Report – 2006 included recreation trend information that is of some use in attempting to predict outdoor recreation future needs for the analysis area. The following recreation trend information is taken from this report.

Trends in Specific Recreation Activities
Within the context of broad societal trends, a number of developments are apparent in regard to specific recreation activities. Recently, a decline in overall participation in outdoor activities has been noted, attributed partially to the growth of leisure choices now available such as the Internet and satellite TV (Roper 2003). Despite this recent trend, with increasing population and growth in income outdoor recreation participation is expected to grow (Cordell 1999). This is especially true for the GYA where population growth is partly fueled by interest in pursuing outdoor recreation opportunities. Cordell and others (1999) have built models to project future participation in particular recreation activities by region. These models incorporate information on behavioral characteristics that are linked to participation in specific activities; current data on participation in specific activities; demographic factors such as population, age and income; and supply factors such as the proximity and availability of specific recreation opportunities.

The recreation trend information from this report can be used to calculate the percentage of increased use by activity over the thirty year period 2000 – 2030. These percentages in turn can be interpolated to calculate a percentage of increased use by activity for the 2008 - 2018 time frame of this analysis. As an example: Hiking and walking averaged together for the 2000 – 2030 timeframe results in an increase of 24% over 30 years or 8.0% over 10 years. The following table utilizes this information and combines it with the NVUM 2003 Custer National Forest data to calculate estimated visitation figures by the four most common motorized and non motorized recreation activities on the District.

Table 3-6. Beartooth District Recreation Use by Activity Projections

Activity Type	Use %[6]	2002 Visits	2008 Visits	10 year %	2018 Visits
Hiking or walking	47.8	271,866	284,916	8	307,709
Wildlife Viewing	52.2	296,892	328,956	18	388,168
Biking	4.3	24,457	25,633	8	27,684
Fishing	23.7	134,796	140,940	11	156,443
OHV Use	2.9	16,494	17,244	8	18,624
Horseback Riding	0.4	2,275	2,377	7.6	2,558
Developed Camping	16.5	93,845	99,251	10	109,176
Dispersed Camping	4.2	23,888	24,848	6.7	26,513

These projections area based on data contained the Recreation in the Greater Yellowstone Area – A Technical Report 2006, and the NVUM data for the Custer National Forest gathered during 2001-2002. The 2003 NVUM Report estimated the use on the Custer National Forest at 758,344 visitors. The 2004 Off-Highway Vehicle Use on National Forests Special Report shows the Custer National Forest percentage of OHV use at 3.16% rather than the 2.9% displayed above. It is reasonable to assume the small difference in this figure would not greatly change this analysis.

Motorized Congestion

The Forest is unaware of any existing data that specifically assess whether motorized congestion on the District is impacting recreation experience. Motorized congestion has not been viewed by the Forest as a particular problem in the past. There are motorized routes in the Main Fork of Rock Creek drainage that are heavily used by recreationists and it is common to see other motorized traffic when traveling these routes during the summer season. For the most part, motorized traffic is much less frequent on other parts of the District. Throughout the District, the highest use occurs on weekend days during the summer season. Since motorized use of the District is anticipated to continue to increase in the future, the quality of future motorized experiences may be more affected by motorized congestion in the future, but the exact degree of the potential effects is uncertain.

3.2.1.2 Environmental Consequences - Recreation

The following charts and tables provide a summary of the ROS settings by acres and miles for each alternative. These are used to form the analytical basis for comparing the alternatives described in Chapter 2.

[6] Use percentages from the Custer N.F. 2003 NVUM Report

Chart 3-2. Acres of Motorized and Non-Motorized Recreation Opportunities - Beartooth Unit by Alternative.

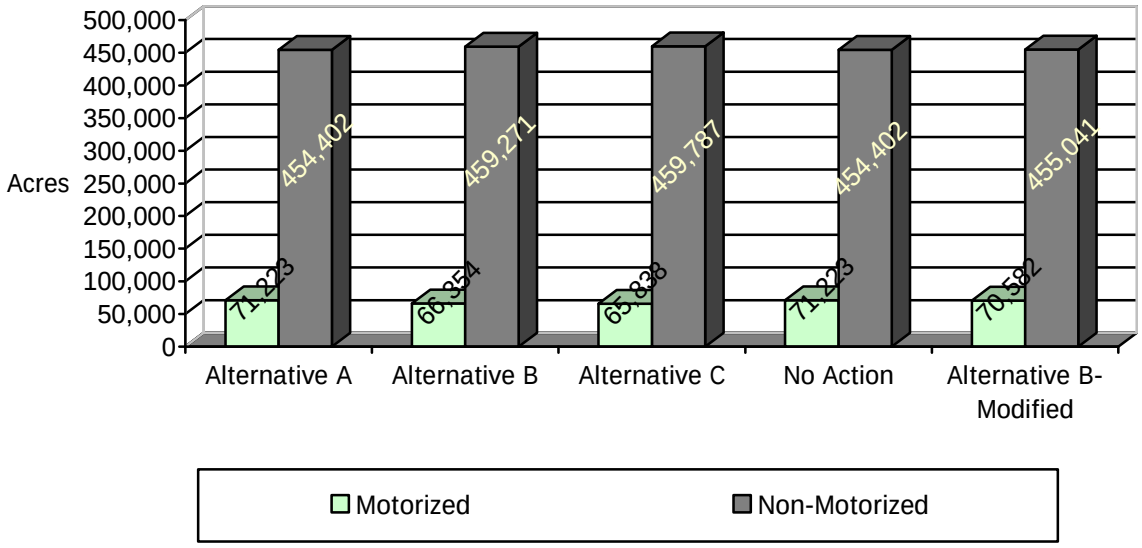


Chart 3-3. Acres of Motorized and Non-Motorized Recreation Opportunities for the entire District.

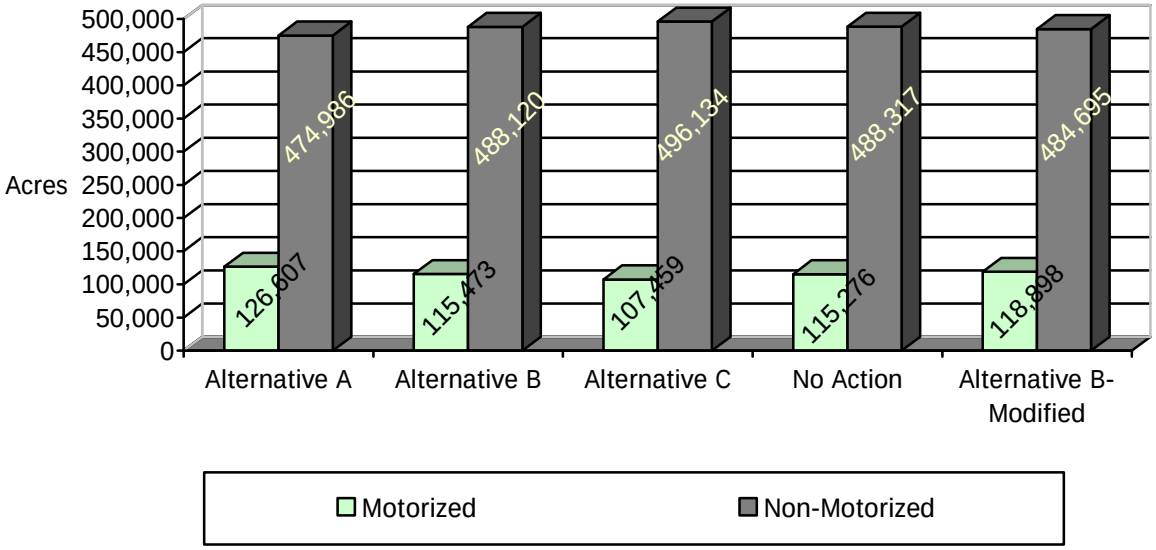


Table 3-7. ROS Setting by Alternative (percent/acres)

ROS Setting	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Pryors Unit (77,969)					
Rural	0%	0%	0%	0%	0%
Roaded Natural	25% (19,399)	33% (25,739)	53% (41,621)	56% (44,055)	33% (25,875)
Semi-Primitive Motorized	46% (35,985)	30%(23,380)	0%	0%	29%(22,439)
Semi-Primitive Non-Motorized	29% (22,584)	37% (28,849)	47% (36,347)	43% (33,913)	38% (29,654)
Primitive	0%	0%	0%	0%	0%
Beartooth Unit (525,625 acres)					
Rural	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,205)
Roaded Natural	10% (51,832)	10% (51830)	10% (51,314)	10% (51,830)	10% (52,307)
Semi-Primitive Motorized	1% (6,715)	<1% (1,848)	<1% (1848)	1% (6,715)	1% (6,072)
Semi-Primitive Non-Motorized	25% (127,281)	25% (132,150)	25% (132,666)	25% (127,283)	24% (127,920)
Primitive	62% (327,121)	62% (327,121)	62% (327,121)	62% (327,121)	62% (327,121)
District-Wide (603,593 acres)					
Rural	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,205)
Roaded Natural	12% (71,231)	13% (77,569)	15% (92,935)	16% (95,885)	13% (78,182)
Semi-Primitive Motorized	7% (42,700)	4% (25,228)	<1% (1,848)	1% (6,715)	5% (28,511)
Semi-Primitive Non-Motorized	25% (149,865)	27% (160,999)	28% (169,013)	27% (161,196)	26% (157,574)
Primitive	54% (327,121)	54% (327,121)	54% (327,121)	54% (327,121)	54% (327,121)

Table 3-8. Summary of Miles of System Roads and Trails by Type of Public Use Designation by Alternative

Type of Use	Alternative A	Alternative B	Alternative C	No Action	Modified Alternative B
Road Designation Type					
All types allowed (motorized mixed use)	28	27	0	0	52
Highway legal vehicles	197	185	198	279	158
Subtotal	225	212	198	279	210
Motorized Trail Designation Type					
All types allowed	110	50	0	0	49
Less than 50 inches only	2	2	0	2	2
Motorcycles only	6	0	0	6	6
Subtotal	118	52	0	8	57
Motorized - Total Miles	**341**	**261**	**198**	**287**	**267**
Non-Motorized Trail Designation Type					
All types allowed	91	98	96	88	88

Table 3-8. Summary of Miles of System Roads and Trails by Type of Public Use Designation by Alternative

Type of Use	Alternative A	Alternative B	Alternative C	No Action	Modified Alternative B
Pedestrian/hiking use only	8	9	9	6	6
Pedestrian/hiking, and pack and saddle stock use only	177	177	183	177	176
Pedestrian/hiking and mechanized use only	3	3	0	3	3
Non-Motorized – Total Miles	**279**	**287**	**288**	**274**	**273**

Direct and Indirect Effects - Recreation

Alternative A

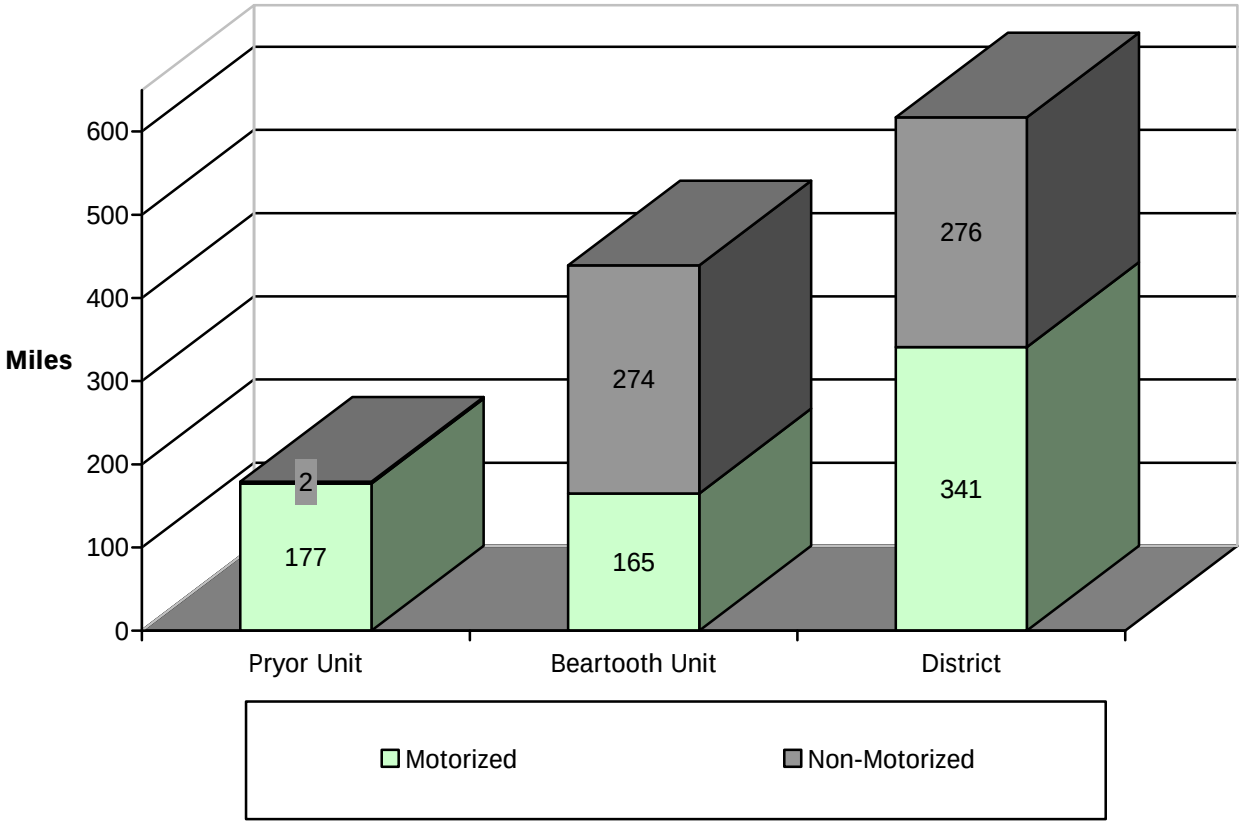
Recreation Opportunity Spectrum
Chart 3-1 indicates that the **Pryor Unit** would consist of 71 percent (55,384 acres) in motorized settings, and 29 percent (22,584 acres) non-motorized settings.

Chart 3-2 indicates the **Beartooth Unit** would contain 13 percent (71,223 acres) in motorized settings, and 87 percent (454,402) in non-motorized settings.

Chart 3-3 indicates the **District** would contain 21 percent (126,607 acres) in motorized settings, and 89 percent (474,986 acres) in non-motorized settings. The specific breakdown of ROS settings are provided in Table 3-7.

Chart 3-4 displays the miles of motorized and non-motorized recreation opportunities that would be available under Alternative A. Details on miles of each type of opportunity provided (i.e. motorized trails, hiking trails, etc.) are provided in Table 3-8.

Chart 3-4. Miles of Motorized and Non-Motorized Recreation Opportunities - Alternative A.



Alternative A has season of use restrictions in the Beartooth Unit. There are 7 miles of roads that have season of use restrictions starting September 30 and ending May 15. These restrictions close ten campgrounds to motorized uses during the time they are in effect. Alternative A has 15 miles roads that have season of use restrictions starting December 1 and ending April 15. These restrictions provide winter range protection for big game or reduce conflicts with motorized uses during the time they are in effect. Alternative A has 12 miles of roads with season of use restrictions starting March 31 and ending July 16. The restrictions provide consistent management with shared roads onto the Gallatin N.F. The acres available and miles of roads associated with these restrictions would change to a semi-primitive non-motorized setting open to all non-motorized uses during the time the restrictions are in place.

Motorized Opportunities

Implementation of this alternative would maximize the opportunities for motorized recreation in the Pryor Unit. It provides the second greatest miles of roads and mixed use roads, and the greatest miles of motorized trails in the Pryor Unit. This would be expected to increase the experience for motorized recreationists that chose to utilize the Pryor Unit. In addition, this alternative would be attractive to users, and may attract users, that are seeking semi-primitive motorized types of experiences.

Implementation of this alternative would maximize the opportunities for motorized recreation in the Beartooth Unit. It provides the second greatest miles of roads and mixed use roads, and the greatest

miles of motorized trails in the Beartooth Unit. This would be expected to increase the experience for motorized recreationists that chose to utilize the Beartooth Unit. In addition, this alternative would be attractive to users, and may attract users, that are seeking semi-primitive motorized types of experiences.

Overall, this alternative provides the greatest number of miles of roads and trails for motorized recreation in the analysis area. If motorized use in the analysis area increased substantially, some motorized users could also be displaced to other locations. Suitable areas for displaced motorized users would depend largely upon other travel management decisions made on the Custer and adjacent National Forests.

Non-Motorized Opportunities
The quality of the outdoor experience for those non-motorized enthusiasts seeking activities in the Pryor Unit would have the greatest potential to be diminished under this alternative. Trend increases in non-motorized activities suggests that there is potential for future demands for these types of experiences to not be met in the Pryor Unit at some point in the future.

This alternative would have the most potential to displace an additional, but unknown percentage, of non-motorized recreationists in the Pryors to other areas. Visitors who prefer to recreate in areas with no motorized use may be able to find suitable areas on the Beartooth Unit, where there is a much greater percentage in non-motorized settings. However, any individuals that are displaced that may also have a strong personal connection to the Pryor Unit are likely to feel adversely impacted.

The quality of the outdoor experience for those non-motorized enthusiasts seeking activities in the Beartooth Unit would have a greater potential to be diminished under this alternative. This alternative would have potential to displace an additional, but unknown percentage, of non-motorized recreationists in the Beartooth Unit to other areas. This percentage is small and would most likely be individuals that have a strong personal connection to the Beartooth Unit and are likely to feel adversely impacted by any motorized activity. Season of use restrictions applying to campgrounds have very limited impacts to non-motorized enthusiasts. Season of use restrictions for other roads in the Beartooth Unit apply to roads during the winter or spring break-up and are accepted by non-motorized enthusiasts due to the corresponding increase in opportunity.

It should be noted that this does not apply to the winter ROS settings which include over-snow vehicle use.

Dispersed Vehicle Camping
Dispersed vehicle camping activities would not be affected under this alternative when compared to no action, because this alternative allows vehicle access to dispersed campsites up to 300 feet off of designated routes.

Motorized Congestion
Based strictly on the proposed miles of motorized routes available (54 miles more than the No Action Alternative), this alternative has potential to decrease motorized congestion effects compared to no action by allowing motorized users more opportunities to disperse. The potential would be about equal between the land units, since the proposed mileage would increase equally for each compared to the No Action Alternative.

Other Recreation Activities of Concern
This alternative would provide the greatest number of roads and trails for scouting and collecting firewood. This alternative provides the maximum opportunity to hunters who desire to retrieve their game by motorized means. In some areas, it provides more hunting opportunities for persons with disabilities, limited mobility, or the elderly. This alternative would provide the least opportunity for non-commercial hunters seeking walk-in only hunting areas. Commercial hunting (outfitter/guide) opportunities may experience higher levels of competition for game where motorized access exists if increased use occurs in those areas. Target shooting activity in the analysis area would be relatively unaffected in this alternative.

Alternative B

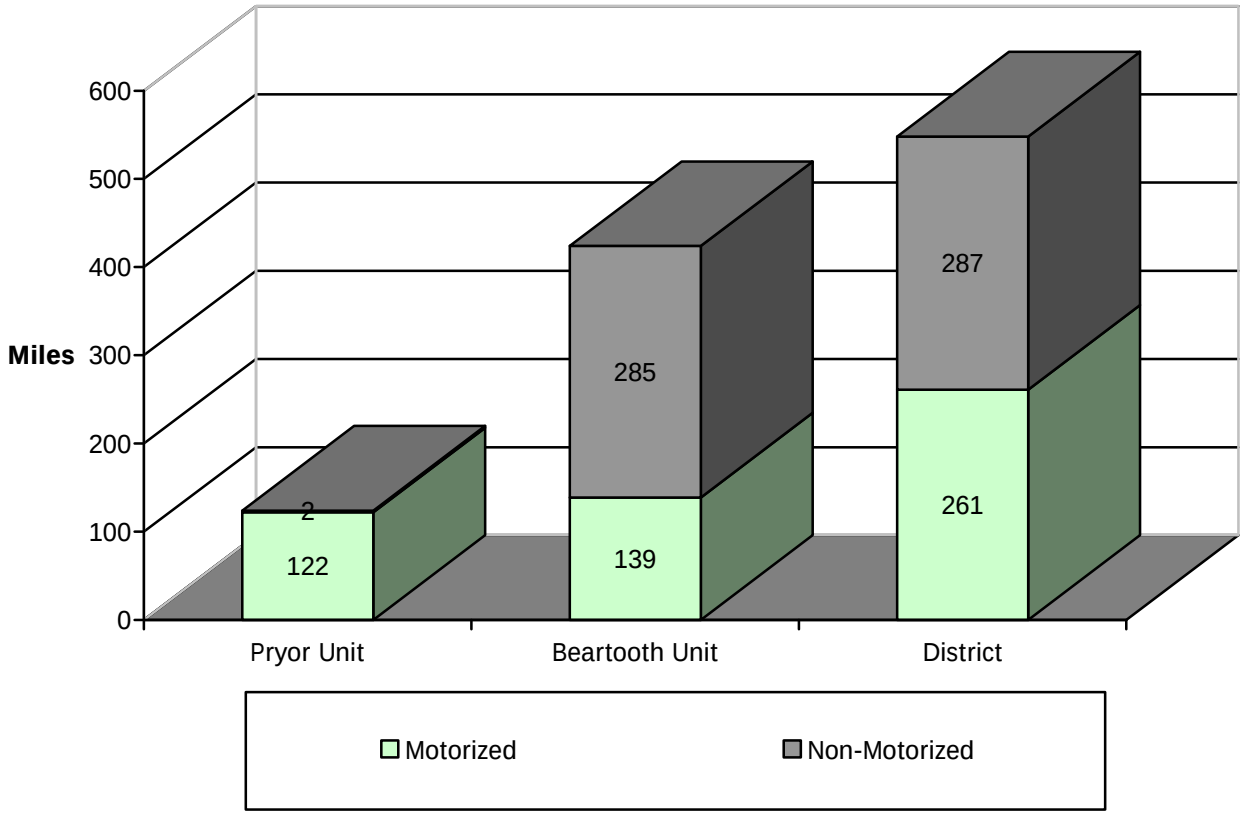
Recreation Opportunity Spectrum
Chart 3-1 indicates the **Pryor Unit** would consist of 63 percent (49,119 acres) in motorized settings, and 37 percent (28,849 acres) in non-motorized settings.

Chart 3-2 indicates the **Beartooth Unit** would contain 13 percent (66,354 acres) in motorized settings, and 87 percent (459,271 acres) in non-motorized settings.

Chart 3-3 indicates the **District** would contain 19 percent (115,473 acres) in motorized settings, and 81 percent (488,120 acres) in non-motorized settings. The specific breakdown of ROS settings are provided in Table 3-7.

Chart 3-5 displays the miles of motorized and non-motorized recreation opportunities that would be available under Alternative A. Details on miles of each type of opportunity provided (i.e. motorized trails, hiking trails, etc.) are provided in Table 3-8.

Chart 3-5. Miles of Motorized and Non-Motorized Recreation Opportunities - Alternative B.



Alternative B has season of use restrictions in the Beartooth Unit. Alternative B has 60 miles of routes with a June 15 to April 15 season of use. Alternative B has 19 miles of routes that have a season of use from April 15 to December 1 for winter range protection for big game or reduce conflicts with motorized uses during the time they are in effect. Alternative B also has 12 miles of roads with a season of use from July 16 to March 31 to provide consistent management with shared roads with the Gallatin N.F. The acres available and miles of routes associated with these seasons of use would change to a semi-primitive non-motorized setting open to all non-motorized uses during the time that motor vehicles are prohibited from using the routes.

Alternative B has 12 miles of trails that have pack and saddle stock use restrictions yearlong for overnight use. The restrictions eliminate overnight camping for users holding stock in areas impacted by high overall camping use. The acres and miles of trails associated with these restrictions in the primitive setting remain in the same setting.

Motorized Opportunities

Implementation of this alternative would provide the second lowest opportunities for motorized recreation in the Pryor Unit. It provides the second greatest miles of roads, the second greatest miles of motorized trails, and the second lowest miles of mixed use roads in the Pryor Unit. This would be expected to provide a better experience than Alternative C or the No Action Alternative due to the mixed use roads which provide more loop opportunities for motorized recreationists that chose to

utilize the Pryor Unit. This alternative would provide a less attractive experience to users seeking semi-primitive motorized types of experiences than Alternative A or Modified Alternative B.

Implementation of this alternative would minimize the opportunities for motorized recreation in the Beartooth Unit. It provides the second greatest miles of roads and mixed use roads, and the second lowest miles of motorized trails in the Beartooth Unit. This would be expected to provide a better experience than Alternative C due to the mixed use roads which provide more opportunities for motorized recreationists that chose to utilize the Beartooth Unit. This alternative would provide a less attractive experience to users seeking semi-primitive motorized types of experiences than Alternative A or Modified Alternative B. This alternative would provide a less attractive experience to users seeking single track motorcycle only experiences than the No Action Alternative.

Overall, this alternative provides the second lowest number of miles of roads and trails for motorized recreation in the analysis area. If motorized use in the analysis area increased substantially in the future, some motorized users could potentially be displaced to other locations possibly due to congestion. Suitable areas for displaced motorized users would depend largely upon other travel management decisions made on the Custer and adjacent National Forests.

It is important to note a small change in the percentage of ROS acres available for semi-primitive non-motorized use in the Beartooth Unit. This change will be important to motorcycle users under this alternative. Trail #22 Lodgepole and Trail #27 Meyers Creek would be changed from motorcycle, single track trails to non-motorized trails. This represents the loss of the only motorcycle trails on the District. Motorcyclists will still be able to use other motorized routes on the District, but these routes do not provide a similar experience since they are ATV width to road-width routes rather than single track trails.

Non-motorized Opportunities

The quality of the outdoor experience for those non-motorized enthusiasts who wish to recreate in the Pryors would be slightly diminished in this alternative due to the slightly reduced percentage of acres available for semi-primitive non-motorized recreation, as compared to no action. The period of time this would be most noticeable is from June 15 to December 15 when all motorized designated routes in the Pryors would be open to use. Approximately sixty miles of roads and trails would move from a motorized to a non-motorized setting during the six months of the year providing an increase in non-motorized acres during that time.

This alternative would have the second lowest potential, when compared to the other alternatives, to displace an additional, but unknown percentage, of non-motorized recreationists to other areas. Visitors who prefer to recreate in areas with no motorized use should be able to find other suitable areas on the District. However, any individuals that are displaced that may also have a strong personal connection to the Pryor Unit are likely to feel adversely impacted.

The quality of the outdoor experience for those non-motorized enthusiasts seeking activities in the Beartooth Unit would have little potential to be diminished under this alternative. This alternative would have little potential to displace an additional, but unknown percentage, of non-motorized recreationists in the Beartooth Unit to other areas. This percentage is small and would most likely be individuals that have a strong personal connection to the Beartooth Unit and are likely to feel adversely impacted by any motorized activity. Season of use restrictions applying to campgrounds have very limited impacts to non-motorized enthusiasts. Season of use restrictions for other roads in the Beartooth Unit apply to roads during the winter or spring break-up and are accepted by non-

motorized enthusiasts due to the corresponding increase in opportunity.

Dispersed Vehicle Camping
This alternative allows for off-route travel to access dispersed campsites up to 300 feet off of designated routes except along system road #2421 (Main Fork of Rock Creek) and system road #2071 (West Fork of Rock Creek). One hundred sixty-six dispersed camping sites in Montana and seven (7) dispersed camping sites in Wyoming (Shoshone National Forest) were inventoried along system road #2421 Main Fork of Rock Creek. Resource concerns were identified in 28 of the 166 dispersed camping sites leaving 138 camping sites that would become designated sites under this alternative. This would reduce the number of dispersed campsites along system road #2421 Main Fork of Rock Creek by 17% of the available sites for designation and off-route travel. This will affect opportunities for dispersed vehicle camping along this drainage. On busy summer weekend days, forest visitors may not be able to find a dispersed vehicle site to use. Most likely some visitors are unable to find desirable sites at this time, and this is likely to increase under this alternative.

The 100 foot setback for dispersed camp sites from streams along system road #2071 West Fork of Rock Creek is not a part of this analysis as it is in the current Forest Plan. A Forest Order would be required to implement the setback.

Motorized Congestion
Based strictly on the proposed miles of motorized routes available (26 miles less than the No Action Alternative), Alternative B has potential to slightly increase motorized congestion effects compared to no action by resulting in slightly less opportunities for motorized users to disperse. The Beartooth Unit would essentially remain unchanged compared to the No Action Alternative (one additional mile), while the Pryor Unit has potential to increase (27 miles less than no action).

Other Recreation Activities
This alternative would provide the second lowest number of roads and trails for scouting and collecting firewood. This alternative provides the second lowest opportunity to hunters who desire to retrieve their game by motorized means. In some areas, it provides more hunting opportunities for persons with disabilities, limited mobility, or the elderly as compared to no action. This alternative would provide the second greatest opportunity for non-commercial hunters seeking walk in only hunting areas. Commercial hunting (Outfitter/Guide) opportunities may experience higher levels of competition for game where motorized access exists if increased use occurs in those areas. This alternative could reduce commercial hunting opportunities on those trails segments designated for day use only, however drop camps would still be allowed. Prohibiting stock use on .58 miles of the Crow Lake trail would have an impact to stock users. Target shooting activity in the analysis area would be relatively unaffected in this alternative.

Alternative C

Recreation Opportunity Spectrum
Chart 3-1 indicates the **Pryor Unit** would consist of 53 percent (41,621 acres) in motorized settings, and 47 percent (36,347 acres) non-motorized settings.

The **Beartooth Unit** would contain less than 13 percent (65,868 acres) in motorized settings, and 87 percent (459,787 acres) in non-motorized settings, as shown in Chart 3-2.

Chart 3-3 indicates the **District** would contain 18 percent (107,459acres) in motorized settings, and 82 percent (496,134 acres) in non-motorized settings. The specific breakdown of ROS settings are provided in Table 3-7.

Chart 3-6 displays the miles of motorized and non-motorized recreation opportunities that would be available under Alternative A. Details on the miles of each type of opportunity provided (i.e. motorized trails, hiking trails, etc.) are in Table 3-8.

Chart 3-6. Miles of Motorized and Non-Motorized Recreation Opportunities - Alternative C.

Alternative C has season of use restrictions that will increase non-motorized recreation opportunities on the District during the period when motorized vehicles are prohibited. Alternative C has 20 miles of routes with a June 15 to April 15 season of use. Alternative C has 15 miles of routes that have a season of use from April 15 to December 1 for winter range protection for big game or reduce conflicts with motorized uses during the time they are in effect. Alternative C also has 7 miles of roads with a season of use from July 16 to March 31 to provide consistent management with shared roads with the Gallatin N.F. The acres available and miles of routes associated with these seasons of use would change to a semi-primitive non-motorized setting open to all non-motorized uses during the time that motor vehicles are prohibited from using the routes.

Alternative C has 12 miles of trails that have pack and saddle stock use restrictions yearlong for

overnight use. The restrictions eliminate overnight camping for users holding stock in areas impacted by high overall camping use. The acres and miles of trails associated with these restrictions in the primitive setting remain in the same setting.

Motorized Opportunities
Implementation of this alternative would provide the lowest opportunities for motorized recreation in the Pryor Unit. It provides the lowest miles of roads, no miles of motorized trails, and no miles of mixed use roads in the Pryor Unit. This would be expected to provide the lowest level of experience for motorized recreationists that chose to utilize the Pryor Unit.
Implementation of this alternative would have the greatest reduction of opportunities for motorized recreation in the Beartooth Unit. It provides the lowest miles of roads, no mixed use roads, and no motorized trails in the Beartooth Unit. This would be expected to provide the lowest level of experience for motorized recreationists that chose to utilize the Beartooth Unit.

Overall, this alternative provides the lowest number of miles of roads and trails for motorized recreation in the analysis area. If motorized use in the analysis area increased substantially in the future, some motorized users could potentially be displaced to other locations possibly due to congestion sooner than in the other Alternatives. Suitable areas for displaced motorized users would depend largely upon other travel management decisions made on the Custer and adjacent National Forests.

Non-motorized Opportunities
The quality of non-motorized experiences in the Pryor Unit under this alternative is expected to be enhanced over all other alternatives. Fewer road miles and larger non-motorized areas would provide a greater potential to meet the experiences sought by non-motorized recreationists. This alternative would have the least potential to displace an additional, but unknown percentage, of non-motorized recreationists to other areas. In fact, the quantity of semi-primitive non-motorized settings may attract those who prefer these experiences. The period of time this would be most noticeable is from April 1 to June 15 when an additional 19 miles of designated roads in the Pryors would be closed to use. The 19 miles of roads would move from a motorized to a non-motorized setting during these two and half months of the year providing an additional increase in non-motorized acres during that time.

The quality of the outdoor experience for those non-motorized enthusiasts seeking activities in the Beartooth Unit would be expected to be enhanced over all other alternatives. Fewer road miles and no motorized trails would lead to larger non-motorized areas providing a greater potential to meet the experiences sought by non-motorized recreationists. Season of use restrictions applying to campgrounds have very limited impacts to non-motorized enthusiasts. Season of use restrictions for other roads in the Beartooth Unit apply to roads during the winter or spring break-up and are accepted by non-motorized enthusiasts due to the corresponding increase in opportunity.

It should be noted that this does not apply to the winter ROS settings which include over-snow vehicles.

Dispersed Vehicle Camping
Access to dispersed camp sites up to 300 feet off of designated roads would not occur in this alternative. Vehicles would be limited to one car length from the road. This alternative would have the most adverse impacts on dispersed vehicle camping of any of the alternatives. This has a high potential to displace recreationists to other developed and undeveloped camping opportunities in the

area.

Motorized Congestion
Based strictly on the proposed miles of motorized routes available (89 miles less than the No Action Alternative), Alternative C has potential to increase motorized congestion effects compared to no action by resulting in less opportunities for motorized users to disperse. The Beartooth Unit has the potential for a slight increase in congestion compared to the No Action Alternative (18 less miles), while the Pryor Unit has more potential to increase (71 miles less than no action).

Other Recreation Activities
This alternative would eliminate all off route wheeled motor vehicle travel to access dispersed recreation opportunities including target shooting for everyone including those individuals with disabilities. This alternative would provide the least number of roads and trails for scouting and collecting firewood. This alternative would provide the least number of roads and motorized trails to access dispersed recreation opportunities for those individuals with disabilities. This alternative would provide the least number of roads and trails for game retrieval and disabled hunter access. This alternative provides the lowest opportunity to hunters who desire to retrieve their game by motorized means. In some areas, it provides lower hunting opportunities for persons with disabilities, limited mobility, or the elderly. This alternative would provide the greatest opportunity for non commercial hunters seeking walk in only hunting areas. Commercial hunting (Outfitter/Guide) opportunities would generally experience lower levels of competition for game due to the least number of designated roads and trails. This alternative could reduce commercial hunting opportunities on those trails segments designated for day use only, however drop camps would still be allowed. Prohibiting stock use on 0.58 miles of the Crow Lake trail would have an impact to stock users.

No Action Alternative

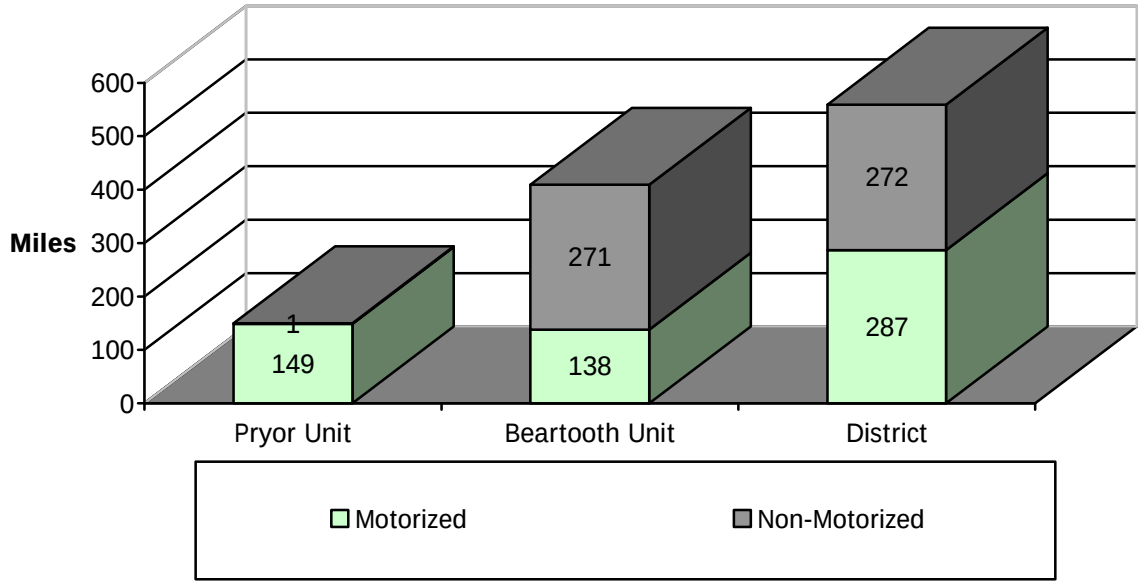
Recreation Opportunity Spectrum
The **Pryor Unit** would consist of 56 percent (44,055 acres) in motorized settings, and 43 percent (33,913 acres) in non-motorized settings as displayed in Chart 3-1.

Chart 3-2 indicates that the **Beartooth Unit** would contain 13 percent (71,223 acres) in motorized settings, and 87 percent (454,402 acres) in non-motorized settings.

Chart 3-3 indicates the **District** would contain 19 percent (115,276 acres) in motorized settings, and 81 percent (488,317 acres) in non-motorized settings. The specific breakdown of ROS settings are provided in Table 3-7.

Chart 3-7 displays the miles of motorized and non-motorized recreation opportunities that would be available under Alternative A. Details on miles of each type of opportunity provided (i.e. motorized trails, hiking trails, etc.) are provided in Table 3-8.

Chart 3-7. Miles of Motorized and Non-Motorized Recreation Opportunities - No Action Alternative.



The No Action Alternative has season of use restrictions in the Beartooth Unit. The No Action Alternative has 15 miles roads that have season of use restrictions starting December 1 and ending April 15. These restrictions provide winter range protection for big game or reduce conflicts with motorized uses during the time they are in effect. The acres available and miles of roads associated with these restrictions would change to a semi-primitive non-motorized setting open to all non-motorized uses during the time the restrictions are in place.

Motorized Opportunities
Implementation of this alternative would provide the second lowest opportunities for motorized recreation in the Pryor Unit. It provides the second lowest miles of roads, no miles of motorized trails, and no miles of mixed use roads in the Pryor Unit. This would be expected to provide the second lowest level of experience for motorized recreationists that chose to utilize the Pryor Unit.

Implementation of this alternative would minimize the opportunities for motorized recreation in the Beartooth Unit similar to Modified Alternative B. It provides the second greatest miles of roads but no mixed use roads. This alternative has the same miles of motorized trails as Alternative A in the Beartooth Unit. This would be expected to provide a better experience than Alternative C due to the motorized trails which provide more opportunities for motorized recreationists that chose to utilize the Beartooth Unit. This alternative would provide a less attractive experience to users seeking semi-primitive motorized types of experiences than Alternative A. This alternative would provide a more attractive experience to users seeking single track motorcycle only experiences than Alternative B.

Overall, the No Action alternative provides the second greatest number of miles of roads and the second lowest number of trails for motorized recreation in the analysis area. Motorized opportunities apply to highway legal motor vehicles and OHVs which makes this alternative closer to Alternative C in overall opportunities. If motorized use in the analysis area increased substantially in the future, some motorized users could potentially be displaced to other locations possibly due to congestion

sooner than other Alternatives except Alternative C. Suitable areas for displaced motorized users would depend largely upon other travel management decisions made on the Custer and adjacent National Forests.

Non-motorized Opportunities
The quality of non-motorized experiences in the Pryor Unit under this alternative is expected to be similar to Alternative C. Fewer road miles and larger non-motorized areas would provide a greater potential to meet the experiences sought by non-motorized recreationists. This alternative would have the similar potential to displace an additional, but unknown percentage, of non-motorized recreationists to other areas as Alternative C. The exception is period of time this would be most noticeable would be less than Alternative C. The period of time this would be noticeable is from September 1 to June 30 when an additional 3 miles of designated roads in the Pryors would be closed to use in Mill Hollow. The 3 miles of roads would move from a motorized to a non-motorized setting providing an additional increase in non-motorized acres during that time.

The quality of the outdoor experience for those non-motorized enthusiasts seeking activities in the Beartooth Unit would be mixed compared to other alternatives. Fewer road miles, no mixed use roads and motorized trails would lead to a small gain in the size of non-motorized areas providing a limited potential to meet the experiences sought by non-motorized recreationists. Season of use restrictions for other roads in the Beartooth Unit apply to roads during the winter or spring break-up and are accepted by non-motorized enthusiasts due to the corresponding increase in opportunity.

It should be noted that this does not apply to the winter ROS settings which include over-snow vehicles.

Dispersed Vehicle Camping
Access to dispersed camp sites up to 300 feet off of designated roads would occur in this alternative and would be similar to Alternative A.

Motorized Congestion
Motorized congestion would be as described in the affected environment.

Other Recreation Activities
The No Action Alternative eliminates all off route wheeled motor vehicle travel to access dispersed recreation opportunities including target shooting for everyone including those individuals with disabilities. This alternative would provide the least number of roads and trails for scouting and collecting firewood. This alternative would provide the least number of roads and motorized trails to access dispersed recreation opportunities for those individuals with disabilities. This alternative would provide the least number of roads and trails for game retrieval and disabled hunter access. This alternative provides the lowest opportunity to hunters who desire to retrieve their game by motorized means. In some areas, it provides lower hunting opportunities for persons with disabilities, limited mobility, or the elderly. This alternative would provide the greatest opportunity for non commercial hunters seeking walk in only hunting areas. Commercial hunting (Outfitter/Guide) opportunities would generally experience lower levels of competition for game due to the least number of designated roads and trails.

Alternative B Modified

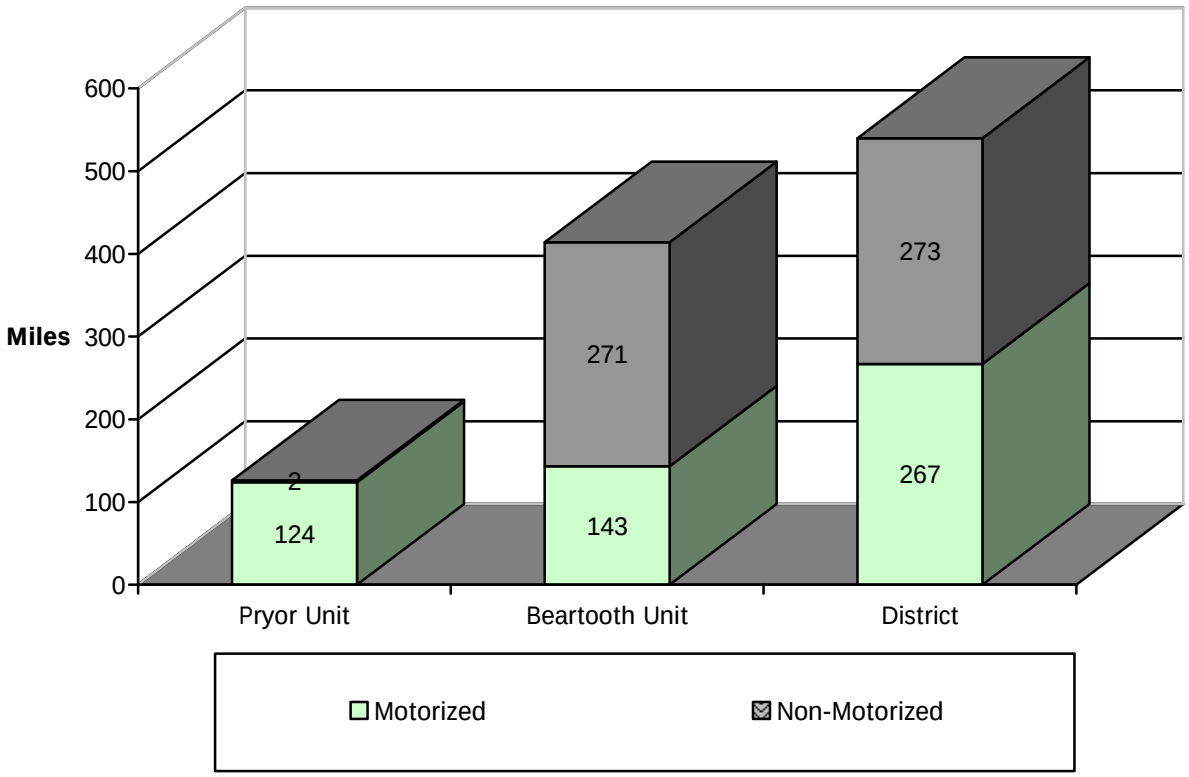
Recreation Opportunity Spectrum
The **Pryor Unit** would consist of 62 percent (48,314 acres) in motorized settings, and 38 percent (29,654 acres) in non-motorized settings as displayed Chart 3-1.

Chart 3-2 indicates the **Beartooth Unit** would contain 13 percent (70,582 acres) of motorized settings, and 87 percent (455,041 acres) in non-motorized settings.

Chart 3-3 indicates the **District** would contain 20 percent (118,898 acres) of motorized settings, and 80 percent (484,695 acres) in non-motorized settings. The specific breakdown of ROS settings are provided in Table 3-7.

Chart 3-8 displays the miles of motorized and non-motorized recreation opportunities that would be available under Alternative A. Details on the miles of each type of opportunity provided (i.e. motorized trails, hiking trails, etc.) are in Table 3-8.

Chart 3-8. Miles of Motorized and Non-Motorized Recreation Opportunities - Modified Alternative B.



Alternative B Modified has season of use restrictions that will increase non-motorized recreation opportunities on the District during the period when motorized vehicles are prohibited. Alternative B Modified has 15 miles of routes with a June 15 to April 15 season of use and 43 miles of routes with a season of use of May 22 to April 15 in the Pryors Unit. Alternative B Modified has 19 miles of routes

that have a season of use from April 15 to December 1 for winter range protection for big game or reduce conflicts with motorized uses during the time they are in effect. Alternative B Modified has 6 miles of motorcycle trails with a season of use from June 15 to December 1 to provide winter range and spring calving protection for big game. The acres available and miles of routes associated with these seasons of use would change to a semi-primitive non-motorized setting open to all non-motorized uses during the time that motor vehicles are prohibited from using the routes.

Motorized Opportunities
Implementation of this alternative would provide the third greatest opportunities for motorized recreation in the Pryor Unit. It provides the third greatest miles of roads, the third greatest miles of motorized trails, and the second greatest miles of mixed use roads in the Pryor Unit. This would be expected to provide a better experience than Alternatives B, C, or No Action due to the greater number of mixed use roads which provide more loop opportunities for motorized recreationists that chose to utilize the Pryor Unit. This alternative would provide a less attractive experience to users seeking semi-primitive motorized types of experiences than Alternative A.

Implementation of this alternative would maximize the opportunities for motorized recreation in the Beartooth Unit during the six months of the year when there are no season of use restrictions. It provides the second greatest miles of roads and mixed use roads, and the greatest number miles of motorized trails in the Beartooth Unit. This would be expected to provide a better experience than Alternative B, C and No Action due to the mixed use roads which provide more opportunities for motorized recreationists that chose to utilize the Beartooth Unit. This alternative would provide a less attractive experience to users seeking semi-primitive motorized types of experiences than Alternative A.

Overall, this alternative provides the third greatest number of miles of roads and trails for motorized recreation in the analysis area. If motorized use in the analysis area increased substantially in the future, some motorized users could potentially be displaced to other locations possibly due to congestion. Suitable areas for displaced motorized users would depend largely upon other travel management decisions made on the Custer and adjacent National Forests.

Non-motorized Opportunities
The quality of the outdoor experience for those non-motorized enthusiasts who wish to recreate in the Pryors may be less diminished in Alternative B Modified due to the increase of 941 acres available for semi-primitive non-motorized recreation, as compared to Alternative B. Approximately fifty-eight miles of roads and trails would move from a motorized to a non-motorized setting providing an increase in non-motorized acres during the time of year the season of use restrictions are in place.

This alternative would have the third lowest potential, when compared to the other alternatives, to displace an additional, but unknown percentage, of non-motorized recreationists to other areas. Visitors who prefer to recreate in areas with no motorized use should be able to find other suitable areas on the District. However, any individuals that are displaced that may also have a strong personal connection to the Pryor Unit are likely to feel adversely impacted.

The quality of the outdoor experience for those non-motorized enthusiasts seeking activities in the Beartooth Unit would have little potential to be diminished under this alternative. This alternative would have little potential to displace an additional, but unknown percentage, of non-motorized recreationists in the Beartooth Unit to other areas. This percentage is small and would most likely be individuals that have a strong personal connection to the Beartooth Unit and are likely to feel

adversely impacted by any motorized activity. Season of use restrictions applying to campgrounds have very limited impacts to non-motorized enthusiasts. Season of use restrictions for other roads in the Beartooth Unit apply to roads during the winter or spring break-up and are accepted by non-motorized enthusiasts due to the corresponding increase in opportunity.

It should be noted that this does not apply to the winter ROS settings which include over-snow vehicles.

Dispersed Vehicle Camping
This alternative allows for off-route travel to access dispersed campsites up to 300 feet off of designated routes except along system road #2421 (Main Fork of Rock Creek) and system road #2071 (West Fork of Rock Creek). One hundred sixty-six (166) dispersed camping sites in Montana and seven (7) dispersed camping sites in Wyoming (Shoshone National Forest) were inventoried along system road #2421 Main Fork of Rock Creek. Resource concerns were identified in 28 of the 166 dispersed camping sites leaving 138 camping sites that would become designated sites under this alternative. This would reduce the number of dispersed campsites along system road #2421 Main Fork of Rock Creek by 17% of the available sites for designation and off-route travel. This will affect opportunities for dispersed vehicle camping along this drainage. On busy summer weekend days, forest visitors may not be able to find a dispersed vehicle site to use. Most likely some visitors are unable to find desirable sites at this time, and this is likely to increase under this alternative.
The 100 foot setback for dispersed camp sites from streams along system road #2071 West Fork of Rock Creek is not a part of this analysis as it is in the current Forest Plan. A Forest Order would be required to implement the setback.

Motorized Congestion
Based strictly on the proposed miles of motorized routes available (20 miles less than the No Action Alternative), Alternative B has potential to slightly increase motorized congestion effects compared to no action by resulting in slightly less opportunities for motorized users to disperse. The Beartooth Unit would essentially remain unchanged compared to the No Action Alternative (five additional miles), while the Pryor Unit has potential to increase (25 miles less than no action).

Other Recreation Activities
This alternative would provide the third greatest number of roads and trails for scouting and collecting firewood. This alternative provides the third greatest opportunity to hunters who desire to retrieve their game by motorized means. In some areas, it provides more hunting opportunities for persons with disabilities, limited mobility, or the elderly as compared to no action. This alternative would provide the third greatest opportunity for non-commercial hunters seeking walk in only hunting areas. Commercial hunting (Outfitter/Guide) opportunities may experience higher levels of competition for game where motorized access exists if increased use occurs in those areas. Target shooting activity in the analysis area would be relatively unaffected in this alternative.

Cumulative Effects - Recreation

Recent Travel Management Decisions

The Forest Service reviewed recent travel management decisions that have potential to impact motorized and non-motorized users of the Beartooth Ranger District. NVUM information indicated that the majority of District visitors come from within 50 miles of the District, primarily the Billings

area. Based on public comments on the project and informal discussions with these users, they indicated that they commonly travel to the Gallatin National Forest and Lewis and Clark National Forest to recreate, and to a lesser degree to the Helena National Forest. It is reasonable to assume that travel management on these forests, along with travel management changes on Bureau of Land Management lands in the vicinity of the District, has the potential to cumulatively impact motorized and non-motorized recreation opportunities.

None of the reasonably foreseeable activities identified at the beginning the Chapter 3 are anticipated to cumulatively impact motorized or non-motorized travel-related recreation opportunities.

2001 Tri-State OHV Decision
The 2001 Tri-State OHV Decision prohibited cross-country vehicle use on Bureau of Land Management and Forest Service lands within Montana, North Dakota, and parts of South Dakota. The ROD for the 2001 Tri-State OHV Decision indicates that cross-country vehicle travel for the Custer, Gallatin, Lewis and Clark, and Helena National Forests was reduced by 64%, 43%, 72%, and 59%, respectively.

Little Belts, Castles, and North Half of the Crazy Mountains Decision
The Lewis and Clark National Forest (Lewis and Clark NF) decision on the Little Belts, Castles, and North Half of the Crazy Mountains would reduce motorized routes by approximately 884 miles (roughly 39%) compared to the No Action Alternative in that analysis. Non-motorized routes would increase by approximately 227 miles (roughly 65%) in that same decision.

Rocky Mountain District – Birch Creek South
The Lewis and Clark NF decision on the Rocky Mountain District – Birch Creek South would reduce miles of motorized routes by 143 miles (roughly 45%) compared to no action in the analysis. Non-motorized routes would increase by approximately 118 miles (roughly 86%) in that same decision.

North Belts Decision
The Helena National Forest's (Helena NF) Record of Decision on the North Belts Travel Planning would reduce the number of miles of motorized routes by approximately 64 miles (roughly 16%) compared to their No Action Alternative.

South Belts Decision
The Helena NF's South Belts Travel Plan, which addresses motorized use between 5/15 and 12/1, would reduce motorized opportunities by approximately 25 miles (roughly 13%) compared to the No Action Alternative.

Gallatin National Forest Decision
The Gallatin National Forest's Travel Management Record of Decision states the following:

"The total amount of public open system road would remain generally unchanged (approx. 740 miles); however there would be a shift of about 10% of this system from road currently only suitable for high clearance vehicles to road that would accommodate passenger cars. Currently about 315 miles of road are considered suitable for passenger cars, and under Alternative 7-M it would increase to 400 miles. This alternative also includes objectives to close and restore non-system and user-built roads.

ATV opportunities provided on trails would be reduced from 281 miles to 143 miles (about 50%) and motorcycle opportunities on trails would be reduced from 458 miles to 278 miles (about 40%)."

The miles of non-motorized routes would remain about the same compared to no action.

Bureau of Land Management
Three recent Bureau of Land Management travel management decisions were identified in the vicinity of the District, including the: Acton Recreation Area OHV Travel Management, Horsethief High Priority Area OHV Travel Management, and Shepard Ah Nei Travel Management decisions. The Acton and Horsethief decisions did not change the miles available for motorized use. The Shepard Ah Nei decision reduced motorized miles in that unit from 50 miles to 44 miles, or by 12%.

Effects
The alternatives in this analysis represent the following changes in miles of motorized routes compared to the No Action Alternative:

- Alternative A would increase motorized route miles by 54 miles (19% increase)
- Alternative B would decrease motorized route miles by 26 miles (9% decrease)
- Alternative C would decrease motorized route miles by 89 miles (31% decrease)
- Alternative B Modified would decrease motorized route miles by 20 miles (7% decrease)

Alternative A is the only alternative that would not further diminish motorized recreation opportunities in the project vicinity described above. Alternative B and B Modified would have a slight contribution to the reduced number of motorized route miles. Alternative C would contribute the most to the cumulative reduction in motorized route miles.

Recent travel management decisions have resulted in a cumulative increase in miles of non-motorized routes as indicated above, or in other words the decisions have resulted in additional non-motorized recreation opportunities. The relatively modest changes in non-motorized trails proposed in the alternatives (>1% decrease to 5% increase) would not be anticipated to contribute appreciably to these cumulative effects.

Finally, the miles of route changes identified for recent decisions above can roughly be expected to result in a corresponding shift in the associated ROS settings, i.e. percentage change in motorized route miles are likely to yield a similar change in ROS setting, given the strong tie of ROS setting identification with motorized and non-motorized routes. However, the alternatives in this analysis would be expected to have very limited cumulative effects given the minor changes in percentage of District-wide ROS settings among the alternatives as shown in Table 3-7 (≤2% change in combined motorized [rural + roaded natural + semi-primitive motorized] or combined non-motorized settings [semi-primitive non-motorized + primitive]).

3.2.1.3 Conclusion - Recreation

The following conclusions are based on the indicators identified in Chapter 2 related to Recreation resources and the analysis in this section.

1) Concerns related to the loss of motorized recreation opportunities.

Alternative A best responds to concerns related to opportunities for motorized recreation, including providing the most miles of system road and trails, most acres in motorized ROS settings, and most loop opportunities on the District and in the Pryor Unit. There would be 126,607 acres in motorized ROS settings and 341 miles of motorized routes on the District, with 55,384 acres in motorized ROS settings and 177 miles of motorized routes in the Pryor Unit.

The remaining alternatives respond to this issue to lesser and varying degrees than Alternative A. Considering the various factors discussed in the above analysis, the remaining alternatives *generally* respond to this indicator in the following order from most to least responsive (District; Pryor Unit):

Alternative B Modified	(118,898 acres/267 miles; 55,384 acres/177 miles)
No Action	(115,276 acres/287 miles; 44,055 acres/149 miles)
Alternative B	(115,473 acres/261 miles; 49,119 acres/124 miles)
Alternative C	(107,459 acres/198 miles; 41,621 acres/79 miles)

2) Concerns related to the loss of non-motorized opportunities.

Alternative C best responds to concerns related to opportunities for non-motorized recreation, including providing the most acres in non-motorized ROS settings and non-motorized trails on the District and in the Pryor Unit. There would be 496,134 acres in non-motorized settings and 286 miles of non-motorized trails on the District, and 36,374 miles in non-motorized settings and two miles of non-motorized trails in the Pryor Unit.

The remaining alternatives respond to this issue to a lesser degree than Alternative C. Considering the various factors discussed in the above analysis, the remaining alternatives *generally* respond to this indicator in the following order from most to least responsive [Alternative (District; Pryor Unit)]: (Alternatives B and B Modified are very similar in responsiveness.)

No Action Alternative	(488,317 acres/272 miles; 38,912 acres/1 miles)
Alternative B	(488,120 acres/287 miles; 28,849 acres/2 miles)
Alternative B Modified	(484,695 acres/273 miles; 29,654 acres/2 miles)
Alternative A	(464,986 acres/276 miles; 22,584 acres/2 miles)

3) Concerns related to opportunities for off-highway legal vehicle operation.

Alternative A best responds to concerns related to opportunities for unlicensed off-highway vehicle operation, including providing the most miles of motorized mixed use roads and motorized trails. There would be 146 combined miles of motorized mixed use roads and motorized trails on the District.

The remaining alternatives respond to this issue to a lesser degree than Alternative A. In relative descending order of responsiveness, they are:

Alternative B Modified	(109 miles)
Alternative B	(79 miles)
No Action	(8 miles)
Alternative C	(0 miles)

3.2.1.4 Affected Environmental – Human Environment

Overview of Changes from the Draft to the Final EIS

- There was no change regarding the human environment from the DEIS to the FEIS.

Introduction

Social settings reflect the amount and frequency of contact between individuals and groups and how they use the environment. On the District, social settings vary from rural environments to open and unmodified primitive areas. Recreationists may find solitude in areas where there are few other people or may encounter large numbers of people in heavily used or concentrated use areas. Encounters with others vary depending on the season of use, the attractiveness of the area, the proximity to population centers, and the particular recreation activity.

Recreation activities include pursuits such as hunting, fishing, trapping, camping, picnicking, rock hounding and climbing, gathering products such as firewood and plants, viewing scenery and wildlife, hiking, nature study, and riding ATV's, motorcycles, and full size road vehicles for pleasure. Participation in recreation activities varies by season and location.

Demographics and Social Trends

Several Montana studies have been conducted that give indications of motorized recreation activity participation. In 1993 and 1994, the Institute for Tourism and Recreation Research conducted a study of Montana that examined the rates of participation in eleven recreation activities (McCool and Harris 1994). In the 6 months preceding their survey, the study estimated that adult Montanans in the study participated in the following off-highway motorized recreation activities at the following rates: 9.1% motorcycle, 11.8% ATV, and 19.6% 4X4 road vehicle. In 1997, Montana Fish, Wildlife and Parks produced a random telephone survey of Montanans that addressed participation in recreation activities (Montana Fish, Wildlife and Parks 1997). Within the past two years preceding the survey, respondents reported using trails for off-road recreation activities at the following rates: 2% motorcycle, 2% ATV, and 2% 4X4 road vehicle. While these studies do show different results, they are an indication that motorized recreation use by Montanans may be as low as 6% or as high as 20% of total recreation activity participation.

In 1998, the population of Montana was less than one million people, resulting in population densities of six people per square mile in Montana. Montana's population grew by 10% from 1990 to 1998. Rural areas tended to decline in population while larger urban areas tended to grow. Montana's population is expected to continue to grow primarily due to people moving into the state and is projected to exceed 980,000 by 2010.

A trend that is common to all states is the aging of the population. The percentage of persons under 20 years of age will decrease and the percentage of people over 65 will increase over the next 30 years. As an example, in Montana, the percentage of population under 20 years old is projected to decrease from 30.2% in 1995 to 24.3% in 2025. Conversely, the percentage of population 65 and over is expected to increase from 13.1% in 1995 to 24.5% in 2025. This would translate into a Montana population over 65 that more than doubles in size between 1995 and 2025. The percentage of people over 65 is actually increasing more rapidly in states like Montana, because young people are more likely to leave for advanced education, military service and employment opportunities not available locally.

Another important trend is the increasing popularity of Montana for recreation. The demand for the types of activities most available on federal lands is growing faster than for other activities (USDA 1989, Cordell 1999). The 1989 report states that some of the major issues facing recreation today include protecting resources and open space, acquiring more land to meet anticipated demand, resolving conflicts among different recreation users, and addressing the need for more access to outdoor recreation areas. Also, many communities are having problems maintaining access to federal lands if access through closed private lands is required to reach federal lands. In addition, loss of access to private lands is putting more pressure on federal lands.

The following concerns were identified by motorized users during the scoping period: loss of access areas traditionally used for these activities, damage being unfairly blamed on vehicle use, and planning focusing on a large area rather than on particular problem areas. Some of these recreationists indicated they are not concerned with this preliminary step, but feel it is only the beginning and that trail and road closures would follow during the next phase. Generally, OHV users indicated they did not experience conflicts with other users.

Based on comments received during scoping, motorized vehicle users participate in their activity on the District as a way for families and friends to enjoy the beautiful scenery together. Passing these activities on to future generations is important to them and has helped their children grow into responsible citizens. Some rely on motorized travel to retrieve game during hunting season. Many OHV users indicated they have a great respect for the land and try to be courteous when traveling. They feel the few people who do not follow the rules are giving all motorized travelers a bad name. Some even indicate a need for some restrictions on use and / or more law enforcement.

The prime motivation of non-motorized users appears to be a quiet, peaceful experience in beautiful surroundings away from the rushing and crowding of everyday life. From comments received during scoping, non-motorized user concerns revolve around conflicts with motorized users. These concerns included visuals, noise, wildlife displacement and harassment, and resource damage.

While some hunters feel that motorized use positively affects their hunting experience, some hunters also feel that motorized use negatively affects their hunting experience. The results of a survey published by Montana Fish, Wildlife and Parks (1998a) show improper vehicle use/road hunting is one of the top behavior problems witnessed by respondents in the 1997 hunting season. Nearly half of the respondents mentioned this problem. Respondents were also concerned about the widespread use of ATV's and their negative impact on the sport of hunting.

Many individuals and groups commented that the condition of resources on public lands is important because they value these resources for recreation, wildlife, scenic and spiritual qualities, and a variety of other reasons. Many appreciate just knowing that these areas exist and feel federal agencies have an obligation to manage these resources for future generations.

Conflict Among Uses of National Forest System Lands

The 2005 Motorized Travel Rule requires the responsible official to consider "conflicts among uses of National Forest System lands" prior to designation of roads, trails, and areas.

Research (Williams 1993a) shows that the following factors influence the likelihood of conflict: activity style, resource specificity, mode of experience and tolerance for lifestyle diversity. Activity style refers to the significance the person attaches to the activity. Conflict is much more likely to

occur if the activity is an integral part of the person's lifestyle rather than an occasional activity. Resource specificity refers to the significance a person attaches to using a specific resource. Conflict is more likely to occur when the person has a special relationship with a place and perceives others are disrupting the traditional uses of the place or devaluing its meaning. Mode of experience refers to the way in which the environment is perceived. Conflict is more likely to occur when the person perceives the environment as part of the experience rather than as a backdrop for the experience. The last factor is tolerance for lifestyle. Conflict is more likely to occur when the user has a higher tendency to reject lifestyles that are different than one's own. Examples include a preference for mechanized versus non-mechanized or consumptive versus non-consumptive activities.

Conflicts over the use of National Forest System lands arise from differing opinions about appropriate uses on National Forest System lands. Participants at public meetings and scoping respondents questioned if the nature of conflicts represented confrontations between users in-the-field. This is generally *not* the nature of user conflict as it relates to this travel management planning effort. It is about forest users and their personal values, and the fact that personal values shape preferences for which activities are appropriate and desirable on public lands. Based on these preferences, some forest visitors may tend to feel that their experience is disrupted by activities that they don't feel are appropriate or desirable. Conversely, other forest visitors may feel offended or defensive when the activities they enjoy are identified as inappropriate or undesirable by others. The conflict related to travel management planning is most often characterized as motorized uses versus non-motorized uses.

Former Chief Dale Bosworth encouraged the use of collaboration to address travel management issues such as conflict between uses. In response, the District hosted a series of public collaborative meetings to work with the community to identify potential points of agreement on roads, trails and areas for designation on the District. The meetings generally revealed that where there was less personal identification with an area or personal values about how the area should be used, there was typically more potential for agreement. There was less potential for agreement when one or more viewpoints had strong personal identification with an area or a strong sense of how the area should be used. Reaching agreement in these later areas would most likely have meant committing to changes or compromising participant's personal values. Ultimately, the meetings were not effective in reaching substantive points of agreement between users with differing values.

3.2.1.5 Environmental Consequences – Human Environment

Direct and Indirect Effects-Human Environment

Effects Common to All Alternatives

The alternatives represent differing levels of motorized route designation, and are likely to represent varying degrees of satisfaction to forest users. Alternatives with more motorized opportunities will most likely be more favorable by forest users that find this type of use desirable and appropriate. Alternatives with relatively less motorized designation and more opportunity for non-motorized types of uses are more likely to be favored by forest users that find non-motorized types of use desirable and appropriate. It is difficult to say to what degree the conflict may be increased or decreased by alternative, because individuals will respond differently to each alternative. However, none of the alternatives wholly eliminate either motorized or non-motorized use, so the alternatives are not expected to increase the conflict to the degree that some users feel they have been entirely precluded from having opportunities compatible with their personal values. Conflicts between motorized and non-motorized users may increase as the number of recreationists on public lands increase.

Comments received after the DEIS pointed out that some conflict may be perceived conflict rather than actual conflict.

Alternative A

This alternative is most responsive to the desires of individuals and groups who feel public lands should remain open to motorized access. Conflict between non-motorized and motorized users may continue due to the greater number of designated roads as compared to no action. Conflicts between motorized users and other types of recreationists may increase as the number of recreationists' increases

Individuals supporting non-motorized recreational opportunities may believe this alternative does not sufficiently provide for non-motorized opportunities or protect the resources on public lands. The condition of the resources on public lands is important to these people because they value these resources for recreation, wildlife, scenic and spiritual qualities, and a variety of other reasons. Concerns for the aesthetic or visuals could be increased due to more use of roads and trails.

Alternative B

Motorized users are likely to feel some degree of loss of opportunities under this alternative, and may not support this alternative. This alternative has fewer routes available to motorized users than the existing condition, but has more than the no action alternative.

Individuals supporting non-motorized recreational opportunities may believe this alternative does not sufficiently provide for non-motorized opportunities or protect the resources on public lands. Concerns for the aesthetic or visuals could be increased due to roads, but could decrease due to restricting use in other areas.

Alternative C

This alternative is most responsive to the desires of individuals supporting non-motorized recreational opportunities, because it is most likely to be viewed as the alternative that provides the most opportunity for non-motorized experiences and provides the most protection for resources on public lands. Concerns for the aesthetic or visuals could decrease due to the fewer number of roads. This alternative is less responsive than other alternatives to the desires of individuals and groups who feel public lands should remain open to motorized access. Conflict between non-motorized and motorized users may continue due to the decreased number of designated roads as compared to existing condition and no action.

No Action Alternative

Conflicts between motorized users and other types of recreationists would continue and, perhaps, increase in the future as the number of recreationists on public lands increases. The quality of the hunt for some hunters would continue to be disturbed by motorized use. People engaged in hiking and other types of non-motorized recreation would also continue to be affected.

Alternative B Modified

This alternative responds to the concerns raised by the public but most likely will not completely satisfy any group. There are unresolved preference values that are looked at on a forest wide basis.

Cumulative Effects-Human Environment

Past, present, and reasonably foreseeable activities generally include motorized travel and are

expected to create cumulative effects relative to recreationists who enjoy non-motorized activities. The expected increase in population and related increase in both motorized and non-motorized recreation activities, would, in general, lead to more conflict among recreationists. In general, as travel management decisions are made on public lands locally and within the region, conflict is not likely to be alleviated. Motorized recreationists may feel that public land managers are not listening and/or responding to their wishes to keep public lands open to motorized use. All alternatives except Alternative A are likely to add to these feelings. Non-motorized recreationists may feel that public land managers are not listening and/or responding to their wishes to reduce motorized use on public lands. All alternatives, except C, are likely to add to these feelings.

3.2.1.6 Conclusion - Human Environment

Considerations of the human environment in each of the alternatives is consistent with the Custer Forest Plan, the Tri-State OHV EIS, travel planning direction and existing manual direction. Concerns raised by the non-motorized or motorized groups through the public comment process, including those received after the DEIS, were used to analyze the human environment aspect of each alternative. Comments received indicated a wide array of public needs and views, including a desire for more or no potential decrease in the number of routes by the motorized group or more quiet areas or less routes by the non-motorized group.

All alternatives address the needs of the recreation communities to differing degrees. None of the alternatives are anticipated to satisfy all publics. Alternative A is most responsive to the desires of individuals supporting motorized recreational opportunities and Alternative C is most responsive to the desires of individuals supporting non-motorized recreational opportunities. Alternatives B and B Modified both emphasize a compromise in addressing human environment concerns. Alternative B Modified responded to comments received from review of the Draft EIS which further emphasizes a compromise.

3.2.1.7 Affected Environment – Noise

Overview of Changes from the Draft to the Final EIS

- Literature review was updated.
- Analysis information is provided for the Pryor and Beartooth Units, and the District as a whole. Discussion of effects related to the season of use related to noise disturbance has been added in response to public comments.

Introduction

An issue raised during scoping was the impact that noise from OHVs and other motorized vehicles has on the quality of recreationists' experience. Many people visit public lands to escape the noise of modern civilization. The natural soundscape and tranquility is a condition that they seek as part of their recreational experience. Non-motorized recreationists say that noise from motorcycles and ATVs, in particular, detracts from the natural setting they have come to the Forest to enjoy. Recent campaigns of organized OHV clubs focus on communicating to their membership that "noise annoys" and encourages them to voluntarily "quiet down" their vehicles, recognizing how important an issue this is to many public land recreationists. Noise can also affect traditional cultural practitioners as well as settings associated with these cultural sites. Noise can also affect wildlife. See the Cultural and Wildlife sections of this chapter for details of noise impacts to those resources.

Noise levels are measured several ways, the most common measure being decibels A (dbA). Experts agree that continued exposure to noise louder than 85 dbA will cause hearing loss (League for the Hard of Hearing 2004). According to the National Institute for Occupational Safety and Health (1998), the maximum exposure time at 85 dBA in 8 hours may impair hearing. At 110 dbA, the maximum exposure time is one minute and 29 seconds.

The measure of decibels increases on an exponential scale. For example, a piece of machinery that emits noise of 102 dbA is roughly four times as loud as one that emits noise at 96 dbA (USFS, 2006). Normal conversation measures around 60 dbA, garbage disposals are around 80 dbA, most stock ATVs/motorcycles are in the low to mid 90s dbA, lawn mowers are around 100 dbA, some performance or after market motorcycles will test at over 100 dbA, discomfort level is 115 dbA, and pain threshold is at about 135dbA. The noise from a shotgun can exceed 170 dbA.

The entire Forest is affected by noise in some way, whether it is ambient noise from wind in the trees, water flowing over rocks, or human-created noise from airplane flights, motorized vehicles, or equipment, for example. Noise carries differently in the natural environment depending on topography, vegetative cover, ambient conditions and snow pack. Flat terrain with little vegetative cover and crusty snow pack creates conditions for sound to carry longer distances than does terrain with more relief, vegetative cover and either fresh snow or no snow cover (USDI, 2003).

The following table illustrates that emerging technology designed to muffle recreational vehicle noise has a significant effect on the distance that the noise from those vehicles will travel under different environmental conditions. It also illustrates how much of an effect forest cover has on the limits of audibility. A large percentage of the District is forested, which has the effect of muffling noise to a degree.

Table 3-9. Distances to Limits of Audibility for Individual Vehicle Pass-bys in Open and Forested Terrain and in Average and Quiet Background Conditions.

Vehicle Type	Maximum 50-foot Pass-by Level (dbA)	Distance (feet) to Limit of Audibility[7]			
		Open Terrain		Forested Terrain	
		Average Background[8]	Quiet Background	Average Background	Quiet Background
Automobile	68	2,180	2,330	1,130	1,200
Two-Stroke Snowmobile	74	3,860	4,120	1,990	2,230
Four-stroke Snowmobile	70	2,690	2,860	1,450	1,620

Montana's sound law (MCA 61-9-418) requires a 96 decibel sound limit for motorcycles and ATVs operated off highway on public lands. Improvement of stock equipment has brought the sound level of most dirt bikes and ATVs down into the mid to low 90 decibel range.

Forest Service regulation 36 CFR 261.52 (j) requires spark arrester devices on all trail vehicles during

[7] Winter Use EIS for Yellowstone National Park (USDI 2000)

[8] Average background levels are 20 dBA and 22 dBA for the Open and Forested terrain, respectively; Quiet background levels are 15 dBA and 18 dBA for the Open and Forested terrain, respectively (USDI 2000).

the State declared fire season, typically May 1 to September 30. Many trail vehicles are now manufactured to meet this requirement, and typically when they meet the spark arrestor requirement they are also within the State mandated 96 decibel limitation. This method of enforcement obviously has its limitations including an officer's ability to recognize mufflers that have been modified from stock equipment, and it only applies during a short portion of the year.

Regardless of sound detectability by distances in a variety of settings, there are still those who are affected by noise-caused actions due to annoyance and resentment at the type of noise sources, or to the direct results of the noise itself.

Analysis Methodology

Recreation Opportunity Spectrum (ROS) settings are used in this analysis to address effects from noise by Alternative. See Recreation section of this chapter for definitions, protocols and further discussion. Noise or quiet aspects by ROS settings were used to assess the amount of the District where variation of noise or solitude might be found. The various ROS categories are compared to see the relative amount of recreational opportunity settings where noise ranges from only ambient noise (i.e., the AB Wilderness Area) to expected noise, especially in areas where quiet trails and opportunities for solitude may be hard to find during the summer and fall seasons. Varying levels of human-caused noise can be expected from settings with motorized uses such as those dominated by home and ranch development (Rural), areas dominated by roads (Roaded Natural) and Semi-primitive Motorized. Settings where human-caused noise is substantially reduced are those dominated by non-motorized areas found in the Primitive Non-motorized and Primitive ROS categories.

National Park Service modeling for "natural quiet" was not used since data needed for these models is not readily available. No matter how long and in what manner one collects soundscape data, there will always be a level of uncertainty because the soundscape is dynamic.

3.2.1.8 Environmental Consequences - Noise

Direct and Indirect Effects-Noise

Effects of All Alternatives – District-wide

All alternatives allow some motorized recreational vehicle travel that will contribute to noise on the District. Noise from recreational vehicles has the potential to impact people's recreation experience, wildlife (see Wildlife section), and traditional cultural practices (see Traditional Cultural Properties section). A large percentage of the District is forested, which has the effect of muffling noise to a degree. All alternatives would restrict motorized vehicles to designated routes only and dispersed vehicle camping along designated routes.

The following table displaying summer ROS classes by Alternative, shows that between 79% and 82% of the District provides non-motorized settings, while between 18% and 21% provides motorized settings under all alternatives. The Semi-Primitive Non Motorized and Primitive category predominates because of the Wilderness, Inventoried Roadless Areas, and the topographic constraints inherent to the landscape of the analysis area.

Table 3-10. Recreation Opportunity Spectrum Acres[9] and Percentages by Alternative[10]

ROS Setting	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Pryors Unit (77,969)					
Motorized Opportunities					
Rural	0%	0%	0%	0%	0%
Roaded Natural	25% (19,399)	33% (25,739)	53% (41,621)	56% (44,055)	33% (25,875)
Semi-Primitive Motorized	46% (35,985)	30%(23,380)	0%	0%	29%(22,439)
Subtotal	55,384 (71%)	49,119 (63%)	41,421 (53%)	44,055 (56%)	48,314 (62%)
Non-Motorized Opportunities					
Semi-Primitive Non-Motorized	29% (22,584)	37% (28,849)	47% (36,347)	43% (33,913)	38% (29,654)
Primitive	0%	0%	0%	0%	0%
Subtotal	22,584 (29%)	28,849 (37%)	36,347 (47%)	33,913 (43%)	29,654 (38%)
Beartooth Unit (525,625 acres)					
Motorized Opportunities					
Rural	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,205)
Roaded Natural	10% (51,832)	10% (51830)	10% (51,314)	10% (51,830)	10% (52,307)
Semi-Primitive Motorized	1% (6,715)	<1% (1,848)	<1% (1848)	1% (6,715)	1% (6,072)
Subtotal	71,233 (14%)	66,354 (13%)	66,038 (13%)	71,222 (14%)	70,584 (13%)
Non-Motorized Opportunities					
Semi-Primitive Non-Motorized	25% (127,281)	25% (132,150)	25% (132,666)	25% (127,283)	24% (127,920)
Primitive	62% (327,121)	62% (327,121)	62% (327,121)	62% (327,121)	62% (327,121)
Subtotal	458,416 (87%)	459,272 (87%)	495,515 (87%)	454,404 (87%)	455,041 (94%)
District-Wide (603,593 acres)					
Motorized Opportunities					
Rural	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,676)	2% (12,205)
Roaded Natural	12% (71,231)	13% (77,569)	15% (92,935)	16% (95,885)	13% (78,182)
Semi-Primitive Motorized	7% (42,700)	4% (25,228)	<1% (1,848)	1% (6,715)	5% (28,511)
Subtotal	126,607 (21%)	115,473 (19%)	107,459 (18%)	115,277 (19%)	118,898 (20%)
Non-Motorized Opportunities					
Semi-Primitive Non-Motorized	25% (149,865)	27% (160,999)	28% (169,013)	27% (161,196)	26% (157,574)
Primitive	54% (327,121)	54% (327,121)	54% (327,121)	54% (327,121)	54% (327,121)
Subtotal	481,000 (79%)	488,121 (81%)	495,862 (82%)	488,317 (81%)	484,695 (80%)

Alternative A has 2% more acreage (11,330 acres) in a motorized setting compared to No Action, and is the least restrictive alternative for motorized recreation with most opportunity for temporary solitude interruption by noise. Alternative C has one percent less acreage (7,818 acres) in a motorized

[9] One half mile buffer from motorized routes are used per ROS definition and protocol.
[10] Calculations were based on all ownerships within the District boundary.

setting compared to No Action and is the most restrictive alternative for motorized recreation and allows for most solitude without interruption by noise. Alternative B and B Modified is less restrictive than Alternative C and more restrictive that Alternative A and No Action and has less than one percent increase in acreage (196 acres) for motorized settings when compared to No Action. Opportunity for temporary solitude interruption by noise will vary.

Effects of the Alternatives – Pryor Unit

Within the Pryor Unit, between 29% and 47% of the unit are in a non-motorized setting and between 53% and 71% would be in motorized settings based on the alternative.

ROS information indicates that in the Pryor Unit Alternative A would increase areas with the potential for motorized noise disturbance by approximately 15% over No Action. Alternative B and B Modified would increase the area with this potential by 7% and 6%, respectively. Alternative C would reduce the area with potential for motorized noise disturbance in the Pryor Unit by 3%.

Frequency of use is highly variable. Under Alternative C, frequency of use might increase as a result of potentially concentrating motorized uses to fewer routes in the Pryors. This may have potential to increase noise impacts along popular loop areas such as Stockman Trail and Red Pryor Divide.

Implementing a season of use for vehicles at higher elevations in the Pryor Unit to reduce vehicle impacts during spring thaw, as proposed in Alternatives B, C, and B Modified, could also limit time that noise, associated with motorized vehicles on designated roads and trails, is a disturbance. In other words, noise disturbance associated with motorized vehicles would be reduced during the period when motor vehicles are prohibited from using routes due to season of use restrictions. In the Pryor Unit, this period varies between alternatives, but generally occurs during spring to early summer. The effects would include the following:

- Under Alternative B, a gross estimate of the acres that would temporarily change from motorized to non-motorized settings for the period from April 16 to June 14 is 38,400 acres, or 49% of the land unit. This is a straight calculation of 60 miles of routes under the season of use restriction multiplied by the one mile associated with the motorized ROS setting. This does not account for overlap of the one mile corridor among some of the routes, which would reduce the overall acreage. Even considering this overlap, there would be substantial shift in the ROS setting during this period under this alternative.
- Under Alternative C, using the same straight calculation method as above, 20 miles of routes or roughly 12,800 acres (16%) would shift from motorized to non-motorized settings from April 16 to June 14. There would be very little ROS corridor overlap of the affected routes.
- Under Alternative B Modified, using the same calculation method, 43 miles of routes or 27,520 acres (35%) would shift from motorized to non-motorized settings from April 16 to May 21. In addition, 15 miles of routes or 9,600 acres (12%) would shift from April 16 to June 14. Similar to Alternative B, there are several routes where the ROS corridors would overlap, which would reduce the overall acreage. Again, even considering this overlap, there would be a substantial shift in the ROS setting during these periods under this alternative. However, the benefit would be less than Alternative B given the shortened period of time (roughly five weeks rather than eight weeks) for a majority of the routes.

Effects of the Alternatives – Beartooth Unit

Within the Beartooth Unit, between 87% and 94% of the unit would be in a non-motorized setting, and between 13% and 14% would be in motorized settings based on the alternative. Motorized

settings in the Beartooth Unit vary only by about 1% between any alternative.

Frequency of use is highly variable. Under Alternative C, frequency of use might increase as a result of potentially concentrating motorized uses to fewer routes in the District. This may have potential to increase noise impacts along popular areas such as Benbow.

Implementing a season of use for motorized use on Lodgepole and Meyers Creek trails in the Beartooth Unit, as proposed in Alternative B Modified, could also limit time that noise, associated with motorized vehicles on designated routes. This period generally occurs during winter and spring.

Cumulative Effects-Noise

Background noise on the Forest (other than naturally occurring sounds from running water, wind in the trees, etc.) has been a function of short term temporal activities like timber harvest, fire suppression activities, and other permitted uses, etc. Short term impacts to recreationists have occurred for many years, especially since the advent of heavy machinery, motor vehicles, aircraft and power equipment. There are no significant stationary noise sources from industrial activities which have effected recreationists on the District in recent history (like sawmills or ore crushing facilities) other than noise associated with several active mines (Stillwater Mine, Limestone Quarry). Noise from these facilities is confined to the immediate vicinity of the project.

Noise associated with projects on the District will continue into the future. Timber harvest, operations of mines or mineral development, permittees, wildlife management activities, etc. typically are site specific, and do not tend to all occur in the same general location at the same times. Because of the dispersed and temporal nature of these projects, combined effects are not very likely. In some cases, road reconstruction work could be occurring concurrently with timber harvest or mining activities, and special use projects which would have an additive effect to the intensity of noise associated with a specific project. All of these projects tend to be temporal with their effect to recreationists typically lasting from several hours to several weeks or months. All reasonably foreseeable effects are short term (less than several months in duration), except Stillwater Mine Company operations where limited recreation occurs.

Numerous District activities other than the recreational use of motorized vehicles contribute to background noise and the loss of natural quiet. Permitted activities such as timber harvesting and mining often involve heavy equipment that is noisy. Fire fighting efforts frequently involve aircraft (helicopters, patrol planes, retardant bombers), as well as pumps, chainsaws, generators, etc. All of this equipment adds to human-caused noise. Commercial and private aircraft over-flights are a daily occurrence on the District, adding a short-term noise impact.

Frequency of use is highly variable. As an example, under Alternative C, frequency of use might increase as a result of potentially concentrating motorized uses to fewer routes. This may have potential to impact residences near popular loop areas such as Benbow, for example.

Alternative A would provide the most dispersed motorized recreation activities across the largest area of the District, which could potentially exacerbate the effects of noise from other activities across a broader portion of the District. In some cases, recreationists may not be as affected by noise from recreational vehicles in areas where other human caused noise may dominate the soundscape.

3.2.1.9 Conclusion - Noise

Recreationists seeking natural quiet near activities producing noise are likely to be annoyed by human-caused noise and may find noise from motorized recreational vehicles to be additive to ambient noise or they make likely recreate elsewhere. These effects are all short term but tend to impact the quality of some users' experience.

Under all alternatives, between 79% and 82% of the District provides non-motorized settings where human caused noise is less likely and between 18% and 21% provides motorized settings where noise impacts are more likely.

There is more difference between alternatives when the Pryor Unit is considered individually. The season of use restrictions in Alternatives B, C and B Modified have the potential to shift (16% or more) the ROS settings from motorized to non-motorized during the spring to early-summer periods affected.

The following table summarizes areas potentially impacted by noise from motorized activities (motorized ROS) and areas not expected to be impacted (non-motorized ROS).

Table 3.11. Summary of Noise Settings

Noise Setting	Unit	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Acres in motorized ROS settings (Percent of land unit in motorized ROS settings)	Pryor	55,384 (71%)	49,119 (63%)	41,421 (53%)	44,055 (56%)	48,314 (62%)
	Beartooth	71,233 (14%)	66,354 (13%)	66,038 (13%)	71,222 (14%)	70,584 (13%)
	District	126,607 (21%)	115,473 (19%)	107,459 (18%)	115,277 (19%)	118,898 (20%)
Acres in non-motorized ROS settings (Percent of land unit in non-motorized ROS settings)	Pryor	22,584 (29%)	28,849 (37%)	36,347 (47%)	33,913 (43%)	29,654 (38%)
	Beartooth	458,416 (87%)	459,272 (87%)	495,515 (87%)	454,404 (87%)	455,041 (94%)
	District	481,000 (79%)	488,121 (81%)	495,862 (82%)	488,317 (81%)	484,695 (80%)

Regardless of sound detectability by distances in a variety of settings, there are still those who are affected by noise-caused actions due to annoyance and resentment at the type of noise sources, or to the direct results of the noise itself.

3.2.2 CULTURAL RESOURCES

Regulatory Framework

This section contains information on the Archaeological Resources and Traditional Cultural Properties and is organized in two respective sections. Cultural resource is a broad term that refers to cultural properties and traditional life way values. A cultural property may be the physical remains of archeological, historical and architectural sites and/or a place of traditional cultural use. Traditional life way values refer to the connection between the landscape and a groups' traditional beliefs, religion or cultural practice.

Since these resources are nonrenewable and easily damaged, laws and regulations exist to help protect them. These include the National Historic Preservation Act (NHPA), the Archeological Resources Protection Act (ARPA), the American Indian Religious Freedom Act (AIRFA) and the Native American Graves Protection and Repatriation Act (NAGPRA). Sacred and culturally important places fall under this purview of the NHPA, AIRFA and the Sacred Lands Executive Order (Executive Order 13007). Native American graves are protected under NAGPRA.

The NHPA and its implementing regulations require that federal agencies take into account the effects of their undertakings on historic properties and provide the Advisory Council on Historic Preservation with an opportunity to comment on those undertakings. The term "historic property" refers to any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion on, the National Register of Historic Places (NRHP).

The Custer National Forest (CNF) is a participant in the Montana Programmatic Agreement (MTPA) between the Montana State Historic Preservation Office (MTSHPO), the Advisory Council for Historic Preservation and the Northern Region of the Forest Service regarding the management of cultural resources on National Forest lands in Montana. A new site identification strategy (SIS) under the MTPA is designed to identify potential effects to cultural resources from this undertaking and is under review by the MTSHPO. In compliance with the SIS the CNF will continue to survey, identify sites, monitor sites and develop avoidance or mitigation measures in consultation with the MTSHPO. All reporting on these activities will be included in the MTPA annual report for travel planning.

Under the guidance provided in the *USDA Forest Service Policy for NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use* prepared by the Forest Service in consultation with the Advisory Council on Historic Preservation (USDA Forest Service 2005), certain travel management proposals are considered an undertaking. The "undertaking" focuses on three specific categories: 1) the construction of a new road or trail; 2) the authorization of motor vehicle use on a route currently closed to vehicles; and 3) the formal recognition of a user-developed (unauthorized) route as a designated route open to motor vehicles. Existing or formally established system (classified) roads and trails already open to motor vehicle will not be evaluated since their current designation is not considered an undertaking under the policy. Category three applies to the Beartooth Travel Management undertaking. The terms of the MTPA will be followed when authorizing motor vehicle use on new or unclassified roads and trails.

3.2.2.1 Affected Environment– Archeological Resources

Overview of Changes from the Draft to the Final EIS

- Inventory conducted on non-system roads proposed for designation as system roads. This new information was included and analyzed for all alternatives.
- Addition of a Site Identification and Monitoring Strategy (SIS) for travel management to the MTPA. The SIS will be followed in compliance with the NHPA and ARPA.

Introduction

The District, situated in south-central Montana, is composed of two separate and unique geographic units. The Beartooth Unit consists of approximately 512,943 federally administered acres. Approximately thirty miles to the east is the Pryor Unit which consists of approximately 74,932 federally administered acres.

At present, there are 399 recorded sites on the District; 233 on the Beartooth Unit and 166 on the Pryor Unit. With approximately 17,282 archeological inventory acres on the Beartooth Unit and approximately 4,578 archeological inventory acres on the Pryor Unit, a site density of one site for every 74 acres on the Beartooth Unit and one site for every 28 acres on the Pryor Unit is estimated.

In 1999, the Custer National Forest 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. A National Forest Service heritage infrastructure database (INFRA) is used to track priority asset sites and associated prescribed maintenance or management activities. Presently on the District, there are 62 sites on this list that are monitored on a five-year cycle for condition assessment. Only one site, Camp Senia (24CB1134) has been formally nominated, and is listed on, the NRHP. At least 15 sites on the District have been evaluated and formally determined Not Eligible for nomination to the NRHP.

Previous Investigations

Archaeological and ethnographic investigations within, and adjacent to, the District have been ongoing since the late 1930s and have revealed a long and diverse series of human occupation in the area (Beckes and Keyser, 1983; Deaver and Kooistra-Manning 1995; Nabokov and Loendorf 1994).

Pryor Unit

During the 1960s the Billings Archaeological Society, often with assistance from Crow Tribal members, conducted inventory investigations in the Pryor Mountains and recorded numerous prehistoric and historic sites. (Conner 1967a and 1967b; Loendorf and Brownell 1980: 5).

Through a jointly funded project between the Bureau of Land Management, the National Park Service and the Forest Service various portions in and around the Pryor Mountains were investigated under the direction of Lawrence L. Loendorf during the 1968-1970 field seasons (Loendorf 1969, 1971, 1974a). Over three hundred new or previously recorded sites were located during these investigations (Beckes and Keyser 1983: 314). Projectile points collected during these three field seasons represent PaloeIndian Period (Angostura) through the Late Prehistoric Period (arrow points). Loendorf later conducted excavation investigations at six of these sites in the Pryor Mountains in order to determine the nature or the type of activity, and the length of occupation, which occurred during the periods of summer occupation at sites situated near the upper elevations in the Pryor Mountains (Loendorf 1974b).

In 1978 the University of Maine-Alberta Pryor Mountains research project began under the direction of Robson Bonnichsen. This multi-year project recorded over twenty-five cave, rockshelter/overhang and natural trap locations in the Pryor Mountains and investigated the presence of Late Pleistocene and Holocene cultural deposits (Bonnichsen and Young 1978). Radiocarbon samples from several of these caves have yielded dates ranging from approximately B. P. 10,530 to 620 years. Paleoclimatic sequences were constructed based upon analyses of floral, faunal and geomorphological samples collected from many of these locations (Beckes and Keyser 1983: 315). A complete Clovis projectile point was found on the surface near a spring in the Pryor Mountains during Bonnichsen's investigations (Scott 2005).

Three overviews have focused on the Pryor Mountains and surrounding areas in Carbon and Yellowstone counties (Harvey 1974, Konrad 1984, Trails and Tales Historical Committee 1983).

In 1989 Historical Research Associates (HRA) conducted cultural resource inventory on two-hundred sixty-seven properties (Forest Service owned buildings) located on thirteen National Forests within Region 1 of the United States Department of Agriculture (Caywood et al. 1990: 1-3). Five properties were recommended eligible for nomination to the National Register of Historic Places (Sage Creek, Rock Creek, Line Creek, Green Shack, and Meyers Creek). Included in this study was Bainbridge Cabin. This site was one of the first Homestead Entry Surveys in the Pryor Mountains and, at over 7800 feet in elevation, is the highest cabin site in the Pryor Unit. Today the Bainbridge Cabin is a popular destination for recreationists.

Beartooth Unit

One of the earliest formal archaeological research projects on the District began in 1972 by the Museum of the Rockies under the direction of Dr. Les Davis (Davis 1972). Six lithic artifact scatter sites (24CB36, 37 and 24ST36, 651, 652, 652) were recorded during a three year period in the Line Creek area and along the West Rosebud Creek drainage (Davis 1975). Following this sample inventory, testing and intensive data recovery projects were conducted at the West Rosebud Lake Archaeological Site (24ST651) during 1977-78. Artifacts recovered during these projects revealed sporadic prehistoric use of this site for the past 6000 years (Gregg 1977, Greiser and Plochman 1981).

Of special interest concerning the prehistory of the Beartooth Unit is a multi-year random sample inventory that was conducted under permit by retired National Park Service archaeologist Wilfred M. Husted and Forest Archaeologist Halcyon La Point during the late 1980s and early 1990s. Husted continued a long-standing interest in the alpine archaeology of the Beartooth Mountains by conducting several excursions into the backcountry to locate and record previously documented and new sites. With access to the Waples' collection, artifacts gathered by former game warden Vern Waples during a career of over thirty years on and near the Beartooth District, Husted was able to conduct an intensive analysis on the diagnostic projectile points, as well as, a detailed obsidian source study on over one hundred artifacts. The Waples' collection represents a time range of approximately 12,000 years of human occupation in the Beartooth Mountains and adjacent lowlands.

An early research project to document the historic era of the Beartooth Mountains and surrounding Stillwater County was conducted in the 1960s (Annin 1964). This three-volume compilation of photographs, recollections and stories provides personal insight to the early-day character and development of the landscape within, and adjacent to, the District. Later, a second collection of photographs and stories was published, focusing on the town of Red Lodge and the immediate surrounding area (Zupan and Owens 1979).

General Prehistoric and Historic Occupation

Evidence of prehistoric human occupation on the District, both in the Beartooth Unit and in the Pryor Unit, spans nearly 12,000 years. All periods of Northwestern Plains chronology, from Paleoindian to Late Prehistoric, have been documented in the area primarily in the form of diagnostic stone artifacts.

Prehistoric site types include alignments/drivelines, bison kill areas, cairns (possible burial features), caves/overhangs/rock shelters/sink holes, depressions, fasting beds/vision quest structures, lithic artifact scatters (with bone, ceramics, fire-cracked rock, etc.), quarries, rock blinds and stone circles. Both the Beartooth and Pryor Units offered all the necessities for prehistoric and historic peoples to survive including clothing, food, protection, raw materials and shelter.

While the prehistory of the District area is complex and varied, so too is the protohistoric and historic era. Protohistoric and historic cultural resource sites may include some of the feature types listed above along with: buildings (Forest Service administrative sites, mining operations, logging/sawmill operations, ski areas, homesteads, squatter cabins), cribbed-log and conical timbered lodge structures, cairns (cadastral survey or trail markers), camps (recreational campgrounds, Civilian Conservation Corps, highway construction, youth organization), concrete or stone dams, special use authorizations (irrigation ditches, hydroelectric facilities, recreation cabins, sheep corrals/water troughs), travel features (bridges/roads, hiking trails), lime kilns, mining or prospect pits, a roadside vista and wood piles that may have served as signal fires.

The Verendyre brothers may have been the first white explorers to travel through the Beartooth Mountains during the 1740s. William Clark, along with several members of the Lewis and Clark expedition, viewed the area from a distance on their return trip down the Yellowstone River in 1806, but did not conduct any detailed investigations of the area. Francois Antoine Laroque had an agreement with the Crow to trade for their beaver and bear skins during the early 1800s. In order to contact them in the fall, Laroque told them he would light fires on the mountain called Amanchable Chije—the Pryor Mountains (Hazlitt 1934: 22). Signal Fire Site may be the location of these Pryor Mountain signal fires.

Lieutenant Gustavus Cheyney Doane traveled through a portion of the District in 1876 and provided descriptions of areas near the Stillwater River. In particular, the Koegh Buffalo Jump—located just off Forest Service administered land along the Stillwater River—received brief but special mention by Doane:

> *"the beautiful Stillwater issuing from a mighty and closed cañon and bordered by a basaltic terrace terminating in sheer walls above the stream. Here was once a buffalo trap. The Indians drove the great herds slowly to the table land in rear and having closed in on the side toward the valley, stampeded and rushed them over the precipice. Their bones lie at the foot of the rock cliffs in a long windrow of bleaching thousands."* (Bonney and Bonney 1970: 461).

The District lies within the former boundary of the Crow Reservation as defined by the 1851 and 1868 Fort Laramie Treaties. While other tribes, such as the Arapaho, Bannock, Blackfoot, Nez Perce, Shoshone and Sioux, are known to have visited and spent time here, no doubt much of the area became well known, especially to the Crow Indians, during the latter half of the 1800s. During the next forty years following the signing of the 1851 Fort Laramie Treaty the Crow people saw their reservation reduced from over 38 million acres to just over 2 million acres through a series of treaty re-negotiations.

Historically, the District and surrounding area saw early development in homesteading, logging, and mining ventures, ranching and trapping. Hundreds of horses and cattle, along with thousands of sheep, were run in the Beartooth Mountain and Pryor Mountain areas (USDA Forest Service 1911-12: 7-10). Although these varied livestock interests were not always compatible, competing individuals usually settled their differences and figured out ways to tolerate each other.

Directly related to these early-day development activities are the numerous roads and trails that were created or constructed to provide access for homesteaders, loggers, miners, ranchers and recreationists. Crooked Creek Road (#2085), Hellroaring Creek Road (#2004), Rock Creek Road

(#2421) and West Fork Rock Creek Road (#2071) are just a few of the historic roads that have recently been recorded as sites. Graham Trail (#2013), Miller Trail (#2496), Red Pryor Divide Road (#2091) and Stockman Trail (#2850) are examples of roads that became travel corridors on the landscape not by formal construction but through frequent use by homesteaders (such as Bainbridge and Greathouse), loggers, cattlemen and sheepmen. Later mining activity—especially in the Pryor Mountains—that brought heavy earth-moving equipment to the area, often saw the improvement of these user-created roads. Many of these roads are scheduled for cultural resource investigation, site recording and evaluation.

An interesting water war evolved along the Sage Creek drainage in and around the Pryor Mountains during the late 1800s and early 1900s. Differing interpretations of water rights and water claims fueled a multi-year conflict between several homesteaders in this area and eventually led to a dynamite blasting event. The remains of a cribbed-log and stone dam on Sage Creek are a reminder today of this early-day water conflict (White 1990).

The mining industry of the 1880s and 1890s focused on coal and hard rock (asbestos, chromite, copper, gold, limestone, platinum/palladium, uranium) development. Along with this mining activity came the need for a work force that consisted of a variety of ethnic groups, the need for a railroad (Zupan and Owens 1979) and the need of mine/railroad timbers (USDA Forest Service 1911-12: 5). Abandoned remains of these mining ventures can be seen today at the New World Mine near Cooke City, the coal mines of Bear Creek/Red Lodge/Washoe, the Benbow and Mouat Mines near the Stillwater River drainage and hundreds of adits, tunnels and prospect pits scattered across the Beartooth and Pryor Mountains. A few lime kilns—reminiscent of small-scale operations dating to the late 1890s—are still present today on the District near Red Lodge and along the base of the Pryor Mountains. More recent mining ventures—specifically those associated with the 1950s-era uranium mining operations in the Pryor Mountains—have just become eligible for consideration as heritage resources. The Old Glory Mine and the Sandra Mine are two abandoned mines that are scheduled for cultural resource investigation, site recording and evaluation.

Not all mining operations in the area have faded to the realm of memories. Today, the Stillwater Mining Company located along the Stillwater River extracts platinum group metals while the Montana Limestone Company operates a commercial limestone quarry along the southwest corner of the Pryor Mountains.

With the establishment of the Pryor Mountain Forest Reserve in 1906 and the Beartooth National Forest in 1908, a variety of resources, besides grazing, mining and timber, were recognized including recreation and water power. Camping, hiking, hunting, fishing and skiing were only a few of the recreational opportunities that lured people away from the cities and towns. Camp Senia, one of the first dude ranch operations in Montana, was started by Alfred Croonquist in 1917 along the banks of the West Fork Rock Creek. Granite Peak—the highest mountain in Montana at 12, 799 feet was successfully climbed in 1923 following numerous attempts dating back to the mid-to-late 1880s (Smith 1923, USDA Forest Service 1962).

Along with the creation of the Pryor Mountain Forest Reserve in 1906 several ranger stations—including Crooked Creek RS, Dry Head RS, Piney RS and Sage Creek RS—were soon established in the Pryor Mountains primarily in order to administer grazing and timber permits. Although the rangers at these administrative sites usually conducted their work on horseback, primitive roads/trails had already begun to appear in the area. These travelways provided access to several Homestead

Entry Surveys (HES) along Sage Creek, to two HES located on Big Pryor Mountain, and to mountain grazing pastures and timber operations. Through the years, as mode of travel switched from animals and wagons to motor vehicles, some of these roads/trails (i.e. Sage Creek Road and Crooked Creek Road) saw improvement such that today they may be accessed by highway vehicles. Other roads/trails (i.e. the majority on Big Pryor Mountain) have retained their primitive character. A brief period of road/trail construction or improvement likely occurred in the Pryor Mountains during the 1950s-era uranium prospecting and mining activity.

These early-day road/trail systems on the Pryor Unit were limited in extent and remained so well into the 1960s. Map comparisons dating from 1918 (USDA Forest Service 1918) and 1965 (USDA Forest Service 1965) show very few additional trails between this nearly fifty-year span. Only one road, Crooked Creek Road #2085, in the Pryors Unit has been formally recorded as a historic site. There may be other historic roads in the Pryor Unit that require site recording.

Two colorful characters that adopted the District as their home were William "Wild Bill" Kurtzer and James "Jimmy Joe" Ayling. Although their solitary lives on the District barely overlapped they both held a kinship in their hermit lifestyle. Wild Bill constructed a small fishing pond in the West Fork Rock Creek drainage and operated a small-scale recreation facility for the Red Lodge locals and the surrounding communities. He was a frequent story-teller at a nearby children's youth camp. Jimmy Joe, who was always in company with his Samoyed dogs, lived along the Main Fork Rock Creek and was a winter caretaker for the recreation cabins along East Rosebud Lake. He was a wood carver of ocean-sailing ships, one of which is on display at the East Rosebud Lake Association Lodge. Although both of these individuals were squatters on National Forest Service land and have long since passed on, Wild Bill in 1934 and Jimmy Joe in 1971, they left their unique mark on the District.

Mystic Lake, located high in the mountains near the headwaters of the West Rosebud drainage, was dammed and became an operating hydroelectric facility in 1925 (Kirk nd: Chapter 5, page 26). In 1925 the first survey for a vehicle route from Red Lodge to Cooke City was conducted and in 1936 the Beartooth Highway was officially opened to the public (Zupan and Owens 1979: 276). Glacier Lake, located at the headwaters of the Main Fork Rock Creek, was dammed in 1937 to provide control facility for irrigation activity (Department of Natural Resources and Conservation 2001).

The Civilian Conservation Corps (CCC), a 1930s-era work relief plan promoted by President Franklin D. Roosevelt to address high unemployment among young men across the nation, played an important role in numerous construction projects on the District. In addition to building miles of fencelines, roads and trails the CCC constructed or improved several recreation campgrounds. Buildings and ski runs, located on the outskirts of Red Lodge at the Willow Creek Ski Area, were constructed by the CCC. The youth-oriented Lion's Camp and the St. Vincent's Orthopedic Camp for crippled/handicapped children benefited from the able work force of the CCC. These two camps are still operating today as youth camps. Impressive rockwork at Vista Point near the top of the Beartooth Highway and along a hiking trail in the Pryor Mountains are lasting examples of CCC craftsmanship. Other projects that the CCC were involved with on the District included fence building, fish planting and stream improvement (Brownell 2002).

One other ski development, known as Shangri-La, was operating up the Main Fork Rock Creek during the 1940s. With a log warming lodge and two thousand feet of ski tow, this development was recognized nationally and was chosen for the 1948 State Meet. A forest fire this same year destroyed the entire development and only remnants of a fireplace are visible today (Zupan and Owens 1979: 226-227).

In 1978 the 945,000 acre Absaroka-Beartooth (A-B) Wilderness was created with approximately 345,000 acres lying within the District.

Methodology

In order to determine the potential effects on cultural resources existing system and non system roads and trails were intersected with known archeological sites lying within a 600 foot wide corridor centered on the road or trail, utilizing GIS layering. This 600 foot wide analysis corridor is in accordance with the 2001 OHV decision to allow motorized wheeled cross-country travel to access dispersed camping sites (USDA Forest Service 2001) and it defines the area of potential effect (APE) when analyzing both direct and indirect effects under Alternatives A, B, B Modified and No Action. Two key stipulations in this 2001 OHV decision are that the selection of dispersed campsites is to be conducted by non-motorized means and once a dispersed camp site is selected it must be accessed by the most direct route (USDA Forest Service 2001: 7).

Two hundred thirty-four sites are identified within the 600 foot wide road and trail corridor on the District. This represents over half of the recorded sites on the District. Fifteen sites within the 600 foot wide corridor have been formally determined Not Eligible (NE) for nomination to the NRHP. These sites are removed from the analysis and will not be further considered. Of the 219 remaining sites, those that are currently defined as "undetermined" (N = 166) with respect to NRHP eligibility status will be considered potentially eligible under the MTPA protocol. The following table presents a NRHP status summary of these 219 sites by geographic unit and also identifies the number of priority asset sites present (priority asset sites are discussed below in Effects Common to All Alternatives).

Table 3-12. NRHP Status of Sites by Geographic Unit

NRHP Status	Pryor Unit	Beartooth Unit	Total
Listed	0	1 (1*)	1 (1*)
Eligible	20 (20*)	32 (22*)	52 (42*)
Undetermined/Potentially Eligible	66 (3*)	100 (5*)	166 (8*)
Totals	**86 (23*)**	**133 (28*)**	**219 (51*)**

(N*) = number of Priority Sites

On the Pryor Unit, twenty sites are recommended eligible for nomination to the NRHP while sixty-six have not been evaluated. Twenty-three of these sites are considered priority assets. On the Beartooth Unit, thirty-two sites are recommended eligible for nomination to the NRHP while one hundred have not been evaluated. Twenty-eight of these sites are considered priority assets. The Camp Senia Historic District is the only site formally listed on the NRHP and is also a priority asset.

Effects to sites are based upon the results of monitoring conducted during the past several years by Forest Archaeologists. These site monitors document natural versus human-caused disturbances and note any changes, either positive or negative, through time. Site by site review of properties that may have adverse effects resulting from the travel management decision will be conducted as part of the travel management SIS and consultation with the MTSHPO will continue until all sites are addressed and issues resolved. Site-specific forms of mitigation may include incorporating avoidance measures such as road realignment or closure, site-armoring techniques, increased enforcement, barriers, stewardship programs and detailed resource documentation and/or data recovery.

Of the 219 sites identified within the 600 foot wide road and trail corridor on the District, 130 involve system roads that are not proposed for any change in designation. Thirty-eight of these sites are located on the Pryor Unit and 82 are located on the Beartooth Unit. Proposed changes from non system road to designated road will result in no effect to twenty-nine sites, of which nine sites are located on the Pryor Unit and seventeen sites are located on the Beartooth Unit. This leaves 60 recorded sites that could potentially be affected by one or more alternative. Thirty-eight sites, all located on the Pryor Unit, will benefit from proposed changes. Up to twenty-two sites (Alternative A) could be adversely affected by proposed designation changes to system roads under the alternatives.

The proposed designation of non system roads to system roads could directly or indirectly affect twenty-two sites under Alternative A, nine sites under Alternative B, ten sites under Alternative B Modified and one site under Alternative C. Affects to these sites are discussed below under the respective alternatives.

The nature of terrain and landscape crossed by motorized vehicles is relative to both the type and number of sites impacted by this activity, and the types of effects to archaeological and TCPs. For the Beartooths, the rugged mountainous terrain was as difficult to traverse for prehistoric and historic groups as it is for recreational users today, and access is concentrated along trail and road corridors that follow streams and rivers. These same areas represent high probability for the presence of archaeological and traditional cultural property site locations. Many of the same dispersed campsites that were favorable in the past are the same ones used today. Along three creeks, West Fork Rock Creek, Main Fork Rock Creek and West Fork of the Stillwater, evidence of past traditional use is found as cairns and trail markers. At least one of these significant sites has been vandalized by present day campers who have taken rocks from the cairns to use for campfire rings. Sites found in Robertson Draw have also been susceptible to effects from dispersed camping.

Over 170 dispersed camping sites along the Main Fork Rock Creek (#2421) were examined by CNF resource specialists during 2007. Dispersed camping sites were found near or on five previously recorded cultural resource sites consisting of cairns, the historic M-K Highway Camp, a prehistoric lithic artifact scatter and a site consisting of multiple cairns and a building foundation. Effects due to dispersed camping activity were observed at the lithic artifact scatter site in the form of vehicle rutting on an access road. Cairns at another site are being dismantled in order to construct a large outlined figure of stone. As a result of these investigations, 20 dispersed camping sites were identified for closure under Alternatives B, B Modified and C.

Cairns may pose a difficult situation when it comes to eligibility determination and NRHP evaluation. The definition of a cairn is “a mound of stone” but determining the age and function of a cairn may be difficult. A few examples of cairn functions include buffalo jump alignment markers, burials, cadastral survey markers, cache markers, campfire rings, fencepost or sign post supports, monuments honoring important events or people, rifle supports, Sheepherder Monuments and trail markers. These functions can pertain to prehistoric, historic or both time periods. While the age and function of some cairns can be determined through historic documents or oral interviews, the age and function of some cairns is questionable unless they are dismantled. Native Americans consider cairns to be culturally sensitive features and avoidance or protection is the proper treatment rather than dismantling. Cairns on the CNF are considered culturally sensitive sites and are avoided and protected.

In compliance with a 2005 Washington Office directive (USDA Forest Service 2005) and following the public release of the DEIS 32 routes (9.24 miles) of proposed non system roads and trails

identified under Alternative B were inventoried utilizing pedestrian transects within a 150 foot wide corridor centered on these routes and six new cultural resource sites were recorded. Actual or potential effects to the sites, due to motor vehicle use, were documented and the results are incorporated into all the alternatives.

An ATV track was observed near one site located near Inferno Canyon on the Pryor Unit but this cairn is undisturbed and will continue to be monitored. A cairn and depression near Jimmy Joe Campground are undisturbed and will continue to be monitored. Two cairns near Lions Camp are undisturbed and will continue to be monitored. The former location of Richel Lodge is a popular dispersed camping area along the Main Fork Rock Creek. Although no standing structures are present at this location one abandoned historic ditch is being driven over by motor vehicles. This site will continue to be monitored and may require formal evaluation and consultation with the MT SHPO. A historic dug-in along Sage Creek is undisturbed and will continue to be monitored. A cairn near a developed picnic area along the Stillwater River is next to a road and near a recent campfire ring. This cairn will be monitored to insure that it is not driven over and the stones are not removed and used to construct additional campfire rings.

3.2.2.2 Environmental Consequences - Archeological Resources

Direct and Indirect Effects-Archeological Resources

Effects Common to All Alternatives

Prehistoric and historic cultural resources are a nonrenewable resource. Significant cultural resources have many values including their potential to provide scientific information on human cultural history, interpretive and educational value, values associated with important people and events of significance in our history, and often an aesthetic value such as a prehistoric petroglyph or a historic landscape. Information present at a site, in the form of artifacts, features or simply its intact, undisturbed character can be used to increase our knowledge and understanding of past life ways, but only if this information is retrieved under controlled methods. For Native American groups and other traditional culture groups' archaeological and historic sites often have importance for religious and ceremonial purposes or simply as locations for traditional uses significant in a particular group's ongoing cultural identity.

The National Register defines four criteria to be used in the evaluation of sites: (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR Section 60.4).

An effect, according to 36 CFR 800.9(a), may include an alteration to the property's characteristics of location, setting or use. Adverse effects are defined as those that may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association and include but are not limited to 1) physical destruction, damage or alteration of all or part of the property; 2) alteration of the character of the setting when that character contributes to the property's qualification for the National Register and 3) introduction of visual, audible or atmospheric elements that are out of character with the property or that alters its setting.

In an attempt to define effects more clearly, as they relate to #1 and #2 above, the CNF relies upon a threshold concept to measure effects to cultural resources. A site threshold has been reached when it is on the verge of losing the very qualities that could be considered eligible for nomination to the National Register. For example, if a previously constructed road coursed through a historic lime kiln such that the only evidence remaining is an oxidized soil stain along the road cutbank the site integrity would have been compromised, whereby it has lost all qualities necessary to be considered eligible for nomination to the National Register.

In contrast, an existing road may course through a lithic artifact scatter site containing intact subsurface cultural deposits. That part of the site containing the road corridor may be disturbed to the extent that it no longer contains information important to the prehistory of the area. The remaining undisturbed portion of the site may contain valuable information and, as such, the site threshold has not been reached and the site may still be considered Eligible for nomination to the National Register. The presence of the road has not threatened the threshold of the site. A new threat to the site may occur if additional vehicle tracks are rutted parallel to the existing road.

An example concerning loss of structures but retention of general setting is the vandalism to fasting beds on Dryhead Vista that has resulted in the obliteration of physical evidence that any such features ever existed. Although a number of fasting bed features that initially made up the site is gone the landscape setting and remaining structures may still retain enough integrity such that the site is still eligible for nomination to the National Register. This example is discussed in detail in the Traditional Cultural Properties section below.

Motorized use and to a lesser degree, non-motorized use, of public lands is an activity that has created a human influenced and/or manipulated landscape (Foster 1977: 107, 130) and has had various effects upon cultural sites in the past and, in many instances, continues today. Motorized use increases visitation and probability of impacts. Recreational motorized use, especially that of four-wheel drive and other off-highway-vehicles (OHV) has seen an ever-increasing trend since the 1960s. In comparing the motorized travel system on the Pryor Unit in 1918 (USDA Forest Service 1918) and in 1965 (USDA Forest Service 1965) there are only a few recognized road additions during a span of nearly fifty years. But in the years since 1965 the numbers of roads have at least doubled, reflecting an increase in motorized use.

Motorized use on, and its effects to, roads must also consider the age of roads and whether or not they represent cultural resources. For example, the Crooked Creek Road #2085, located on the Pryor Unit, was constructed during the 1920s and much of its original alignment is still intact and in use. At least eleven or twelve abandoned segments are still visible adjacent to the existing road. This road has been recorded and any proposed changes by the Forest Service require evaluation and consultation with the MT SHPO.

Several other roads on the Pryor Unit including Bear Canyon Road (#24921), Burnt Timber Ridge Road (#2849), Graham Trail (#2013), Sage Creek Road (#2144) and Stockman Trail (#2850) are similar in age and may also be potentially eligible historic properties. Roads on the Beartooth Unit that have already been recorded and found to be eligible historic properties include the East Rosebud Road (#2177), the West Rosebud Road (#2072), the Main Fork Rock Creek Road (#2421) and the West Fork Rock Creek Road (#2071)..

Numerous studies beginning during the early 1970s have documented the detrimental impacts of OHV use on archaeological sites by means of direct or indirect effects (Lyneis et al. 1980: 14; USDA Forest Service 2001: 55; USDA Forest Service 2002: 33). More roads result in more access to areas and increased effects to cultural resources.

A direct effect occurs when the action of the undertaking itself affects the cultural resource. Direct effects may be described as the breaking, crushing and scattering of cultural material when motorized vehicles are driven across or through sites. Soil compaction from wheel pressure and soil erosion processes may occur following removal of protective ground cover (i.e. vegetation and ground litter). Not only is there soil compaction and erosion as the ground surface becomes exposed, but the ground surface may become deflated. These types of site damage are especially apparent where concentrated and/or repeated vehicle travel occurs that causes rutting. Sites that consist of surface artifacts or features, or that contain intact subsurface cultural materials, are especially prone to damage and losses of valuable information due to motorized vehicle travel (ASPPN I-15 1990).

Actions associated with travel management which could have the potential to adversely affect prehistoric and historic cultural properties include increases in the type, intensity and duration of trail, road or land use. Of particular concern is the increase through the years of user-created roads and trails. The majority of these travel ways has been, and continues to be, created without engineering design and without input from a variety of other resource specialists, including archaeologists. Attempts to use these roads during inclement weather or when the roads are impassible may result in either deep/severe rutting or in the creation of parallel tracks along the initially established road. This action exposes buried cultural material and often churns up the matrix so that artifacts loose their context. Often, sites associated with these user-created travel ways are discovered by chance, exposing them to archaeologists and public visitor alike. Site damage has already occurred or is ongoing. Visually, as these user-created roads increase in number they become unsightly and may become permanent scars on the landscape.

Actions that have the potential to benefit cultural properties include decreases (but not necessarily closure or obliteration) in the type, intensity or duration of trail and road use where cultural properties are present or where the character of the historic route can be maintained or restored through a travel management decision.

An indirect effect is not caused by the action itself but is the secondary result of the undertaking. Increased site access and exposure of sites to the elements may result in a greater chance for looting and artifact displacement from erosion. Soil compaction and artifact displacement can result from foot, horse and motor vehicle traffic and from camping on prehistoric sites. Soil erosion and artifact looting associated with vegetative cover removed due to traffic and livestock use may also lead to site degradation.

An example of an indirect effect to sites involves the improved or increased access that a road may offer to a motorized vehicle user. The ability to access distant areas, relatively quickly and with relative ease, via motorized vehicles can increase visitation and consequently result in looting or vandalism. Highly visible structures are more prone to visits due to their attractive nature as destination points. Large numbers of people, along with inappropriate behavior, can alter or damage the very attributes that make the structure important or attractive as a destination. These behaviors include trampling (leading to erosion or feature damage), theft, wall or feature damage and other types of vandalism.

Sites that contain features, such as cairns, cribbed log structures, stone circles or historic buildings, may become damaged by actually driving over them or simply through acts of theft or vandalism. Motorized vehicles can more easily transport equipment (i.e. shovels, screens, hammers, crowbars, high-powered rifles) that can be used to damage or vandalize sites. These same vehicles can be used in theft to remove large items of value, whether this is weathered logs or lumber from a historic building or old mining equipment. These types of damage lessen the sites' integrity and are irreversible.

Certain sites are well known to vandals who dismantle structures (such as the fasting beds formally at Dryhead Vista) or who illegally collect artifacts (such as stone tools throughout the District). Several archaeological sites on the Pryor Unit have been popular destination spots to artifact collectors for years. Recent attempts by the CNF to mitigate some of these activities have focused on the restoration of a protective vegetation cover on sites to reduce the site surface exposure and to eliminate illegal collecting. The simple act of theft or removal of one or more artifacts from a site results in a loss of information about that site.

In the past, where vehicle access to sites may have been non-existent or limited, so too was the degree of site damage, artifact theft and vandalism. This is most dramatically represented at Dryhead Vista with the total loss of the six fasting bed/vision quest structures that were last documented in place in 1965. Studies have shown that increased access to public lands display a concurrent increase in the amount of vandalism of cultural resources (ASPPN I-13, 1989). Motorized vehicles have allowed improved access, increased visitation, increased damage, increased theft and increased vandalism to sites.

Beneficial indirect effects may include reduction in type and amount of traffic into the more remote areas through a decision to not designate certain routes for motorized use. Should cultural properties be located along a road or be crossed by a road, reducing the type and amount of traffic to the site may limit additional site disturbance and help preserve the site.

Any adverse effects to sites may require formal review in order to determine what actions are needed that will reduce, remove or mitigate the effects. Where appropriate, cooperation with interested tribes will occur during these site reviews. Under the protocol of the MTPA, all sites that are identified as potentially adversely affected by the travel management decision will be monitored and results of these monitors will be reported to the MT SHPO on an annual basis.

Alternative A

Direct Effects

Under this alternative ten sites are directly associated with roads that are proposed for a travel management designation change to public motorized use. Seven sites are located on the Pryor Unit and three sites are located on the Beartooth Unit. Most of these sites consist of lithic artifact scatters with intact subsurface cultural material and the direct effects consist of rutting or down-cutting of the existing roads that pass through the sites. Increased motor vehicle use would further expose these deposits resulting in loss of valuable information.

Two extremely important artifact scatter sites in the Pryor Unit, Big Springs Site and Mill Hollow Site, would continue to suffer damage from motorized vehicle rutting and erosion.

On the Beartooth Unit, one non system road proposed to be designated a system road crosses a historic ditch and at the remains of Richel Lodge vehicles are currently driving across an abandoned historic ditch.

Indirect Effects
Under this alternative, twelve sites may be indirectly affected due to the proposed travel management designation change to public motorized use. Nine sites are located on the Pryor Unit and three sites are located on the Beartooth Unit. These effects consist of potential vandalism to cairns, cribbed-log structures, fasting beds and historic log cabins and theft of historic and prehistoric artifacts. Cairns and fasting beds at some sites have been already been vandalized, and illegal artifact collecting has been ongoing at several of these sites. One cairn on the Beartooth Unit is next to a road and near a recent campfire ring. This feature is threatened with vehicles driving over it and dismantling to build additional campfire rings. The Benbow Mill area is a popular recreation area for the public and recently, the abandoned structures have become an area used for rifle and pistol target practice.

There is with increased potential for Stick City and Timber Town (two rare cribbed-log structure sites) to be threatened by vandalism visitation increases.

Five sites under this alternative will experience no effects due to designation of existing system roads to system motorized trails, system no designation or system administrative use only.

No change in dispersed camping practices along the Main Fork Rock Creek will continue to disturb two cultural resource sites and potentially disturb three sites.

Alternative B

Direct Effects
Under this alternative five sites are directly associated with roads that are proposed for a travel management designation change to public motorized use. Four sites are located on the Pryor Unit and one site is located on the Beartooth Unit. These direct effects consist of rutting or down-cutting of the existing roads that pass through Pryor Unit lithic artifacts scatter sites due to increased motor vehicle use. Intact subsurface cultural material present at these sites would be further exposed due to increased motor vehicle use resulting in loss of valuable information. One site on the Beartooth Unit consists of the remains of Richel Lodge. Vehicles are currently driving across an abandoned historic ditch.

Two extremely important artifact scatter sites in the Pryor Unit, Big Springs Site and Mill Hollow Site, would be protected under this alternative.

Indirect Effects
Under this alternative, four sites may be indirectly affected due to the proposed travel management designation change to public motorized use. These effects consist of potential for vehicles driving over cairns near a road and theft of prehistoric artifacts. One cairn on the Beartooth Unit is next to a road and near a recent campfire ring. This feature is threatened with vehicles driving over it and dismantling to build additional campfire rings.

There is with increased potential for Stick City and Timber Town (two rare cribbed-log structure sites) to be threatened by vandalism visitation increases.

Under this alternative, effects to 16 sites will be reduced or removed due to system roads not designated; system administrative use only; system road with a dropped segment; or system administrative use with a dropped road segment.

Three areas, containing 20 dispersed camping sites along the Main Fork Rock Creek, are proposed for closure to protect three cultural resources.

Alternative C

Direct Effects
Under this alternative there are no sites associated with roads that are proposed for a travel management designation change to public motorized use.

Indirect Effects
Under this alternative one site may be indirectly affected due to the proposed travel management designation change to public motorized use. One cairn on the Beartooth Unit is next to a road and near a recent campfire ring. This feature is threatened with vehicles driving over it and dismantling to build additional campfire rings.

Under this alternative, effects to 40 sites will be reduced or removed due to system roads not designated; system administrative use only; system road with a dropped segment; or system administrative use with a dropped road segment.

Dispersed camping under this alternative would not be allowed within a specified distance of designated motorized routes but parking within one vehicle length from the edge of system roads and trails would be allowed. While this may help protect many cultural resources located near roads, other sites would require monitoring to determine new effects.

No Action Alternative

The No Action Alternative sets a baseline by considering the existing system road and trail system as defined by the CNF Forest Plan, Plan Amendments and all existing Forest Orders. Under the No Action Alternative there are 169 sites, 72 in the Pryor Unit and 97 in the Beartooth Unit, located within the 600 foot wide corridor centered on 45 existing system roads and 21 existing system trails. Only one road in the Pryor Unit and six roads in the Beartooth Unit are currently designated for administrative use only.

Direct Effects
Under this alternative direct effects are identified at 12 sites (nine in the Pryor Unit and three in the Beartooth Unit) while no effects are identified at 159 sites. These effects consist of rutting or tread down cutting.

Indirect Effects
Under this alternative indirect effects are identified at 15 sites (ten in the Pryor Unit and five in the Beartooth Unit). The designated public motorized roads continue to see an increase in use. This

increased use, particularly where sites are present, could result in damage to or loss of information at these sites through vandalism and illegal artifact collecting.

Overall, the No Action Alternative would result in continued degradation of some known sites through rutting or tread down cutting, illegal artifact collecting and vandalism. Unknown sites would be damaged or obliterated by similar means, without the knowledge of archaeologists. Loss of site integrity, site artifacts and site information would continue, and likely increase, as recreation use grows in both the Pryor Unit and the Beartooth Unit.

No change in dispersed camping practices along the Main Fork Rock Creek will continue to disturb two cultural resource sites and potentially disturb three sites.

Alternative B Modified

This alternative differs from Alternative B by designating an additional 11.72 miles of motorized public use routes, not designating 7.41 miles of motorized public use and designating 3.19 miles of administrative use only routes.

Direct Effects
Under this alternative six sites are directly associated with roads that are proposed for a travel management designation change to public motorized use. Four sites are located on the Pryor Unit and two sites are located on the Beartooth Unit. These direct effects consist of rutting or down-cutting of the existing roads that pass through Pryor Unit lithic artifacts scatter sites due to increased motor vehicle use. Intact subsurface cultural material present at these sites would be further exposed due to increased motor vehicle use resulting in loss of valuable information.

Effects to five sites located along Shriver Peak Road (#2088) would be reduced by not designating a segment of this road.

Effects to two extremely important artifact scatter sites in the Pryor Unit, Big Springs Site and Mill Hollow Site, would be reduced under this alternative.

One site on the Beartooth Unit consists of the remains of Richel Lodge. Vehicles are currently driving across an abandoned historic ditch. Another site on the Beartooth Unit, consisting of a historic irrigation ditch, is proposed for designation for administration use only. Motorized vehicle use across this historic ditch may damage the ditch.

Indirect Effects
Under this alternative, four sites may be indirectly affected due to the proposed travel management designation change to public motorized use. These effects consist of potential vehicle driving over cairns near a road and theft of prehistoric artifacts. One cairn on the Beartooth Unit is next to a road and near a recent campfire ring. This feature is threatened with vehicles driving over it and dismantling to build additional campfire rings.

Effects to Stick City and Timber Town, two rare cribbed-log structure sites, would be reduced under this alternative.

Under this alternative, effects to 19 sites will be reduced or removed due to system roads not designated; system administrative use only; system road with a dropped segment; or system administrative use with a dropped road segment.

Three areas, containing 20 dispersed camping sites along the Main Fork Rock Creek, are proposed for closure to protect cultural resources.

Cumulative Effects - Archeological Resources
Monitoring site conditions will continue in support of travel management as well as other Forest undertakings such as range development, fuels and timber management. Mitigation of these effects and site protective measures will continue to be employed in consultation with SHPO.

Additional inventory in response to this and future undertakings will add to the understanding of the area prehistory and history. Proposed nomination of the Dryhead Archeological and Traditional Cultural Property District will protect this area for future generations.

3.2.2.3 Conclusion - Archaeological Resources

For all alternatives compliance with the NHPA through the MTPA is required. A monitoring program will be implemented that will address sites identified as at risk from the decision, and measures to reduce, remove, or mitigate these effects will be taken in consultation with the MTSHPO.

In overall comparison, Alternative A consists of the highest count of sites (22) that are either currently being effected or may potentially be affected. Alternative C consists of the lowest site count (1) that is either currently being effected or may be affected. Alternative B and Alternative B Modified consist of nine and ten sites that are either currently being effected or may potentially be affected. The following table compares the action alternatives.

Table 3-13. Potential Effects to Sites by Action Alternative and Geographic Unit

Potential Effects	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
Pryor Unit					
Direct Effects	7 Sites	4 Sites	0 Sites	9 Sites	4 Sites
Indirect Effects	9 Sites	3 Sites	0 Sites	10 Sites	3 Sites
Beartooth Unit					
Direct Effects	3 Sites	1 Sites	0 Sites	3 Sites	2 Sites
Indirect Effects	3 Sites	1 Sites	1 Sites	5 Sites	1 Sites
Entire District					
Direct Effects	10 Sites	5 Sites	0 Sites	12 Sites	6 Sites
Indirect Effects	12 Sites	4 Sites	1 Sites	15 Sites	4 Sites
Entire District					
All Effects	22 Sites	9 Sites	1 Sites	27 Sites	10 Sites

3.2.2.4 Affected Environment– Traditional Cultural Properties

Overview of Changes from the Draft to the Final EIS
- Continued consultation with affected tribes

- In Alternative B Modified, the addition of protective measures for the Big Pryor cultural landscape.

Introduction

American Indians and Alaskan Natives are recognized as people with distinct cultures and traditional values. They have a special and unique legal and political relationship with the Government of the United States as defined by history, treaties, statues, executive orders, court decisions and the U.S. Constitution. There is an emphasis on government-to-government relationships with federally recognized tribes, including consultation in order to identify rights and concerns during the development of plans, projects, programs and activities (USDA Forest Service 1997).

The 1992 amendments to NHPA specify that properties of traditional religious and cultural importance to an ethnic group referred to as traditional cultural properties (TCPs) may also be determined eligible for inclusion on the NRHP. Under NHPA, effects to "cultural resources of traditional religious and cultural importance" must be considered. A location or site has cultural value if its' significance to American Indian beliefs or customs "has been ethnohistorically documented and if the site can be clearly defined" (Parker and King 1990:15-27). Locations of natural features significant in the mythology, cosmology, and history of a Native American group are potentially eligible to the National Register. Sites " where Native American religious practitioners have historically gone, and are known or thought to be today, to perform ceremonial activities in accordance with traditional rules of practice"(Parker and King 1990:1) are also potentially eligible properties. In carrying out its responsibilities under Section 106, a federal agency is required to consult with any Indian tribe that attaches religious and cultural significance to such properties (16 USC 470a(d)(6)(A) and (B)) when any federal undertaking might affect them.

Federal agencies must also consider American Indian traditional use, belief system, religious practices and lifeway values as directed by the Archeological Resources Protection Act of 1979 (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA) and the American Indian Religious Freedom Act (AIRFA). Contemporary use sites for traditional or cultural purposes are provided protection under AIRFA. When management activities might limit current religious activities, restrict access to important ethnographic resources, alter sacred sites, or affect Indian burials, AIRFA stipulates the need for consultation with Indian tribes. Additionally, rights reserved under treaties may possess an inherent measure of resource protection. The Fort Laramie Treaties of 1851 and 1868 apply to the Beartooth and Pryor Units. Reserved resource rights and privileges associated with these treaties and other Indian agreements include activities such as hunting and gathering access to forest resources.

Under the USDA Forest Service Policy for NHPA compliance in Travel Management (2005), Forests are to consider roads, trails or areas that may be associated with TCPs that are important to tribes, or to other ethnic and social groups. Forests are to cooperate with tribes or other ethnic and social groups that ascribe traditional use to a property or area and this cooperation and consideration is to extend throughout the NHPA compliance process for this undertaking.

Coordination with pertinent Tribes has been ongoing in the form of the original project scoping letter, public meetings, agency meetings, letter correspondences and proposed/scheduled field trips which outlined the proposed project specifics and requested any concerns that they may have regarding cultural resources or TCPs. This coordination effort is intended to insure that any tribal concerns or comments are addressed throughout the NEPA process in regards to NHPA, ARPA, AIRFA, and

NAGPRA as well as through Government to Government consultation.

The study area is located within the Beartooth District of the Custer National Forest in south central Montana. It is composed of two topographically different units, the Beartooth and the Pryor, and is within traditional Crow Indian Territory. Both units, along with the lands in between, are considered "Crow Country" by the Crow and eloquently described by Crow Chief Arapooish:

It has snowy mountains and sunny plains; all kinds of climates and good things for every season. When the summer heats scorch the prairies, you can draw up under the mountains, where the air is sweet and cool, the grass fresh, and bright streams come tumbling out of the snow banks. There you can hunt the elk, the deer, the antelope, when their skins are fit for dressing; there you will find plenty of white bears and mountain sheep…

In the autumn, when your horses are fat and strong from the mountain pastures, you can go down into the plains and hunt the buffalo, or trap beaver on the streams. And when winter comes on, you can take shelter in the woody bottoms along the rivers…

Crow country is exactly in the right place. Everything good is to be found there. There is no country like the Crow Country (Nabokov and Loendorf 1994).

As detailed in the archaeological and historical analysis under Issue 5 Archaeological Resources, there have been a number of archaeological inventories and investigations and many of these projects have recorded archaeological sites that are considered cultural resources of traditional religious and cultural importance to Native Americans. In addition to the archaeological reports, several documents were found to contain extensive information on the traditional Indian use of the District.

The first is a letter received from Crow Cultural Commission Chairman George Reed who identified the Pryor Mountains as Arrow Shot Into Rock Mountains and having "much spiritual significance to the Apsaalooke (Crow) Nation"(Reed 2007). The Arrow Shot Into Rock Mountains are the home of the Little People. The Crow consider the whole Pryor, Arrow Shot Into Rock, Mountains as a sanctuary for individuals who venture off on fasting quests. Indeed, Mr. Reed says:

"all the mountain ranges in the territory of the Apsaalooke (Crow) nation are sacred because that is where First Maker Travels as he watches his creation…'If you need to contact me you will find me along the backbone of the earth where I travel as I watch my possession'…These are the exact words that was said to His Arrows Are Sacred as he was being prepared to return to the Apsaalooke (Crow) people…" (Reed 2007).

The second account is the ethnographic overview conducted by Sherri Deaver and Ann Kooistra-Manning for the Custer National Forest (CNF) in 1995. The purpose of this overview was to identify Native American groups who have used, or currently use, CNF administered lands for ceremonial and other traditional cultural activities; define culturally sensitive site types and their location on the CNF; and identify potential conflicts between CNF management practices and traditional cultural practices.

The Crow, Shoshone and Arapahoe were found to have historical and current ties to the District and a number of creeks, lakes, mountains and glaciers appear to have been named after Native Americans and their traditional activities such as Lodgepole Creek, Sioux Charley Lake, Sundance Lake, Teepee Creek, Crow Mountain, Red Lodge Creek and Sage Creek.

They found that the significance of the Pryor Mountain Unit to the Crow could not be overemphasized – the area was found to be used on a regular basis for fasting, plant collecting, subsistence activities such as tipi pole and fire wood collecting, and ceremonial practices. Pryor Gap, just north of the Pryor Unit, is significant not only in Crow history since it served as a major transportation route in

and out of the mountains, but it also has great spiritual significance since it is the home of the Little People. Other areas of the Pryors such as Dryhead Overlook are associated with the fasting of individuals such as Chief Plenty Coup who were important in Crow history.

Cultural resources associated with traditional Indian ceremonies, cultural practices and important events in tribal history were classified as culturally sensitive sites by Deaver and Kooistra-Manning (1995). Culturally sensitive sites identified within the District include stone ring sites, cairn sites, rock alignments, fasting sites, eagle trapping sites, and log structures. Five basic tribal concerns were expressed specifically for the District – respectful treatment of the burials; maintenance of access for plant and tipi pole gathering; maintenance and increased access for mineral resource gathering such as soapstone and paint pigment; respectful treatment of TCPs, especially sun dance grounds, fasting sites, rock art sites, and medicine wheels; and respectful treatment of hunting, fishing and root gathering sites (specifically requested by the Shoshone-Bannock).

The last document is a study by Peter Nabokov and Larry Loendorf conducted in 1994 that included lands managed by the CNF, Bureau of Land Management, the National Park Service and Bighorn Canyon National Recreation Area within and surrounding the Pryor Unit. Under this study, forty-one ethnographic resources were identified as important to the Crow Tribe. The following ethnographic resource locations were found on and directly adjacent to the CNF:

- Pryor Mountain which "was more sacred than its neighbors" and was to this mountain that "pilgrimages were made… the thunder had his home on this mountain, and storms could be seen sporting on its summit when fair weather rulled the neighboring country" (Janette Woodruff, in Nabokov and Loendorf 1994);
- Trail through Pryor Gap which connects the Clark Fork of the Yellowstone River Valley with the Bighorn River, along Pryor (Arrow) Creek through Pryor Gap (Shoots with the Arrow Gap). Rock Cairns mark the trail, although many have been removed where land cleared for agricultural fields. Still, several dozen cairns remain in an alignment through the gap.
- Trail marked by rock cairns on the southern flank of Big Pryor Mountain shows the access route from the mountains to Demi John Flats along Crooked Creek. These rock cairns may also designate or commemorate routes used for significant journeys as well as trail makers.
- Commissary Ridge Bison Drive - an important Crow buffalo jump described by Crow Elder Henry Old Coyote.
- Commissary Ridge Plant collection area - identified by Henry Old Coyote who described the entire Pryor Mountains as a commissary for the Crow. Loendorf (in Nabokov and Loendorf 1994) described an explanation given by Old Coyote "…within a radius of a few feet, Henry identified the plants that were edible, those that had medicinal use, and those that had other uses, such as straight pine for tipi poles…he wove together the inorganic and organic parts of the mountains while constantly reminding us that this was the commissary, the storehouse of life to the Crow Indians". It is further identified as a root-plant (bitterroot, sego lily, Indian turnip) collection area and is still used by the Crow.
- Bear Canyon Conical Timber Lodge – only remaining example of conical pole lodge in the Pryor Mountains. Although the exact cultural affiliation is not known it may represent past activities of the Crow or other visiting tribes to the Pryor Unit.
- Timber Town and Stick City - considered houses made of dead –fall timber, which, according to Joe Medicine Crow were one of three types of lodges built by the Crow Indians. These structures are considered temporary houses and may have been used by traveling war parties serving as fortifications in case of attack.

- Vision Quest Sites – generally located on eastward-facing ridges or dramatic promontories in the Pryor and Big Horn Ranges. Three areas have been identified: Dryhead Overlook on East Pryor; Big Pryor/Sage Creek Overlook overlooking Sage Creek and Pryor Gap; and the east side of the Big Pryor Mountain called "where they saw the rope".

Included in the study are recommendations for management of these important resources, and a call to treat the Pryors as an ethnographic landscape that is made up of places of "sacramental, subsistence, historical, and sentimental significance" to the Crow as well as other groups who identify with this unit (Nabokov and Loendorf 1994:A.1).

These studies found numerous areas within and near the District that offered Native American Indians the opportunity to reconnect with, and practice, the spiritual realm of human existence. Many of these spiritual areas are reflected today by the presence of animal skulls within stone circles or embedded in the forks of a tree, caves that may have served as the abodes for the Little People of Crow, cairns that may represent burials or offering structures, fasting beds/vision quest structures, stone circles that may have served as support structures during fasting ordeals and traditional plant collecting areas.

Methodology

In order to analyze potential effects to cultural resources of traditional religious and cultural importance, culturally sensitive sites, and TCPs from this undertaking, the archaeological record and available ethnographic accounts were reviewed to identify and map these cultural resources. Ethnographic association with the archaeologically recorded sites and place name locations were acquired by a search of archaeological database on the CNF and other historical and ethnographic literature for the District. Ongoing consultation with the Crow Cultural Commission identified additional locations. The sites were then mapped in relation to the road and trail network to assess the potential effects to these resources from motorized use of the roads and trails in both units. It should be noted that this is a very preliminary list and, through additional consultation and further archaeological inventory, will no doubt be expanded.

From this work, over 140 recorded cultural resource sites within the two units were found that could be identified as cultural resources of traditional religious and cultural importance. Seventy-nine of the 140 cultural resource sites are either crossed by system and non-system roads and/or trails, or located within a 600 foot wide corridor. Few sites have been formally evaluated for site eligibility for nomination to the NRHP. For this analysis, all undetermined sites are considered potentially eligible. A draft District nomination for the Dryhead Overlook is currently being compiled that will consist of over 200 features including fasting beds, bison jumps, rock alignments, drive lines, cairns, and stone circle sites within the CNF and BLM administered lands within this ethnographic landscape. These sites are further described by unit in the following tables.

Table 3-14. Recorded Traditional Cultural Properties/ Culturally Sensitive Sites - Beartooth Unit

Site Number	Site Name	Site Type	Eligible [11]
24CB00036	North Line Ridge	Cairn, stone feature	U
24CB00409*	Lost Picket Creek Site	stone circles	U
24CB01296	Friday PM Site	Stone circles, cairn	U

[11] Eligible = Eligible for nomination to the NRHP; E = Eligible; U = Undetermined; * = Priority Asset

Table 3-14. Recorded Traditional Cultural Properties/ Culturally Sensitive Sites - Beartooth Unit

Site Number	Site Name	Site Type	Eligible [11]
24CB01328*	RLC-08	Cairn	E
24CB01540	D2-00-19-03	Cairn, stone feature	U
24CB01546	D2-00-19-09	Stone circles	U
24CB01550	D2-00-19-13	Cairns	U
24CB01551	D2-00-19-14	Cairn	U
24CB01625	D2-01-09-01	cairn	U
24CB01645	WFRC-01	cairn	U
24CB01646	WFRC-02	stone circle	U
24CB01647	WFRC-03	cairn	U
24CB01648	WFRC-04	cairn	U
24CB01649	WFRC-05	stone structure, depression	U
24CB01650	WFRC-06	cairn	U
24CB01651	WFRC-07	cairn	U
24CB01652	WFRC-08	cairn	U
24CB01653	WFRC-09	stone circle	U
24CB01800	Robertson Draw-04	cairn, stone structure	U
24CB01853		stone structure	U
24CB01854		cairn	U
24CB01894		cairns	U
24CB01895	Jimmy Joe	cairns	U
24CB01955		cairn	U
24CB01956		Cairn, stone circle	U
24CB01957		cairn	U
24CB01958		cairn	U
24CB01959		cairn	U
24CB01960		cairn	U
24CB01961		cairn	U
24CB02046	Parkside-01	cairns	U
24ST00280*	Merv's elk site	Cairn, elk antler	E
24ST00343	Cathedral Fire - 02	cairns	U
24ST00346	WFRC-01	cairn	U
24ST00354	RG-01	cairns	U
24ST00370		cairn	U
24ST00376		cairn	U
24CB02100	Inferno Cairn	cairn	U
24CB02102	Lions Cairns	cairn	U
24ST00379		cairns, rock alignment	U

Table 3-15. Recorded Traditional Cultural Properties/ Culturally Sensitive Sites - Pryor Unit

Site Number	Site Name	Site Type	Eligible
24CB00159		bison kill	U

Table 3-15. Recorded Traditional Cultural Properties/ Culturally Sensitive Sites - Pryor Unit

Site Number	Site Name	Site Type	Eligible
24CB00419*	Dryhead Overlook Site	fasting beds	U
24CB00608/833*	Overlook/Ice Cave Buffalo Jump	rock alignment, kill site	U
24CB00759	Bear Trail Site	Artifact scatter, stone circles	U
24CB00776*	Timber Town	log and stone structures	E
24CB00777*	Big Springs	artifact scatter, cairns	E
24CB00834	Quiet Pine Site	artifact scatter, cairn	U
24CB00849	Piney Springs Site	Stone circles, artifact scatter	U
24CB00863*	Commissary Ridge Bison Kill	Bison kill	U
24CB00893*	Signal Fire Site	Signal fire wood	E
24CB00894*	Stick City	log structures	E
24CB01031	D2-16-02	Cairn	U
24CB01371	D2-98-16-01	Cairn	U
24CB01373	Pryor 98-01	Cairn	U
24CB01374	Pryor 98-02	Cairn	U
24CB01376	Pryor 98-04	Cairn	U
24CB01377	Pryor 98-05	Cairn	U
24CB01378	Pryor 98-06	Cairn	U
24CB01383*	Where they saw the rope	fasting beds	E
24CB01384	Pryor 98-12	Cairn	U
24CB01385	Pryor 98-13	Cairn	U
24CB01386	Pryor 98-14	Cairn, artifact scatter, stone circle	U
24CB01388*	Bear Canyon Timber Lodge	Timber lodge	U
24CB01529	D2-00-06-01	Cairn	U
24CB01533	Fog Runner	Cairn, artifact scatter	U
24CB01793	DHVRoad-01	stone feature	U
24CB01794	DHVRoad-02	cairn	U
24CB01795	DHVRoad-03	cairn	U
24CB01884		cairn	U
24CB01885		Cairn, artifact scatter	U
24CB01890	GA-06-01	cairn	U
24CB01891	GA-06-02	cairn	U
24CB01892	GA-06-03	cairn	U

As can be seen from the tables, most of the culturally sensitive sites appear to be cairn sites. As noted earlier, these rock features may have served a variety of functions. Native Americans consider cairns to be culturally sensitive features since they could be burials and/or important markers, and avoidance and protection is considered the most appropriate treatment.

Along with the recorded sites displayed above are three traditional cultural property/ethnographic "landscapes" described earlier which include Commissary Ridge plant collection area; the Dryhead Overlook; the Big Pryor Overlook The Big Pryor Overlook refer to fasting areas along the north and east perimeter of Big Pryor, including the location of "where they saw the rope". In the Beartooth Unit, consultation with the Crow found the area of Robertson Draw to contain a number of culturally

sensitive sites that should be protected.

3.2.2.5 Environmental Consequences - Traditional Cultural Properties (TCPs)

Direct, Indirect, and Cumulative Effects-Traditional Cultural Properties

Effects Common to All Alternatives

According to Section 800.9 (a) of the NHPA an undertaking "has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register." Alteration to features of the property's location, setting, or use may be relevant depending on the property's significant characteristics. Further, Section 800.9 (b) of the act specifies, "...an undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, workmanship, feeling or association".

Culturally sensitive sites and TCPs often consist of or include archaeological sites. Specific classes of sites identified as culturally sensitive require the protection of site setting as well as the visible remains. These sites include vision quest markers, cairns, eagle trapping pits, rock imagery, and certain types of stone circles. While specific sites have not been identified by the tribes as culturally sensitive or TCPs (with the exception of Dryhead Overlook) at this time, for this analysis all recorded culturally sensitive sites are treated as if they are potentially TCPs.

The characteristics of the ethnographic landscape that contribute to the use of a traditional cultural property (TCP) may include visual setting, qualities of spiritual reflection, renewal and sanctuary; natural setting; and unique ecosystem. The physical environment provides a basis upon which the integral relationships to the TCPs depend. Maintenance of the setting and its relationship with the surrounding lands become vital to the preservation of these sites and the cultural landscape.

Adverse effects could be in the form of direct, indirect, or cumulative impacts. Direct impacts are physical, and adversely affect the site or its setting. For this undertaking, new road or trail construction and/or change of use would be the primary direct impact affecting sites or structures by either destroying or damaging the site, causing isolation from or alteration of its surrounding environment, or the alteration of site setting by introducing visual, audible, or atmospheric elements that are out of character. Adverse effects to setting have especially serious consequences for TCPs, since these sites were chosen for their pristine qualities and remoteness, among other things. Introduction of noise, smells, dust along with increased recreational visitation and accessibility may adversely affect the TCPs and their continued use.

Increased recreational access and visitation also introduce the potential for destruction or vandalism of TCPs. Comparatively remote sites were naturally protected from direct and indirect impacts due to difficulty in access. With the availability of new, more versatile motorized vehicles, access to more remote areas of public lands is possible. This new wave of motorized use has introduced more human presence in these remote areas and has left a mark on the ethnographic landscape through the pioneering of roads and trails. Vandalism and destruction of TCPs have unfortunately been a subsequent indirect effect of increased access.

A prime example of this is what has occurred and continues to occur at Dryhead Overlook. The Dryhead Overlook is now one of the most popular public recreation areas in the Pryor Mountains. Of significant concern is the increased use of the area, both on and off established roads, by motorized

vehicle recreationists and the vandalism of several fasting bed/vision quest structures. The Dryhead overlook was recorded in 1952 and photographs taken at that time display fasting beds that are no longer present (see Figure 3-1). At the time of recording, access to the site was along an unimproved trail considered accessible only by four wheel drive vehicles. In 1965, a recreation plan called for the construction of a parking lot and loop for public access to the overlook. Recreation design maps from 1965 display plans to construct a loop road, parking stalls, outhouse, paths and overlook wall (to protect the public!). These plans also note six "rectangular Indian features". The original plans were followed for the loop access and parking area, but the rest of the design plans were not implemented. The six "Indian features" no longer exist, having been vandalized and destroyed over the years. Loss of these sacramental features is attributable to unrestricted visitation, lack of interpretation at the overlook, and lack of protection. Continued traditional use of more remote areas within the overlook is a testimony to the lasting importance of this ethnographic landscape but continued motorized intrusion may eventually take its toll and prove fatal to the future use of this important traditional cultural property.

Indirect effects would not immediately result in physical alteration of site or setting. A new access road into an area containing significant sites or structures would allow public access and exposure of the properties, and potentially decreasing the seclusion and quiet necessary for many of the traditional practices.

This use of motorized vehicles, especially ATVs, allows people to cover more ground off roads and trails and has increased exposure of the more remote cultural sites to vandalism and illicit collecting. The incidence of vandalism and illicit collection is also very much influenced by the level of visitation and access to certain areas. Greater visitor use to some areas has led to the increase of vandalism, illicit collection, littering and disturbance to cultural sites. Vandalism has also increased in previously inaccessible areas, due in part to the fact that many visitors now use motorized vehicles that are capable of reaching these formerly isolated areas. While cultural properties situated along designated trails and road corridors can be signed, monitored, patrolled and protected, the impacts outside of these areas are largely uncontrolled and the extent of impact unknown.

The more people who visit an area increases, the potential for vandalism of the cultural resource and general degradation of the historic and natural landscape increases. Motorized travel increases the number of people who travel to these areas. Crow Cultural Commission Chairman George Reed states that motorized vehicles are threatening the sacredness, solitude and pollution free atmosphere of the Pryor, Arrow Shot Into Rock, Mountain, the last sacred place where individuals go for guidance and prayer without disturbance and interference. He calls for restriction of motorized vehicle travel in the Pryor Unit.

Figure 3-1. 24CB419 - Dryhead Overlook Site

Left to right: Waldo M. Wedel, Frank P. Wedel and Achilles (who thought he had no heels) caption and photograph by Waldo R. Wedel, June 29, 1952

Approximate photo point of June 29, 1952; photo reference MWB-2003-29, frame 5; September 21, 2003

The following tables display the potential effects to TCPs relative to road for each alternative. They are displayed by Beartooth and Pryor Units. Effects were analyzed at two scales: 1) Recorded cultural site scale to consider effects to cultural sites that have a boundary defined; and 2)Unit scale to consider effects to the ethnographic landscapes. The indices used are the same as described above for archaeological sites - the number and type (TCPs and/or ethnographic landscapes) whose integrity or NRHP eligibility status could be affected. Adverse effects considered are impacts to feeling and association of the properties in question and include access, vandalism, and disruption of the site and landscape setting. While there appears to be affects to the Commissary Ridge Plant Collection area, this effect is for the most part beneficial for increasing access for Traditional Practitioners. Administrative use for some of the roads is considered a beneficial effect since the access for the general public is reduced, and incidences of vandalism and indirect effects from camping should be removed. For these reasons, Commissary Ridge landscape and Administrative only road effects are not included in the summary line displaying potential and on-going adverse effects.

Table 3-16. Motorized Route Potential Effects By Alternative[12] – Beartooth Unit

Route No. – Beartooth Unit	Site Number	Effect	Alt. A	Alt. B	Alt. C	No Action	Alt. B Mod
2008	24CB01546	Access	S	S	S	S	S
	24CB01550	Access	S	S	S	S	S
	24CB01800	Access	S	S	S	S	S
	24CB01894	Access	S	S	S	S	S
	24CB01296	Road, Access	S	S	S	S	S
20083	24CB01540	Access	Y	-	-	-	-
20084a	24CB00036	Access, Vandalism, Camping	Y	-	-	-	-
2071	24CB01645	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01646	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01647	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01648	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01649	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01650	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01651	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01652	Camping	Y/S	Y/S	-	Y/S	Y/S
	24CB01653	Camping	Y/S	Y/S	-	Y/S	Y/S
234262	24CB2102	Vandalism	A	A	A	A	A
24004	24ST0379	Vandalism	Y	Y	Y	-	Y
24147	24ST00280	Vandalism	Y	Y	A	-	Y
2421	24CB01955	Camping	Y	Y	-	Y	Y
	24CB01956	Camping	Y	Y	-	Y	Y
	24CB01957	Camping	Y	Y	-	Y	Y
	24CB01958	Camping	Y	Y	-	Y	Y
	24CB01959	Camping	Y	Y	-	Y	Y
	24CB01960	Camping	Y	-	-	Y	-
	24CB01961	Camping	Y	-	-	Y	-

[12] A = Administrative Use; Y = Yearlong; S = Seasonal; Y/S = Part year long and part seasonal; - = not affected

Table 3-16. Motorized Route Potential Effects By Alternative [12] – Beartooth Unit

Route No. – Beartooth Unit	Site Number	Effect	Alt. A	Alt. B	Alt. C	No Action	Alt. B Mod
	24CB00409	Vandalism	Y	-	-	Y	-
	24CB01895	Vandalism	Y	-	-	Y	-
2846	24ST00346	Camping	Y	Y	-	Y	Y
	24ST00354	Camping	Y	Y	-	Y	Y
2846F	24ST00343	Access	Y	A	A	Y	A
Total Potential Adverse Effects Sites/Landscapes	**31/0**		**30/0**	**23/0**	**6/0**	**25/0**	**23/0**

Table 3-17. Motorized Route Potential Effects By Alternative – Pryor Unit

Route No. – Pryor Unit	Site Number	Effect	Alt. A	Alt. B	Alt. C	No Action	Alt. B Mod
20162	24CB00776	Road, Access, Vandalism	Y	-	-	-	-
20182	24CB2100	Access	Y	Y	-	-	Y
2088	24CB00893	Access	Y	S	Y	Y	-
	24CB01383	Access	Y	S	Y	Y	-
	24CB01384	Access	Y	S	Y	Y	-
	24CB01385	Access	Y	S	Y	Y	-
	24CB01386	Road, Vandalism, Access	Y	S	Y	Y	-
	Big Pryor Overlook	Access, Vandalism	Y	S	Y	Y	-
209116	24CB00777	Road, Access	Y	-	-	-	-
2091T	24CB01388	Access, Vandalism	Y	-	-	-	-
	24CB00894	Road, Access, Vandalism	Y	-	-	-	-
2092	24CB00863	Access	Y	Y	-	Y	Y
	Commissary Plant Collection	Access	Y	S	Y	Y	S
2095	24CB00777	Road	Y	A	A	Y	A
20972	24CB01031	Road	Y	S	-	-	S
2308	24CB00419	Access	Y	S	S	Y	S
	24CB00608/833	Road, Access, Vandalism	Y	S	S	Y	S
	Dryhead Overlook	Road, Access, Vandalism	Y	S	S	Y	S
2308B	24CB00419	Road, Access, Vandalism	Y	-	S	Y	-
	Dryhead Overlook	Road, Access, Vandalism	Y	-	S	Y	-
2308B1	24CB00419	Road, Access, Vandalism	Y	-	-	-	-
	Dryhead Overlook	Road, Access, Vandalism	Y	-	-	-	-
Total Potential Adverse Effects Sites/Landscapes	**17/3**		**17/2**	**12/1**	**12/2**	**14/2**	**5/0**

Alternative A

Overall, Alternative A increases access to more people and to a number of remote areas within the two units. Increased access or ease in access to formerly remote traditionally significant ceremonial or gathering areas will then be available to all, potentially decreasing the privacy, seclusion and quiet necessary for many traditional cultural practices. Designation of non-system roads and/or trails to

system roads and/or trails may increase accessibility to remote areas which have been used for prayer and fasting activities where seclusion is required**.** Increased access often increases the opportunity for site vandalism and illicit artifact collection. Due the relative remoteness of the units, development of roads near the units opens up large areas for this illicit activity.

Opening new roads and/or trails would require more archaeological inventory and environmental assessments which may result in the identification of more TCPs and/or more information on the distribution of culturally significant plant, animal, mineral and fossil resources. This information could be useful to traditional Indian Communities. It is possible that roads developed can increase or ease access to traditionally significant ceremonial or gathering places. However, increasing or easing of access to traditionally significant ceremonial or gathering areas would make them available for all. There is the potential to decrease the seclusion and quiet necessary for many traditional cultural practices.

For the Beartooth Unit, the addition of road spurs in Robertson Draw will only increase access to and exposure of cairn and stone features already being vandalized by visitors and campers within the draw. Additional public access along the Beartooth Christian Ranch Road and Horseman Flat NW may threaten the preservation of important features along these routes. Dispersed vehicle camping activities along the West Fork of Rock Creek, Main Fork of Rock Creek and West Fork of Stillwater will continue to affect cairn features concentrated along these routes.

Within the Pryor Unit, the addition of roads #20162, #209116, #20972 and #2091T would permit access to now remote areas of the unit and expose a number of unique and fragile TCPs to inappropriate visitation and potential vandalism. Increased access has been shown to lead to an increase in vandalism, and including these routes could lead to the loss of these irreplaceable cultural resources. The three route additions do not connect with other routes but terminate at a dead end turnaround – this would further concentrate traffic in these areas and further expose the TCPs to damaging impacts.

Year round access along the Pryor Mountain road to the Dryhead Overlook would compound an already existing problem of damage to the site setting, reduction of the area needed to fasting, and continued vandalism of TCPs features. Addition of the Dryhead Loop cutoff concentrated traffic at the overlook leading to even more potential vandalism. The additional route plus the increased year round use of the Pryor Mountain road and Dryhead Loop may threaten the nomination of the Dryhead Archaeological and Traditional Use District to the NRHP.

Shriver Peak road accesses the Big Pryor Overlook which is now a relatively remote location but still can be visited by motorized traffic. Any increase in access to this area threatens to turn this fasting area into the same circumstance as Dryhead Overlook has experienced. Increased traffic can be expected with the "high country loop" provided by routes 2091 and 2095A and portions of the Shriver Peak Road that may further damage the site setting.

Addition of the spur road to the Bainbridge loop road may further affect TCP features at the end of the spur where motorized vehicle users may stop and "catch the view". With little room to turn around at the dead end, concentrated traffic may lead to damage of these irreplaceable features. With increased traffic and visitation comes the higher potential for vandalism of these TCPs.

Access to and along Commissary Ridge would allow continued motorized access to plant collection

areas, but may also cause vandalism to important TCPs at the end of the route. Here, use would be concentrated at the dead end as vehicles turn around and park.

Alternative B

Alternative B allows for seasonal motorized access along existing system roads and administrative access to two areas of traditional cultural concerns. The most important feature of this alternative is the preservation and protection measures for Dryhead Overlook through the restriction of direct access to this important TCP and cultural landscape.

For the Beartooth Unit, restricting access to Road #2208 in Robertson Draw may reduce some of the access to and exposure of cairn and stone features currently being vandalized by visitors and campers within the draw. Additional public access along the Beartooth Christian Ranch road may threaten the preservation of important features along that route, but restricting access to administrative use along Horseman Flat NW may provide needed protection to TCP features along that route. Dispersed vehicle camping activities along the West Fork of Rock Creek, Main Fork of Rock Creek, and West Fork of the Stillwater may continue to affect cairn features concentrated along these routes, but the removal of several of the concentrated use may reduce the potential effects at four sites.

Within the Pryor Unit, the addition of seasonal use of road #20972 still permits access to a remote area of the unit and exposes a TCP to potential vandalism. Increased access has been shown to lead to an increase in vandalism, and including this route could lead to the loss of this irreplaceable cultural resource. The route addition does not connect with other routes and dead ends at the end of the route – this could further concentrate traffic in this area and further expose the TCP to damaging impacts.

Seasonal access along the Pryor Mountain road to the Dryhead Overlook may reduce some of the existing problems of damage to site setting, reduction of appropriate areas needed for fasting, and continued vandalism of TCPs features. Easy access to the overlook rim, however, would be restricted by closing the Dryhead Loop route. Loss of many of the TCP features has been attributed to unrestricted visitation, lack of interpretation at the overlook, and lack of protection (Nabokov and Loendorf 1994). While it will be very difficult to deny or limit access to the immediate overlook since the pattern of use of the overlook for its view is so ingrained with the public, access to the edge of the scarp in either direction, from the immediate overlook site, needs to be limited in some way to allow for solitude for fasting activities and to protect the TCPs from further vandalism. Access for all of the public, including traditional cultural practitioners would be by walking from the Pryor Road to the overlook. These changes may ensure continued use of the Dryhead Overlook for traditional religious activities and preserve the features included in the proposed Dryhead Overlook Archaeological and Traditional use District.

Shriver Peak Road accesses the Big Pryor Overlook which is now a relatively remote location but still can be visited by motorized traffic. Any increase in access to this area threatens to expose these fasting areas to the same vandalism circumstances that the Dryhead Overlook has experienced. The seasonal use restriction may alleviate some of the access damage, but the primary season of use is when most of the motorized use activity occurs that can damage the TCPs and affect the site setting. Increased traffic can be expected with the use of the seasonal “high country loop” provided by a portion of this route and routes 2091 and 2095A which could further affect the overlook setting with the introduction of noise, dust and fumes. Dispersed vehicle camping at the end of the route may begin to affect cairn locations much the same as is occurring in the areas of the Beartooth Unit.

Seasonal access to and along Commissary Ridge would still allow continued motorized access to plant collection areas during the time the site would be used, but dropping the end spur of the road would alleviate potential effects to important TCPs at the end of the dead end route.

Alternative C

While this alternative may be considered the most restrictive of the alternatives presented, it still allows access to many remote areas of the two units for motorized recreation. Restricting access to public lands can have both a beneficial and adverse effects on traditional cultural activities – restricting access may be beneficial when it preserves the solitude and quiet necessary for fasting, prayer and other ceremonies. Negative effects would occur when it restricts the ability to collect traditionally important plant, animal, mineral and fossil resources. This alternative, while allowing access of motorized vehicles to most of the more popular routes that are now available, does restrict access of motorized vehicles to more remote and pristine areas for both units. This does help protect, in part, the ethnographic landscape of the Pryor, Arrow Shot Into Rock, Mountain.

For the Beartooth Unit, restricting access to Road #2208 in Robertson Draw may reduce some of the access to and exposure of cairn and stone features currently being vandalized by visitors and campers within the draw. Administrative use access along the Beartooth Christen Ranch road and Horseman Flat NW may provide needed protection to the TCP features along these routes. The elimination of dispersed vehicle camping activities along 600 foot wide corridors of the West Fork of Rock Creek and West Fork of the Stillwater would reduce the effects to cairn features concentrated along these roads. Restrictions along the Main Fork of Rock Creek would help protect the cairn features located along this road.

Within the Pryor Unit, seasonal access along the Pryor Mountain Road to the Dryhead Overlook may reduce some of the existing problems of damage to the site setting, reduction of the area needed for fasting, and continued vandalism of TCPs features. Easy access to the overlook rim, however, would continue despite the seasonal access restriction assigned to the Dryhead Loop since it is that season that the overlook has the greatest use by visitors as well as religious practitioners. Loss of many of the TCP features has been attributes to unrestricted visitation and easy access.

Shriver Peak road accesses the Big Pryor Overlook which is now a relatively remote location but still can be visited by motorized traffic. Any increase in access to this area threatens the pristine site setting and introduces the likelihood of vandalism, much as has occurred to the Dryhead Overlook TCP features. Increased traffic can be expected with the use of the "high Country Loop" provided by a portion of this route and routes 2091 and 2095A which could further affect the overlook setting with the introduction of noise dust, and fumes. Dispersed vehicle camping areas at the end of the route may begin to affected TCP features like similar areas in Robertson Draw on the Beartooth Unit.

Restricting traffic to administrative use along the Bainbridge loop road would reduce the effects to the TCP features along the route. Year round access to and along the Commissary Ridge would still allow continued motorized access to plant collection areas during the time the site would be used, but shortening the route may reduce the effects to important TCPs located at the end of the route.

No Action Alternative

The present condition of both of the units is a result of this alternative. The present network of system roads have allowed access to important plant collection areas and fasting locations, but have also allowed for the partial destruction of a once remote and pristine ethnographic landscape.

For the Beartooth Unit, dispersed vehicle camping activities that are affecting TCP features along the West Fork of Rock Creek, Main Fork of Rock Creek, and West Fork of the Stillwater would continue.

Within the Pryor Unit, year round access along the Pryor Mountain Road to the Dryhead Overlook and the use of the Dryhead Loop would continue to damage the site setting, further reduce areas needed for traditional practices, and add to the loss of more TCP features. Big Pryor Overlook, currently a relatively remote location, would continue to receive effects from motorized traffic and could eventually be affected to the same extent as Dryhead Overlook. Increased traffic can also be expected as more recreational users discover these routes and use the "high country loop".

Year long use along the Bainbridge Loop road would continue to expose TCP features along the route to vandalism and other access problems.

Alternative B Modified

Effects from this alternative are basically the same as Alternative B with one important exception – it protects the Big Pryor overlook by dropping a segment of road 2088 where most of the fasting areas and cultural sensitive sites are located. By dropping the segment before it reaches the Shriver Peak and the Crater Ice Cave, motorized access over TCP sites at Shriver Peak would be reduced. Removing motorized access along the Big Pryor Overlook should reduce the possibility that this overlook would suffer from the same fate as portions of the Dryhead overlook.

Cumulative Effects-Traditional Cultural Properties

As our national population grows and the west becomes increasingly developed for minerals, residences, and recreational sites, it is becoming increasingly difficult for practitioners of Native religions (or other practitioners) to find places for ceremonial purposes and traditional cultural practices. Fasting overlooks and plant gathering areas that were once isolated locations have become more rare, or harder to utilize, for religious purposes as development and increased access continues. This loss, along with the loss of other TCPs and ethnographic landscapes are irreplaceable and very difficult, if not impossible to mitigate.

More access, due to improved and additional system roads, may result in increased visitation, especially to the more remote locations in the units. These visitors might not respect the privacy of religious practitioners and will add more noise and vehicle effluents. Under Alternatives B and B Modified, provisions for Dryhead Overlook may allow continued and future use by practitioners. Alternative B Modified would also reduce the potential effects to the Big Pryor Overlook from increased accessed.

3.2.2.6 Conclusion - Traditional Cultural Properties

The CNF has been utilized through the centuries by prehistoric, historic and contemporary cultures and this use is reflected in the landscape we see today. Contemporary use includes traditional cultural properties, grazing, mineral extraction and recreation. The last use includes hiking, motorized touring, and off highway vehicle driving, and was the focus of this analysis.

Unmanaged motorized vehicle use has come in conflict with the other forest uses and has had adverse effects to archaeological and traditional cultural properties. Alternatives A and the No Action alternatives do little to curb these effects and may in fact introduce more detrimental effects.

Alternative C, while considering the fewest roads and cumulatively may result in reducing adverse effects for some of the archaeological resources, it does not address two significant cultural landscapes – the Dryhead overlook and the Big Pryor overlook.

Alternative B identifies some measures to reduce effects to archaeological and traditional cultural properties, but still neglects the need to protect the Big Pryor cultural landscape. The Alternative B Modified includes some protection for all three cultural landscapes that promises to reduce the effects to these non-renewable and vital resources.

Table 3-18. Comparison of Potential Effects to Traditional Cultural Properties by Alternative

Feature		Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Number of Sites potentially affected (directly and indirectly)	Pryor	16	7	0	19	7
	Beartooth	6	2	1	7	3
	District	22	9	1	26	10
Number of Cultural Landscapes potentially affected	Pryor	2	1	2	2	0
	Beartooth	0	0	0	0	0
	District	2	1	2	2	0
Number of Traditional Cultural Properties potentially affected within the project area.	Pryor	17	12	12	14	5
	Beartooth	30	23	6	25	23
	District	47	35	18	39	28

For all alternatives compliance with the NRHP through the MTPA is required. An extensive monitoring program will be implemented that will address sites identified as at risk form the decision, and measures to reduce, remove, or mitigate these effects will be taken in consultation with the MTSHPO.

3.3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES – OTHER ISSUES

3.3.1 WATER QUALITY, FISHERIES, AND AQUATICS

Introduction

This section outlines affected environment and environmental effects of travel management to water resources. This section also addresses the impacts of motorized and non-motorized uses on Forest Service Region 1 sensitive fish and amphibian species, management indicator aquatic species, and aquatic habitat.

3.3.1.1 Affected Environment – Water Quality

Overview of Changes from the Draft to the Final EIS

- Changes to the water quality assessment were a result of public comments that requested clarification or change in the analysis. Narratives under Route Risk Analysis, TMDLs, and Effects Common to All Action Alternatives were expanded to meet these requests.

- The Route Risk Analysis was revised by eliminating route segments that extended significantly off forest and adjusting the risk category for six routes. Although the number of routes did not change substantially, the total miles did.
- The effects discussion also changed to more closely follow the purpose and need to identify opportunities to take action to minimize or eliminate water quality impacts on some routes or sites through future decisions, rather than incorporate those opportunities into the Record of Decision for this FEIS.

Applicable Laws, Regulations, and Policy

Federal Clean Water Act requires Federal Agencies to comply with all federal, state, and local requirements, administrative authority, process and sanctions related to the control and abatement of water pollution (CWA, Sections 313(a) and 319(k)). The Act gives authority to individual States to develop, review, and enforce water quality standards under Section 303. This section also requires the States to identify existing water bodies that do not meet water quality standards, and develop plans to meet them. These plans are commonly called TMDLs, an acronym for total maximum daily load.

Federal Multiple Use Sustained Yield Act of 1960 sets policy to define why the national forests were established and how they should be administered relative to outdoor recreation, range, timber, watershed, and wildlife and fish purposes. [T]hat some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output (16 USC 2 (I); Sec 528).

Montana Water Quality Act directed the Montana Department of Environmental Quality (MTDEQ) to develop a water quality classification system, developed water quality standards to be applied to various water classes, and identified water bodies that do not meet standards (TMDL List). MTDEQ has classified most waters within the analysis area and area as B-1 waters. The beneficial uses associated with this classification include; drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (Administrative Rules of Montana (ARM) 17.30.611). Due to the municipal watershed status of the West Fork Rock Creek, all waters within this drainage are classified as A-1.

The 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. Under ARM 17.30.623 (2) (f) "No increases are allowed above naturally occurring concentrations of sediment, settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife." Naturally occurring is defined in ARM 17.30.602 (19) as: "the water quality condition resulting from runoff or percolation, over which man has no control, or from developed lands where all reasonable land, soil and water conservation practices have been applied". Reasonable land, soil and water conservation practices are similar to Best Management Practices (BMPs). BMPs are considered reasonable only if beneficial uses are fully supported. BMPs are further discussed under the section Soil and Water Conservation Practices.

Water quality standards for A-1 waters (West Fork Rock Creek) are slightly more restrictive than B-1 waters because of the municipal watershed status. Those standards relative to travel planning include

coliform and turbidity levels. For A-1 waters, the geometric mean number of organisms in the coliform group must not exceed 50 per 100 milliliters if resulting from domestic sewage, whereas B-1 standards allow 200 per 100 milliliters when the daily maximum water temperature is greater than 60º F and up to 400 per 100 milliliters for less than 10 percent of samples over 30 days. Additionally, turbidity standards for A-1 waters do not allow for any increase above naturally occurring levels, whereas for B-1 waters an increase of up to five nephelometric units is allowed.

Riparian and stream conditions are assessed by MTDEQ to determine the level of beneficial uses support. Streams that do not fully support their uses do not fully meet water quality standards. The status of water quality assessment and Total Maximum Daily Load (TMDL) development of streams are identified in a biennial report from MTDEQ (2006). The 2006 Montana 305(b)/303(d) Water Quality Assessment Database lists eight streams within the analysis area where one or more uses are impaired and a TMDL is required (Category 5). Refer to the Table 3-21 for more detail on these streams.

The State of Montana has the authority to develop TMDLs. On streams with multiple ownership, the Forest Service cooperates with the State and other adjacent landowners in the development process. Additionally, the fact that a particular stream is listed does not preclude management activities from occurring. Montana Code Annotated (MCA) 75-5-703(10)(c), states: (10) Pending completion of a TMDL on a water body listed pursuant to 75-5-702: (c) new or expanded non-point source activities affecting a listed water body may commence and continue their activities provided those activities are conducted in accordance with reasonable land, soil, and water conservation practices.

2005 Travel Management Final Rule provides the following direction related to water quality: (b) Specific criteria for designation of trails and areas. [C]onsider effects on the following, with the objective of minimizing: (1) Damage to soil, watershed, vegetation and other forest resources. (36 CFR 212.55).

Custer National Forest Land and Resources Management Plan identifies management goals for soil, water and riparian resources under Chapter II - Forest Wide Management Direction and Chapter III – Management Area Direction. The Forest Plan goal for watershed management is to: [E]nsure that soil productivity is maintained and that water quality is maintained at a level which meets or exceeds state water quality standards (page 4). The objectives for soil and water resources are: Continue to produce water that meets State water quality standards. National Forest System lands will be managed so that the soil and watershed conditions are in a desirable condition and will remain in that condition for the foreseeable future. Soil and water quality objectives are designed to assure that these resources meet State water quality objectives and BMPs (Best Management Practices) are incorporated to assure this (page 5). The goal for riparian areas include: [M]anage for water quality, provide diverse vegetation, and protect key wildlife habitat in these areas from conflicting uses and uses and activities that adversely impact these areas will be mitigated (page 3). The objectives for riparian areas include recognition of their unique values, and management direction is to be designed to protect these key wildlife habitats and improve water quality: [T]hese areas will be managed in relation to various legally mandated requirements including, but not limited to, those associated with floodplains, wetlands, water quality, dredged and fill material, endangered species, and cultural resources (page 5). The goals for Management Area M (Riparian) are: Manage to protect from conflicting uses in order to provide healthy, self-perpetuating plant and water communities that will have optimum diversity and density of understory and overstory vegetation (page 80).

Soil and Water Conservation Practices (or BMPs) are the primary mechanism to comply with state and federal water quality law by minimizing water quality impacts from non-point source pollution while still allowing dispersed land management activities to occur on National Forest System land. To reach these objectives the Forest Service developed the R1/R4 Forest Service Soil and Water Conservation Practices Handbook (USDA Forest Service 1995). This handbook is not available on the Region 1 internet website, but is available from the project file. A revised handbook is anticipated from the Washington Office in 2008.

Practices specific to travel management include: 11.01 - Determination of Cumulative Watershed Effects, 11.09 - Management by Closure to Use, 12.10 - Management of Off-Road Vehicle Use, 12.11 - Protection of Water Quality Within Developed and Dispersed Recreation Areas, 12.12 - Location of Pack and Riding Stock Facilities in Wilderness, Primitive, and Backcountry Areas, 15.01 - General Guidelines for Transportation Planning, 15.02 - General Guidelines for the Location and Design of Roads and Trails, 15.03 - Road and Trail Erosion Control Plan, 15.21 - Maintenance of Roads, 15.23 - Traffic Control During Wet Periods, and 15.27 - Trail Maintenance and Rehabilitation. The effectiveness of these BMPs and other road maintenance and construction BMPs can be found in Logan (2001), Seyedbagheri (1996), and USDA-FS (2002).

Introduction - Water Quality

Both natural events and human activities have the potential to impact soil, water and riparian resources across both forest and range land. Significant natural events include wildfire and floods, while the most significant human activities include mining, livestock grazing, roads/trails, floodplain development, timber harvest and recreation. The degree of impact depends upon the soil and hydrologic characteristics of the watershed and how sensitive and resilient they are to these disturbances. Soil and hydrologic characteristics vary extensively across the landscape and are dictated by local landform, geologic material and climate.

Natural Characteristics and Processes

Watersheds, undisturbed by human influences, are not static systems. Deep snow packs and heavy spring rains can cause substantial flooding, landslides and instream erosion. Wildfire, wind, or insect and disease mortality can drastically alter the vegetative composition of a watershed. Depending on the extent of mortality and rate of stand decomposition, impacts to stream systems can also be substantial. Beneficial uses, including fisheries habitat, can be negatively affected by these natural events. However, watersheds left undisturbed after natural events, can and do recover rapidly, and ultimately provide conditions that fully support all beneficial uses within a relatively short period of time. These natural disturbances occur infrequently, which allows for significant and generally rapid recovery of hydrologic and erosional processes prior to the next major disturbance event. This results in pulse effects to water resources, which are moderate to high in magnitude, but low in frequency. Within the current climatic regime and prior to significant human influence, stream systems have developed under pulse type disturbances.

Geology and Landform

Geologic parent material and landform varies considerably across the District. Landtype associations are a useful tool to describe this variability and help identify potential erosion hazards associated with management activities and impacts to water quality. They are also incorporated into the route risk analysis described under the section Human Influences. Erosion hazards on the District are summarized in the following table. For a detailed description of parent material and landform categories, refer to the Soils section of this analysis.

Table 3-19. Characteristics of Erosion Hazard Categories and Landtype Associations [13]

Water Quality Hazard Category	Geologic Parent Material / Landform	Landtype Association ID	Acres*
Low	Alluvium/valley bottom	10, 12	138,470
	Carbonates/steep glaciated mountain slopes	43	
	Carbonates/mountain slopes and ridges	66 [14]	
	Sandstone and shale/mountain slopes and ridges	68	
	Gneiss and schist/frost-shattered mountain ridges	77	
Moderate	Sandstone and shale/high relief mountain slopes	36	272,101
	Carbonates/high relief mountain slopes	37	
	Gneiss and schist/steep glaciated mountain slopes	39	
	Gneiss and schist/glaciated mountain slopes	57	
	Gneiss and schist/mountain slopes and ridges	63	
High	Sandstone and shale/breaks	25	45, 258
	Carbonates/breaks	27	
	Volcanics/glaciated mountain slopes	54	
	Carbonates/mountain slopes and ridges	66 [15]	
	Mixed geology/mass wasted slopes	90	

Erosion and Sediment

Erosion is a natural process of geologic decomposition that occurs in all watersheds. The rate at which it occurs is a function of soil and stream characteristics, precipitation and flow regimes, and vegetative cover. There are three basic types of erosion; 1) detachment and routing of individual soil particles from the land surface; 2) mass wasting such as landslides and slumps; and 3) detachment and mobilization of stream channel banks or bottom material, i.e., instream erosion. All of these processes produce "sediment," and all stream systems transport sediment. Sediment is a loosely used term that can refer to a wide range of channel substrate particle sizes, i.e., silt, sand, gravel, cobble, boulder, etc. The larger particle sizes are generally produced through instream erosion or mass wasting and are commonly referred to as bedload. The finer particles that are suspended in flowing water can be produced through all of the erosion processes mentioned above.

Geology and landforms within the analysis area have produced soils that are generally stable and not highly erodible when adequately vegetated. MacDonald and Stednick (2003) suggest that undisturbed forested watersheds typically have very low erosion rates because of high infiltration rates and limited surface runoff. Erosion rates have been estimated at less than 0.1 tons per acre per year for most forested areas in the interior western U.S. (Patric et al. 1984). Stednick (2000) summarized research concerning timber management in the Northern Rockies which also suggests that erosion rates for undisturbed forested landscapes (control watersheds, no harvest/roads) are very low (0 - 0.09 t/ac/yr). Therefore, in the absence of wildfire, hillslope surface erosion within undisturbed areas across the District is considered to be nearly non-existent. The exception to this occurs on steep, high energy (south facing) landforms composed of fine textured material. Due to dry site conditions and steep slopes, vegetation can be sparse. Episodic precipitation events that saturate these soils can result in landslides (mass wasting) that release substantial amounts of sediment to streams. However, at the broad scale, instream erosion is considered the dominant erosion process across the District.

[13] *Landtype associations were not mapped for areas below the National Forest boundary and portions of the A-B Wilderness. Unmapped acreage within the Forest boundary is approximately 152,000 acres.
[14] SW Pryors
[15] N, NE, SE Pryors

Precipitation and Flow Regimes

Elevations across the Beartooth unit range from under 5000 to over 12,000 feet, while those on the Pryors unit range from under 5000 to just under 9000. Based on a 30 year period of record, the average annual precipitation associated with these elevations range from 20 to 70 inches on the Beartooth unit. Average annual precipitation on the Pryor unit is from 12 to 26 inches (MTNRIS 2005). Although the majority of the precipitation falls as snow, a significant portion falls as spring rain in May and June.

Streamflow regimes also vary across the District in relation to these precipitation regimes and geologic/landform features. All watersheds on the Beartooth Unit that encompass high elevations and large areas produce substantial perennial flows, in contrast to lower elevation smaller watersheds that are generally intermittent, ephemeral or short spring flow systems. Due to limestone parent material and landform, flow regimes for most drainages in the Pryor Unit are also intermittent, ephemeral or short spring flow systems, except for Sage, Crooked and Dry Head watersheds which produce perennials flows.

Many of the mainstem reaches have experienced significant flood events in the recent past. Analysis of discharge records for Rock Creek near Red Lodge (USGS gage 06209500) indicates that over a 54-year period (1932 to 1986) the 1957 flood was the highest, with an instantaneous peak flow of 3,110 cubic feet per second (cfs). Floods of lower magnitude occurred in 1952 (2,590 cfs). Discharge records on the Stillwater River near Absarokee (USGS gage 06205000) indicates that over a 71-year period (1935 to 2006) the 1967 flood was the highest, with an instantaneous peak flow of 12,000 cubic feet per second. Floods of lower magnitude also occurred in 1948 (10,600 cfs), 1970 (10,300 cfs), 1974 (11,600 cfs) and 1975 (11,300 cfs) (USGS 2008). This information suggests that the floods of the past century have contributed substantially to the current conditions along many stream reaches. These infrequent, high magnitude flood events result from a combination of natural characteristics and conditions; namely deep winter snow pack, cool spring temperatures and heavy spring rain events. These conditions are not unique to the District and the climatic conditions leading up to these infrequent events and the resulting flood stage cannot be mitigated. Except for potential localized influences on snow packs and melting rates in small headwater streams from harvest and prescribed burn activities, the frequency and magnitude of these large events, at the watershed scale, are outside of human control.

Historically, beaver played a significant role throughout the project area through the development of extensive dam/pond networks. Beaver populations have been reduced relative to historic levels. Although temporary, beaver dams and ponds are an important component of riparian systems. They help to trap and store both sediment and water. A reduction in beaver populations over the years has likely resulted in lower water tables and lower late season streamflows along small, low elevation streams.

Vegetative composition is largely defined by climate and soils, but natural agents including fire and insects or disease can drastically alter the vegetative cover. Within the last three decades, timber stands have been affected by fire, insect/disease or wind on over 120,000 acres across the District and concentrated in the following watersheds: Bad Canyon, Trout Creek, Middle East Rosebud, and headwater tributaries to the Stillwater River. Wildfire events have likely resulted in substantial increases in surface erosion although sediment deliveries to perennial streams have not been quantified.

Human Influences

Humans have influenced watersheds and water quality for centuries. Prior to European settlement, Native Americans used fire to manipulate vegetation which influenced hydrologic processes at the local scale. As European settlement occurred, so did uncontrolled beaver harvest, timber harvest and forage harvest through livestock grazing. All of these activities had long term substantial impacts to watershed characteristics and hydrologic processes, some of which are still present today.

Currently, many activities influence water quality and natural channel processes including mining, livestock grazing, floodplain development, timber harvest, recreation and transportation systems. Some of these activities are constant or occur on an annual basis, e.g., transportation systems or livestock grazing. The effects from these types of activities are considered chronic. Although chronic effects are generally low to moderate in magnitude, they occur with moderate to high frequency. In contrast to pulse effects discussed previously, chronic effects may not allow for significant recovery of the soil and water resource over time.

Mining

Historical mining was limited to a few small areas across the District. The Grove Creek area along the southeast flanks of the Beartooth Unit was explored for gold through small, hand dug adits. No production ever occurred. These workings have healed over and are not influencing water resources. Limited chromite extraction occurred along the Hellroaring Plateau and on the plateau east of the Beartooth Highway. These workings have also healed over and are not influencing water resources. Larger scale uranium exploration and production occurred in the Pryor Unit and downslope on BLM administered land. These workings are still evident on the landscape. Although exposed tailings are high in radioactivity and are considered a health risks from exposure, they are not likely to affect water resources because they are 2-3 miles from the nearest perennial stream. Adits and tailings on BLM administered land have been rehabilitated and those on NFS land are planned for rehabilitation in the near future.

The Stillwater mining complex is the largest ongoing mining operation on the District. Fortunately the geologic characteristics of this complex do not produce acid rock mine drainage. Nitrates are the pollutant of concern, a product of underground blasting operations. Numerous best management practices and active reduction methods are in place, per state and federal regulations, to extract and minimize nitrates levels that may reach surface or groundwater resources. Similarly, sediment is a by-product of this operation and numerous best management practices are also in place to minimize sediment loads to the Stillwater River.

Livestock Grazing

Livestock grazing has occurred on the District since the late 1800s. Livestock numbers have decreased over the years; in some allotments quite substantially. Currently there are 24 allotments providing 13,225 AUMs on 54,000 acres of suitable range. Recent range analyses on the Beartooth unit have identified issues concerning livestock grazing impacts to riparian systems and water quality. In general, livestock grazing can impact riparian systems through overuse of streamside vegetation and destabilization of streambanks. Water quality impacts can occur by increasing levels of fine sediment, increasing water temperature or changing flow regimes. The 2006 Meyers Creek Range Analysis EA proposed changes in range management to address the issues and implementation of those proposals are in progress. Range management planning across the remainder of the District is ongoing.

Floodplain Development

Residential developments in floodplains have the potential to affect natural floodplain processes by reducing the ability of floodwaters to access their historic floodplain. These developments include building structures, elevated driveways, bank rip-rap and stream crossing structures. When floodwaters are more confined to the main channel, streamflow velocities generally increase, which results in more damage to streambanks and human structures downstream. The cumulative effect on floodplain processes from of all structures within a given valley bottom can be substantial. Floodplain development within the Forest boundary occurs in lower Rock Creek, lower West Fork Rock Creek and lower Stillwater River.

Timber Harvest and Prescribed Fire

Timber harvest over the last three decades is limited to small areas across the District totaling 1471 acres. The majority of the harvest has occurred in the Pryors unit (N.F. Sage Creek and Upper Crooked Creek watersheds). Prescribed fire over the last two decades encompasses 7098 acres and is concentrated in Bad Canyon, Line Creek, Limestone Creek, Crooked Creek, Lower W.F. Rock Creek and Middle Stillwater River watersheds. On a watershed basis, neither harvest nor prescribed burn activities are substantial enough to be detrimental to water resources. Both of these activities have helped to reduce fuel loads and potential for future catastrophic wildfires.

Dispersed Recreation

Dispersed recreation (dispersed camping and off-road vehicle use) across the District has steadily increased over the years resulting in localized soil compaction, erosion and accelerated sediment delivery to stream systems. Areas of concentrated camping immediately adjacent to streams have also destabilized streambanks and channels from camper created access paths. Concerns over human sanitation practices and the potential for spreading disease through soil or water contact is also an issue. These activities continue to expand into new areas each year thereby continually increasing the risk of impact to water resources.

Areas that have the most concentrated dispersed use include Rock Creek (along RD 2421), West Fork Rock Creek and spurs along the lower Benbow area. Refer to Appendix E for observations and recommendations on spur routes to individual dispersed sites with impacts to water quality.

Transportation Systems

General Influences on Water Resources: Roads modify natural drainage networks and accelerate erosion processes. These changes can alter physical processes in streams, leading to changes in streamflow regimes, sediment transport and storage, channel bank and bed configurations, substrate composition, and stability of slopes adjacent to streams (Furniss et al. 1991). Numerous studies have identified unpaved roads as a major source of sediment in streams (Elliot 2000). Sudgen and Woods (2007) measured 20 unsurfaced road plots in western Montana and found average annual sediment yields to be 5.4 Mg/ha/yr (14.7 tons/ac/yr). In relation to other transportation systems (motorized/non-motorized trails), roads open to full size vehicles pose the greatest risk of impact to water resources due to 1) largest tread width, 2) largest weight, size and force of vehicle, and 3) generally higher use levels.

Motorized two-track trails can also negatively affect streams. Meadows (2007) suggests that ATV trails are high-runoff, high-sediment producing strips on low-runoff, low-sediment producing landscapes. For six study sites across six states, he found that sediment concentrations generally tended to increase with increasing disturbance levels. Although runoff did not appear to increase for

the Montana site, sediment increased by approximately 625%, compared to the undisturbed, pre-traffic forest floor.

Motorized and non-motorized single track trails can also negatively affect streams, but the degree of affect is determined by the mode of travel. Deluca et al. (1998) found a substantial increase in sediment supply from horse traffic when compared to foot or llama traffic. Wilson and Seney (1994) documented similar conclusions concerning horse traffic. They also suggest that two-wheeled cycle traffic (motor/bi-cycle) results in less sediment than either horse or foot traffic, although the actual data appears to suggest foot traffic produces the least sediment. These two studies documented opposite results concerning sediment production on wet trails. Wilson and Seney (1994) documented increased sediment production on wetted trails, whereas Deluca et al. (1998) found no increase. Cole (1991) found, in a study of three trails in the Selway-Bitterroot Wilderness of Montana, that although most individual trail segments experienced change, there was no net erosion over an 11 year period.

Unplanned (user created) routes have the potential to be the most detrimental to water quality because of improper location of the route in relation to adjacent streams. Incorporating adequate BMPs into the design, construction and maintenance phases of all routes can minimize negative effects to the greatest extent feasible and still provide a long-term transportation network.

Route Risk Analysis: Roads and trails were evaluated for their potential to impact water quality or natural channel processes. Impacts to water quality on the District generally occur from concentrated road surface flows routed directly to streams at crossing locations (bridges or fords), or indirectly at cross-drain locations without adequate filter capacity. Impacts to natural channel processes generally occur through floodplain alteration, i.e., roads within floodplains that straighten stream channels or restrict natural channel meandering.

Due to the large number and miles of routes, GIS analysis using existing spatial data was the only practical method to accomplish this evaluation. Information was obtained concerning three basic road/stream interaction variables: stream crossings, routes adjacent to streams and routes by erosion hazard category. These three basic variables were further refined to obtain the following route attributes: 1) Crossings: number of crossings of perennial streams, and number of crossings of intermittent streams; 2) Adjacency: miles of route within 100 feet of perennial streams, miles of route within 100 feet of intermittent streams, and miles of route beyond 100 feet of either intermittent or perennial streams; and 3) Erosion Hazard: miles of route within low hazard landtypes, miles of route within moderate hazard landtypes, and miles of route within high hazard landtypes. Refer to Table 3-19, Characteristics of Erosion Hazard Categories and Landtype Associations under the section Natural Characteristics and Processes. Since past maintenance of roads and trails has not correlated well with road maintenance level or trail class, this variable was considered not useful for refining route risks to water quality.

Attribute values related to perennial streams and high hazard landtypes were weighed higher than those for intermittent streams or moderate hazard landtypes. Attribute values for routes beyond 100 feet of streams and low hazard landtypes were weighed the lowest. Values for these attributes were summed by individual route to obtain a total route value. Final route risk ratings were then adjusted based on 1) field evaluations and 2) professional judgment concerning water and sediment transport potential to perennial streams. Routes were then grouped into three qualitative categories based on the distribution of route risk values across the District. There were 642 individual routes evaluated, totaling 714 miles. The distribution of these routes across the three risk levels are provided in

Table 3-20. Attribute values and total values for individual routes are available from the project file.

This total route value is a relative index of potential water quality impact, or route risk to water quality and is useful for summarizing conditions and effects across a broad landscape and multiple alternatives. It is not intended to predict or provide an absolute level of impact, and should not be used to develop route specific planning without field verification. Although models are available that attempt to determine absolute impacts in terms of sediment production or sediment delivery to streams, applying these models at the District scale would yield results that are either simple to obtain but with very high degrees of error, or extremely difficult to obtain with moderate to low degrees of error.

Table 3-20. Route Risk Summary

	Low	Moderate	High	Total
Miles of Routes	296	379	39	714
Number of Routes	533	89	20	642

The route risk analysis is a surrogate for effects to streamside wetlands (riparian areas). Routes or portions of routes that lie within 100 feet of perennial or intermittent streams are variables in the analysis that increases the route risk index. Routes with these characteristics generally fall into the moderate or high risk category, although not all moderate and high risk routes contain substantial streamside wetlands. Isolated wetlands are a much more difficult resource to access transportation system impacts, especially on a large scale. Field reviewed routes were the means to identify these impacts and only one isolated wetland was found, although it could also be linked to the very upper end of the headwaters of Crooked Creek. Route 2097C is an alternate route to the Sage Creek Guard Station and crosses a wetland area with seeps.

Route and Site Field Review
Over 80 miles of routes were reviewed on the ground for observed impacts and risk of impact to water quality of perennial streams. Of these miles, approximately 77 percent have no observed impacts, whereas 23 percent do have observed impacts. About one percent of the miles are spur routes to dispersed sites with observed impacts. A narrative of field observations and recommendations for all routes reviewed is available from the project file. Observation and recommendations for routes with observed impacts, or high risk of impact, to water quality can be found in Appendix E – Opportunities.

Watershed Scale (Cumulative) Influences
As mentioned previously, riparian and stream conditions are assessed by the MTDEQ to determine the level of beneficial use support. Impaired streams with known pollutant related sources require a TMDL (Category 4A and 5 streams). Category 4A streams have all necessary TMDLs in place, while category 5 streams still need TMDLs developed. Impaired streams with no known pollutant related sources do not require a TMDL (Category 4C streams). Category 1 streams fully support all beneficial uses, while category 3 streams have not had all beneficial uses assessed. This assessment provides the best information on current stream conditions below the Forest boundary. A summary of streams identified on the 2006 303(d) List are provided in Table 3-21.

With two exceptions, impaired uses for category 5 streams include aquatic life and cold water fisheries, but the impairment is only partial. The exceptions are Bad Canyon with only primary contact as the impaired use and Bear Creek where the impaired uses are not supported. Probable

causes for aquatic life and fisheries impairment vary from alteration of streamside vegetation to nitrate/nitrites, sedimentation, solids, fish barriers and alteration of flow regimes. Probable sources are identified as livestock grazing, irrigated crop production, hydro structures and interbasin water transfers, abandoned mines and natural sources. In some cases sources are unknown at this time. The other impaired use for some of the streams is primary contact- recreation.

Routes were also evaluated at the 6 HUC (hydrologic unit code) watershed scale (10,000-40,000 acre) similar to the individual route risk evaluation discussed previously. All routes, regardless of ownership were included and weighted according to their interaction with intermittent and perennial streams. Non-motorized wilderness trail routes are considered a lower risk due to narrow tread width, low compaction travel means and relatively light use levels. Since landtype association information was not available below forest, it was not part of this watershed scale evaluation.

A summary of route information by watershed is provided in Table 3-22. Other known activities within individual watersheds are also included in an attempt to qualify other potential sources of impact to water resources. Watersheds considered to be a high risk for cumulative effects to water resources are identified based on 1) the cumulative route risk, 2) other known past, present and foreseeable activities, and 3) TMDL listed streams.

Table 3-21. Summary of Streams on the 2006 Montana 303(d) List Within or Immediately Adjacent to the Project Area

Stream/6HUC ID/TMDL category	Probable Impaired Use [16]	Probable Cause of Impairment	Probable Source of Impairment	Location
TMDL Category 4A and 5 Streams (TMDLs Required)				
Bad Canyon Creek 100700050502, Cat 5	Primary Contact - Recreation(P)	Chlorophyll-a	Rangeland Grazing	Headwaters to mouth.
Bear Creek 100700060608 Category 5	Aquatic Life Support (N) Cold Water Fishery - Trout (N) Primary Contact - Recreation(N)	Alteration in stream-side or littoral vegetative covers, Chlorophyll-a, High Flow Regime, Nitrate/Nitrite, Phosphorous, Sedimentation/Siltation	Loss of Riparian Habitat, Rangeland Grazing, Irrigated Crop Production, Transfer of Water from an Outside Watershed, Impacts from Abandoned Mine Lands.	Headwaters to mouth. Mostly below Forest.
Butcher Creek 100700050405 Category 5	Aquatic Life Support (P) Cold Water Fishery - Trout (P) Primary Contact - Recreation(P)	Chlorophyll-a, Phosphorous, Sedimentation/Siltation, Fish-Passage Barrier, Solids	Sources Unknown, Hydrostructure Impacts on Fish Passage, Natural sources.	Headwaters to Hwy 78. Mostly below Forest.
Castle Creek part of 100700050202 Category 5	Aquatic Life Support (P) Cold Water Fishery - Trout (P) Primary Contact - Recreation(N)	Chlorophyll-a, Nitrate/Nitrite	Livestock (Grazing or Feeding Operations), Sources Unknown, Upstream Source.	Headwaters to WF Stillwater confluence.
Fishtail Creek 100700050401, Cat 5	Aquatic Life Support (P) Cold Water Fishery - Trout (P)	Iron, Lead	Sources Unknown	Headwaters to mouth.
Lodgepole Creek part of 100700050202 Category 5	Aquatic Life Support (P) Cold Water Fishery - Trout (P) Primary Contact - Recreation(N)	Chlorophyll-a, Nitrate/Nitrite	Rangeland Grazing, Irrigated Crop Production, Sources Unknown.	Headwaters to mouth. Mostly below Forest.
West Rosebud Creek 100700050404/06 Category 5	Aquatic Life Support (P) Cold Water Fishery - Trout (P)	Benthic-Macroinvertebrate Bioassessments (Streams)	Source Unknown	Headwaters to mouth.
Willow Creek 100700061005 Category 5	Aquatic Life Support (P) Cold Water Fishery - Trout (P) All other uses not assessed	Low flow alterations, Sedimentation/siltation	Irrigated Crop Production	Headwaters to mouth. Mostly below Forest.
Stillwater River 100700050101/02/05 Category 4A TMDL developed	Aquatic Life Support (P) Cold Water Fishery - Trout (P) Drinking Water (N) Primary Contact-Recreation (na)	Copper, Iron, Manganese, pH, Sedimentation/Siltation	Acid Mine Drainage, Mine Tailings, Natural Sources, Highway/road/bridge runoff (non-construction related), Impacts from Abandoned Mine Lands	Headwaters to Flood Creek.
Stillwater River 100700050204 Category 4A TMDL developed	Aquatic Life Support (P) Cold Water Fishery - Trout (P) Drinking Water (N)	Cadmium, Chromium, Copper, Cyanide, Mercury, Nickel, Nitrate/Nitrite	Hardrock mining discharges, Natural Sources, Sources unknown, Impacts from Abandoned Mine Lands (inactive)	West Fork to mouth. Below Forest boundary.

[16] N = Not supporting, P = partial support, na= not assessed

Table 3-21. Summary of Streams on the 2006 Montana 303(d) List Within or Immediately Adjacent to the Project Area

Stream/6HUC ID/TMDL category	Probable Impaired Use [16]	Probable Cause of Impairment	Probable Source of Impairment	Location
TMDL Category 1, 3 and 4C Streams (TMDLs Not Currently Required)				
Crooked Creek 100800100501/02 Category 4C	Aquatic Life Support (P) Cold Water Fishery - Trout (P) All other uses not assessed	Physical Substrate Habitat Alterations	Agriculture	Headwaters to Wyoming border.
East Rosebud Creek 100700050301/02 Category 1	All uses fully supported	na	na	Wilderness boundary to Morris Cr.
Nye Creek part of 100700050204 Category 3	Insufficient data to assess any use	na	na	Headwaters to mouth.
Red Lodge Creek 100700061003 Category 4C	Aquatic Life Support (P) Cold Water Fishery - Trout (P)	Alteration in stream-side or littoral vegetative covers	Grazing in riparian or shoreline zones, Crop Production (crop land or dry land)	West Fork to Cooney Reservoir. Below Forest boundary.
West Red Lodge Ck 100700061001 Category 1	All uses fully supported	na	na	Headwaters to mouth. Mostly below Forest.
Rock Creek 100700060901/03 Category 1	All uses fully supported	na	na	State line to West Fork.
Rock Creek 100700060906 Category 4C	Aquatic Life Support (P) Cold Water Fishery - Trout (P) Primary Contact - Recreation(P)	Low flow alterations	Flow alterations from Water Diversions, Irrigated Crop Production	West Fork Rock Creek to Red Lodge Creek. Below Forest boundary.
Wyoming Creek part of 100700060901 Category 1	All uses fully supported	na	na	State line to mouth.

Table 3-22. Summary of Watershed Characteristics and Watershed Scale Influences

6th HUC Watershed	Watershed Name	Acres	% FS	Past, Present, Foreseeable Activities*	Cumulative Watershed Risk Rating	Primary Influence for Watershed Rating
100700050401	Fishtail Creek	24,113	74	D, G, R, Θ	High	TMDL
100700060901	Rock Creek-Wyoming Creek	32,086	71	D, F, M, R, Θ	High	Recreation, Routes
100700050501	Little Rocky Creek	12,136	66	D, G, M, R, ס	High	All Listed Activities
100700050204	Stillwater River-Mountain View Creek	25,720	64	D, F, G, M, R, Θ	High	All Listed Activities
100700050502	Bad Canyon Creek	12,245	59	F, G, R,T, Θ	High	TMDL, Fire, Grazing/Agriculture, Routes
100800140401	Sage Creek-North Fork Sage Creek	31,025	56	D, F, G, R, T, Θ	High	Floodplain Development, Grazing/Agriculture, Routes
100700050504	Trout Creek	16,873	35	D, F, G, R, ●	High	Routes
100700050405	Butcher Creek	25,747	11	D, G, R, Θ	High	Grazing/Agriculture , TMDL, Routes
100700061005	Willow Creek-Clarks Fork Yellowstone	32,362	8	D, G, R, ●	High	TMDL, Floodplain Development, Routes
100700050303	Lower East Rosebud Creek	19,653	7	D, G, ס	High	Floodplain Development, Grazing/Agriculture
100700060608	Bear Creek-Clarks Fork Yellowstone River	28,441	3	D, G, M, R, Θ	High	TMDL, Floodplain Development, Mining, Routes
100700060906	Rock Creek-Stanley Draw	37,344	1	D, G, R, ●	High	Floodplain Development, Routes
100800100501	Crooked Creek-Commissary Creek	13,739	100	F, G, M, R, T, ס	Mod	All Listed Activities
100700050101	Stillwater River Headwaters-Upper	23,500	100	M, R, ס	Mod	Mining
100700060905	Lower West Fork Rock Creek	22,567	97	D, R, T, ●	Mod	Grazing/Agriculture, Routes
100700060903	Rock Creek-Snow Creek	26,122	90	D, G, R, Θ	Mod	Floodplain Development, Routes
100700050404	Lower West Rosebud Creek	29,020	88	G, R, T, ס	Mod	Grazing/Agriculture
100700050302	Middle East Rosebud Creek	37,209	86	D, F, G, R, ס	Mod	Floodplain Development
100700050202	Limestone Creek	31,726	86	D, F, G, R, T, ●	Mod	TMDL, Grazing/Agriculture, Routes
100700061001	West Red Lodge Creek	30,089	53	D, G, R, Θ	Mod	TMDL, Routes
100800100502	Crooked Creek-Lost Water Creek	21,618	37	D, F, G, M, R, ס	Mod	All Listed Activities
100700050403	Fiddler Creek	18,030	36	D, G, Θ	Mod	All Listed Activities
100700061002	Upper Red Lodge Creek	21,693	18	D, G, Θ	Mod	All Listed Activities
100700060904	Upper West Fork Rock Creek	21,136	100	R, ס	Low	NA
100700060902	Lake Fork	24,205	100	R, ס	Low	NA

Table 3-22. Summary of Watershed Characteristics and Watershed Scale Influences

6th HUC Watershed	Watershed Name	Acres	% FS	Past, Present, Foreseeable Activities*	Cumulative Watershed Risk Rating	Primary Influence for Watershed Rating
100700050201	Upper West Fork Stillwater River	28,675	100	F, M,R, ɒ	Low	NA
100700050103	Wounded Man Creek	17,573	100	R, ɒ	Low	NA
100700050301	Upper East Rosebud Creek	35,592	100	R, ɒ	Low	NA
100700050402	Upper West Rosebud Creek	30,502	100	R, ɒ	Low	NA
100700050105	Stillwater River Headwaters-Woodbine Creek	40,510	100	R, ɒ	Low	NA
100700050104	Flood Creek	14,383	100	R, ɒ	Low	NA
100700050102	Stillwater River Headwaters-Lower	18,571	100	R, ɒ	Low	NA
100700050203	Lower West Fork Stillwater River	14,772	83	D, G, M, R, T, ɒ	Low	NA
100800140405	Bear Creek-Sage Creek	22,124	54	G, R, ɒ	Low	NA
100800100801	Upper Dry Head Creek	22,737	41	D, G, R, ϴ	Low	NA
100700060511	Line Creek	24,881	35	D, G, R, ●	Low	NA
100800140403	Sage Creek-Inferno Canyon	22,211	26	D, G, R, ɒ	Low	NA
100800140404	Sage Creek-Piney Creek	38,861	19	D, G, M, R, ϴ	Low	NA
100700060607	Grove Creek	16,700	18	G, R, ϴ	Low	NA
100700050503	Middle Stillwater River-Magpie Creek	11,806	16	D, F, G, ɒ	Low	NA
100700060601	Clarks Fork Yellowstone River-Dilworth Creek	39,543	7	D, G, R, ϴ	Low	NA
100800100504	Big Coulee	20,370	6	G, M, R, ɒ	Low	NA
100800100503	Crooked Creek-Gypsum Creek	15,649	6	F, G, M, R, ɒ	Low	NA
100800140402	Sage Creek-Section House Draw	37,096	4	D, G, R, ϴ	Low	NA
100800140502	Dry Creek-Shoshone River	37,343	2	G, M, R, ϴ	Low	NA

*Watershed: Past, Present, And Foreseeable Activities
Refer to Table 3-1 for a list of reasonable foreseeable activities within the analysis area.
D - Development/ Floodplain
F - Wild Fire/ Prescribed Fire
G - Grazing/Agriculture
M - Mining
R - Recreation/ Camping
T - Timber Harvest

TMDL – Total Maximum Daily Load (Refer to Table 3-21)
NA – Not Applicable

●– High Route Risk
ϴ– Moderate Route Risk
ɒ – Low Route Risk

3.3.1.2 Environmental Consequences – Water Quality

Effects Common to All Action Alternatives - Water Quality

Direct Effects
Relative to transportation systems, only the installation, reconstruction or removal of stream crossing structures result in direct effects to water quality. Since there are no actions proposed to actively change specific stream crossings under this analysis, there are no direct effects to evaluate.

Indirect Effects
Indirect effects occur at a later time or distance from the proposed action. For example, a system route with a proposed seasonal restriction would potentially result in less traffic during spring wet periods which would potentially result in less sediment delivery to streams. However, this potential effect would occur at a later time than the implementation of the seasonal restriction and the effect to water quality would be some distance downslope from the identified route.

Only moderate or high risk routes with proposed actions are evaluated for indirect effects. Existing system routes that are designated without further actions, or non-system routes not converted to system routes, are not considered actions under this analysis. However, these routes are incorporated into the cumulative effects analysis below. Proposed actions for individual moderate and high risk routes under this analysis include designating non-system routes, not designating existing system routes, designating system roads for administrative use only, converting system roads to trails, applying a season of use, or changing the mode of travel.

The only action that would tend to increase risk for moderate and high risk routes is designating non-system roads or trails for public motorized use. This action adds additional route miles to the landscape for the long-term, thereby maintaining the risk of indirect and cumulative effects to water resources. Except for conversion of roads to trails and some changes in mode of travel, all other actions would tend to decrease risk for moderate and high risk routes. Converting system roads to administrative use reduces traffic and allows revegetation of the road surface to occur, both of which reduce erosion. Not designating non-system routes potentially reduces route miles on the landscape in the future, thereby reducing potential erosion. Applying seasonal use periods, especially those related to periods when roads are wet, will reduce surface erosion, rutting and maintenance needs (refer to Appendix F). Changing the mode of travel by converting motorized trails to non-motorized, restricting non-motorized trails to foot only, or restricting bicycles from non-motorized trails are actions that potentially reduce erosion and are likely to reduce the cumulative effect of sediment delivery to streams, thereby improving water quality and aquatic habitat. Changing modes of travel for other reasons, e.g., from motorized vehicle to highway legal vehicle are not considered actions that substantially change risk. Although converting roads to trails potentially reduces tread width and vehicle weight/compaction, thereby potentially increasing revegetation and reducing erosion, the fact that vehicle size and maintenance is unlikely to change substantially on these routes suggests that this action will result in no substantial change in risk to water quality.

Through the route risk analysis, 83 percent of the total numbers of routes (41 percent of the total miles) were determined to have a low potential to cause impacts to water resources. These low risk routes generally are 1) very short, 2) do not cross perennial streams, and 3) not located within 100 feet of perennial streams. They are also mainly located on low or moderate hazard landtypes. Some of these low risk routes have associated actions under this analysis and therefore the indirect effects of

these actions have a low potential for causing impact to water resources. These routes are therefore not included in the indirect effects for moderate and high risk routes. However, cumulative impacts could occur from a concentration of low risk routes within a single watershed, so low risk routes are included in the watershed scale analysis for cumulative effects.

As mentioned previously, 18 miles, or 23 percent of the 80 miles, of field reviewed routes have observed impacts, or high risk of impact to water quality in perennial streams. Proposed actions that decrease risks to water resources for any of these 18 miles of routes is the first step towards mitigating or eliminating water quality impacts. Future actions will be required in terms of maintenance, reconstruction or obliteration in order to fully address water quality impacts and comply with state and federal water quality regulations. Observations and recommendations for these routes can be found in Appendix E –Opportunities.

Effects by Alternative - Water Quality

Alternative A - Indirect Effects

This alternative proposes to add 5.8 miles of moderate and high risk non-system routes. Field observations indicate that ten of these routes contribute to water quality impacts and the addition of these routes will not reduce risks to water resources. Future actions that involve maintenance, reconstruction or obliteration will be necessary to address the impacts.

This alternative proposes actions on 8.5 route miles that should reduce risks to water resources. Actions involve converting system routes to administrative use, not designating system routes and specifying seasonal use periods. No changes in mode of travel that would reduce risks on moderate and high risk routes. Field observations indicate that four of these routes contribute to water quality impacts. The proposed actions will be the first steps to address these impacts, but future actions that involve maintenance, reconstruction or obliteration will likely be necessary to fully mitigate or eliminate the impacts.

Dispersed Vehicle Camping under this alternative would be designated within 300 feet of all system routes. Localized impacts to water resources have been documented in some high use areas across the District. Under this alternative, all sites would be available for use, although future actions that involve maintenance, reconstruction or obliteration would be necessary to address those sites with impacts. Additionally, this alternative allows unmanaged expansion of dispersed camping to continue thereby increasing the risk for additional impacts to develop in the future.

Alternative B - Indirect Effects

This alternative adds 4.2 miles of moderate and high risk non-system routes. Field observations indicate that three of these routes contribute to water quality impacts and the addition of these routes will not reduce risks to water resources. Future actions that involve maintenance, reconstruction or obliteration will be necessary to address the impacts.

This alternative proposes actions on 54.6 route miles that should reduce risks to water resources. Actions involve converting system routes to administrative use, not designating system routes, specifying seasonal use periods and changing the mode of travel. Field observations indicate that eight of these routes contribute to water quality impacts. The proposed actions will be the first steps to address these impacts, but future actions that involve maintenance, reconstruction or obliteration will likely be necessary to fully mitigate or eliminate the impacts.

Dispersed Vehicle Camping under this alternative would be designated within 300 feet of all system routes, except along route 2421 (Rock Creek) and in some cases along 2071 (West Fork Rock Creek) where the road is within 300 feet of streams. No dispersed sites would be allowed within 100 feet of the West Fork or its tributaries. Localized impacts to water resources have been documented in some high use areas across the District. Under this alternative, eight sites along Rock Creek would not be designated and therefore impacts would diminish over time through non-use or active rehabilitation. Additionally, this alternative attempts to manage future expansion of dispersed camping that is occurring which will minimize risks for additional impacts to develop in the future.

Alternative C - Indirect Effects

This alternative proposes to add 4.0 miles of moderate and high risk non-system routes. Field observations indicate that one of these routes contributes to water quality impacts and the addition of these routes will not reduce risks to water resources. Future actions that involve maintenance, reconstruction or obliteration will be necessary to address the impacts.

This alternative proposes actions on 52.6 route miles that should reduce risks to water resources. Actions involve converting system routes to administrative use, not designating system routes, specifying seasonal use periods and changing the mode of travel. Field observations indicate that five of these routes contribute to water quality impacts. The proposed actions will be the first steps to address these impacts, but future actions that involve maintenance, reconstruction or obliteration will likely be necessary to fully mitigate or eliminate the impacts.

Dispersed Vehicle Camping under this alternative would not be designated but would be allowed within 50 feet of all system routes. However, many dispersed sites on non-system routes would be closed because more non-system routes will not be designated under this alternative. Localized impacts to water resources have been documented at some sites and future actions that involve maintenance, reconstruction or obliteration would be necessary to address the impacts, depending on the level of use. This alternative would also help manage the expansion of dispersed camping that is occurring which should help minimize risks for additional impacts to develop in the future.

Alternative B Modified - Indirect Effects

This alternative adds 4.1 miles of moderate and high risk non-system routes, although 1.3 miles would only be open for administrative use. Field observations indicate that two of these routes contribute to water quality impacts and the addition of these routes will not reduce risks to water resources. Future actions that involve maintenance, reconstruction or obliteration will be necessary to address the impacts. Routes 21407 and 21415 are proposed for addition, but only after water quality impacts are mitigated. Route 21407 requires rehabilitation of a dispersed site at the end of the route, and route 21407 requires reconstruction of a stream crossing on East Fork West Red Lodge Creek.

This alternative proposes actions on 43.4 route miles that should reduce risks to water resources. Actions involve converting system routes to administrative use, not designating system routes, specifying seasonal use periods and changing the mode of travel. Field observations indicate that eight of these routes contribute to water quality impacts. The proposed actions will be the first steps to address these impacts, but future actions that involve maintenance, reconstruction or obliteration will likely be necessary to fully mitigate or eliminate the impacts.

Dispersed Vehicle Camping under this alternative would be designated within 300 feet of all system routes, except along route 2421 (Rock Creek) and in some cases along 2071 (West Fork Rock Creek) where the road is within 300 feet of streams. No dispersed sites would be allowed within 100 feet of the West Fork or its tributaries. Localized impacts to water resources have been documented in some high use areas across the District. Under this alternative, eight sites along Rock Creek would not be designated and therefore impacts would diminish over time through non-use or active rehabilitation. Additionally, this alternative attempts to manage future expansion of dispersed camping that is occurring which will minimize risks for additional impacts to develop in the future.

No Action Alternative

This alternative designates the most moderate and high risk system routes, without any additional actions to reduce risks to water resources. Field observations indicate that 16 of these routes contribute to water quality impacts. Future actions that involve maintenance, reconstruction or obliteration will be necessary to address the impacts.

Moderate and high risk non-system routes for which there are no proposed actions, and are not designated, is also the greatest under this alternative – 11.0 miles. Field observations indicate that nine of these routes contribute to water quality impacts. Not designating these routes would be the first step toward reducing impacts, but future actions that involve reconstruction or obliteration will be necessary to fully mitigate or eliminate the impacts in order to comply with state and federal water quality regulations.

Routes with observed impacts or risks to water resources are identified in Appendix E – Opportunities.

Dispersed Vehicle Camping under this alternative would be designated within 300 feet of all system routes. Localized impacts to water resources have been documented in some high use areas across the District. Under this alternative, all sites would be available for use, although future actions that involve maintenance, reconstruction or obliteration would be necessary to address those sites with impacts. Additionally, this alternative allows unmanaged expansion of dispersed camping to continue thereby increasing the risk for additional impacts to develop in the future.

Comparison of Indirect Effects for Action Alternatives - Water Quality

Indirect Effects for Moderate and High Risk Routes with Actions: The various actions proposed for moderate and high risk routes are summarized in the following table. Again, this discussion only refers to those routes that were determined to have a moderate or high risk of impacting water resources. Low risk routes are not likely to impact water resources and are not included in the mileage summaries below. They are however, accounted for under the cumulative effects discussion, as are routes with no proposed actions.

Table 3-23. Summary of Actions for Moderate / High Risk Routes

Action	Alternative			
	A	B	B Modified	C
Add (designate non-system routes) miles **Increases Risk**	5.8	4.2	4.1[1]	4.0
Convert and Vehicle (Not Included Below) Miles **No Change to Risk**	28.6	12.4	22.1	6.5

Table 3-23. Summary of Actions for Moderate / High Risk Routes

Action	Alternative			
	A	B	B Modified	C
Administrative (Convert System Road To Administrative Use Only) Miles **Decreases Risk**	5.6	9.1	11.1	12.6
Do Not Designated (Do Not Designate System Routes) Miles **Decreases Risk**	0.7	6.3	5.8	8.8
Season (allow use during specified season) miles Decreases Risk	2.1	32.0	26.0	23.3
Vehicle (restrict mode of travel[2]) miles **Decreases Risk**	0.0	7.2	0.5	7.2
Moderate/High Risk Routes with Action – **Total Miles that Reduce Risk**	8.5	54.6	43.3	51.9
Total Miles – All Actions	42.9	71.3	69.5	62.4

[1] 1.3 miles of the 4.1 miles would be restricted to admin use only.
[2] Changes in mode of travel that can reduce risks to water resources include restricting pack/saddle use to foot only and restricting motorized and mechanized use to pack/saddle and foot only. Other changes in mode of travel are not expected to change risks.
NOTE: Due to rounding of individual action miles, the sum of all individual miles may be different than the total miles displayed by up to +/- 0.2 miles.

Of the actions that affect risk, actions that are most different across the action alternatives are 1) converting system roads to administrative use only, 2) not designating system routes, 3) restricting use to specified seasons, and 4) changing the mode of travel. Alternative B specifies seasonal use on the most route miles and also proposes actions on the most route miles to reduce route risk. Alternative C converts the most system roads to administrative use only and does not designate the most system routes. Both alternatives B and C change the mode of travel on the most route miles. All of these actions are likely to reduce potential impacts to water resources from moderate and high risk routes. However, as previously discussed, these actions are the first steps toward reducing impacts on routes with observed water quality impacts. Future actions that involve maintenance, reconstruction or obliteration will be necessary to fully mitigate or eliminate the impacts in order to comply with state and federal water quality regulations. Observations and recommendations for these routes can be found in Appendix E – Opportunities.

Cumulative Effects - Water Quality

Effects for Moderate and High Risk Routes Without Proposed Actions

All alternatives include moderate and high risk routes without proposed actions. Actions to reduce the risk of impacting water resources will not occur on these routes, and existing impacts and risks are expected to continue into the foreseeable future until road or trail maintenance occurs. The following table summarizes miles of moderate and high risk routes without actions.

Table 3-24. Summary of Moderate / High Risk Route Miles without Proposed Actions[17]

Designation Status	Alternative				
	A	B	B Modified	C	No Action
NF System Road (designated)	133.9	122.1	112.4	135.3	171.0
NF System Trail (designated)	234.8	216.8	228.1	212.3	234.8

[17] Due to rounding of individual status miles, the sum of all individual miles may be different than the total miles displayed by up to +/- 0.2 miles.

Designation Status	Alternative				
	A	B	B Modified	C	No Action
Undetermined/Non-System Trail (not designated)	5.0	6.5	6.6	6.7	10.7
Moderate/High Risk Routes without Actions Subtotal Miles	373.7	345.4	347.1	354.4	416.5
All Moderate/ High Risk Routes (includes routes with actions from indirect effects) Total Miles	416.5	416.7	416.7	416.8	416.5

Action Alternatives

These alternatives designate varying levels of moderate and high risk system routes, without any additional actions to reduce risks to water resources, but all are substantially less than the No Action Alternative. Some of these routes are known to contribute to water quality impacts. Future actions that involve maintenance, reconstruction or obliteration will be necessary to address the impacts.

Moderate and high risk non-system routes for which there are no proposed actions, and are not designated, cover 5.0 to 7.0 miles. Some of these routes are known to contribute to water quality impacts. Not designating these routes would be the first step toward reducing impacts, but future actions that involve reconstruction or obliteration will be necessary to fully mitigate or eliminate the impacts in order to comply with state and federal water quality regulations.

Routes with observed impacts or risks to water resources are identified in Appendix E – Opportunities.

No Action Alternative

See discussion of the no action alternative under the previous section.

Effects Common to All Alternatives at the Watersheds Scale

Sediment modeling was not incorporated into the effects analysis for water quality for many reasons. First of all, natural erosion rates specific to the Custer National Forest have not been developed and extrapolating rates from other Forests would only increase errors associated with the model results. Additionally, except for wildfire, road construction and harvest of green timber stands, surface erosion rates have not been developed for other frequent activities on the forest. Therefore, from a cumulative effects standpoint, existing sediment models are not adequate to quantify to a single cumulative value, the effects of all the diverse activities in individual drainages including wildfire/prescribed fire, mining, dispersed camping, off-highway vehicle use, grazing, floodplain development, timber harvest, and transportation networks. A combination of individual models could prove useful, but a large amount of additional data (on-ground and spatial) would be necessary to obtain valid results. The only way to address these various activities cumulatively for this travel management analysis is to address each activity individually and then qualify, in general terms, the cumulative effects between specific activities where appropriate. Existing activities are discussed previously under the section – **Affected Environment – Water Quality.**

Finally, existing models can have very high errors associated with their results. Elliot (2000) indicates that, at best, any predicted runoff or erosion value, by any model, will be within plus or minus 50 percent of the true value. The high degree of error associated with cumulative effects models make it difficult, if not impossible, to compare results between alternatives because confidence intervals

overlap. Professional judgment and ultimately management decisions, based on modeling results with this degree of error are not appropriate.

At the watershed scale, the proposed actions are not likely to be substantial enough to cause measurable changes in water quality, quantity or channel processes under any action alternative. Although the information indicates that total beneficial action miles for moderate and high risk routes are a relatively large percentage of the total miles in some watersheds (for example Limestone Creek), these routes will still be on the landscape with the associated risks (crossings, within 100', etc). Additionally, watersheds with high risk have other activities with higher levels of impact that are likely to negate measurable benefits related to most of the proposed actions. However, from purely a risk standpoint, the proposed actions should help to reduce risks to water resources in the following moderate and high risk watersheds: Limestone Creek, North Fork Sage Creek, Crooked Creek- Commissary, Crooked Creek – Lost Water, Stillwater River- Mountain View, Lower WF Rock Creek, and West Red Lodge Creek.

This same rational applies to those watersheds where the proposed actions are associated with low risk routes. Low risk routes account for less than half the total route miles, and proposed actions associated with low risk routes are more evenly distributed across the watersheds. Watersheds with the most substantial amount of actions associated with low risk routes include all but three watersheds on the Pryor unit, and three watersheds on the Beartooth unit. Because low risk routes are located further from perennial and intermittent streams and generally do not cross these streams, their ability to influence water quality is very limited at the watersheds scale. Again, from purely a risk standpoint, these proposed actions should help to reduce risks to water resources in the following high risk watersheds: North Fork Sage Creek, Crooked Creek- Commissary, Crooked Creek- Lost Water, and Crooked Creek- Piney.

Natural disturbance events will continue to influence hydrologic and erosional processes across all watersheds. Given the current vegetative conditions and associated fuel accumulations in some watersheds, there is potential for wildfires to occur that may be outside the range of conditions (intensity and duration) that have occurred over the last few hundred years. Depending on the intensity and area burned, accelerated soil erosion is likely, particularly where hydrophobic soils may be formed. Significant channel adjustments could be expected in these watersheds, especially during years of average or higher precipitation/runoff conditions. Stream systems will however stabilize as vegetative recovery occurs during post-fire years.

Past and present timber harvest activities and prescribed fire will continue to be a minimal influence on water resources as described under the affected environment. However, other human influences including transportation systems, grazing, recreation, mining and floodplain development are likely to continue to cause chronic effects to water resources in the future. These activities are qualified by watershed in the following table.

Table 3-25. Summary of Cumulative Effects at the Watershed Scale for Moderate / High Risk Routes

6th HUC Watershed #	Watershed Name	Acres	% FS	Total Route Miles	Past, Present, Foreseeable Activities*	Cumulative Watershed Risk Rating	Actions That Reduce Risks on Mod/High Risk Routes (miles)				Actions That Increase Risks on Mod/High Risk Routes (miles)			
							Alt A	Alt B	Alt B mod	Alt C	Alt A	Alt B	Alt B mod	Alt C
100700060902	Lake Fork	24,205	100	17	R, ס	Low	_	10.7	_	10.7	_	_	_	_
100800100501	Crooked Creek-Commissary Creek	13,739	100	49	F, G, M, R, T, ס	Mod	–	8.8	8.8	8.8	–	–	–	–
100700050202	Limestone Creek	31,726	86	61	D, F, G, R, T, ●	Mod	2.3	8.4	8.5	8.4	0.9	0.9	0.9	0.8
100800140401	Sage Creek-North Fork Sage Creek	31,025	56	86	D, F, G, R, T, ϴ	High	1.7	7.8	7.8	9.1	0.1	_	_	_
100800100801	Upper Dry Head Creek	22,737	41	49	D, G, R, ϴ	Low	–	5.7	5.7	4.2	_	_	_	_
100700050204	Stillwater River-Mountain View Creek	25,720	64	69	D, F, G, M, R, ϴ	High	3.5	3.5	3.5	3.5	_	_	_	_
100700061001	West Red Lodge Creek	30,089	53	54	D, G, R, ϴ	Mod	–	2.9	2.5	0.4	1.7	1.3	1.3	1.3
100700060905	Lower West Fork Rock Creek	22,567	97	40	D, R, T, ●	Mod	–	1.9	1.9	1.9	<0.1	_	_	_
100700060511	Line Creek	24,881	35	51	D, G, R, ●	Low	_	1.7	1.7	1.7	_	_	_	_
100800100502	Crooked Creek-Lost Water Creek	21,618	37	30	D, F, G, M, R, ס	Mod	–	1.4	1.4	1.4	_	_	_	_
100700050302	Middle East Rosebud Creek	37,209	86	53	D, F, G, R, ס	Mod	–	0.5	_	0.5	_	_	_	_
100700050501	Little Rocky Creek	12,136	66	46	D, G, M, R, ס	High	_	_	_	_	0.1	<0.1	_	_
100700050403	Fiddler Creek	18,030	36	32	D, G, ϴ	Mod	0.5	0.5	0.5	0.5	_	_	_	_
100700050401	Fishtail Creek	24,113	74	36	D, G, R, ϴ	High	0.3	0.3	0.3	0.3	_	_	_	_
100700050404	Lower West Rosebud Creek	29,020	88	21	G, R, T, ס	Mod	0.2	0.2	0.2	0.20	0.6	_	_	_
100700061005	Willow Creek-Clarks Fork Yellowstone	32,362	8	107	D, G, R, ●	High	<0.1	<0.1	<0.1	<0.1	_	_	_	_
100700060901	Rock Creek-Wyoming Creek	32,086	71	55	D, F, M, R, ϴ	High	–	–	–	–	2.0	2.0	2.0	2.0
100700060904	Upper West Fork Rock Creek	21,136	100	27	R, ס	Low	–	–	–	–	0.3	–	–	–
100700050101	Stillwater River Headwaters-Upper	23,500	100	22	M, R, ס	Mod	–	–	–	–	–	–	–	–

Table 3-25. Summary of Cumulative Effects at the Watershed Scale for Moderate / High Risk Routes

6th HUC Watershed #	Watershed Name	Acres	% FS	Total Route Miles	Past, Present, Foreseeable Activities*	Cumulative Watershed Risk Rating	Actions That Reduce Risks on Mod/High Risk Routes (miles)				Actions That Increase Risks on Mod/High Risk Routes (miles)			
							Alt A	Alt B	Alt B mod	Alt C	Alt A	Alt B	Alt B mod	Alt C
100700050102	Stillwater River Headwaters-Lower	18,571	100	9	R, ס	Low	–	–	–	–	–	–	–	–
100700050103	Wounded Man Creek	17,573	100	17	R, ס	Low	–	–	–	–	–	–	–	–
100700050104	Flood Creek	14,383	100	4	R, ס	Low	–	–	–	–	–	–	–	–
100700050105	Stillwater River Headwaters-Woodbine Creek	40,510	100	14	R, ס	Low	–	–	–	–	–	–	–	–
100700050201	Upper West Fork Stillwater River	28,675	100	20	F, M,R, ס	Low	–	–	–	–	–	–	–	–
100700050203	Lower West Fork Stillwater River	14,772	83	28	D, G, M, R, T, ס	Low	–	–	–	–	–	–	–	–
100700050301	Upper East Rosebud Creek	35,592	100	16	R, ס	Low	–	–	–	–	–	–	–	–
100700050303	Lower East Rosebud Creek	19,653	7	37	D, G, ס	High	–	–	–	–	–	–	–	–
100700050402	Upper West Rosebud Creek	30,502	100	11	R, ס	Low	–	–	–	–	–	–	–	–
100700050405	Butcher Creek	25,747	11	61	D, G, R, ϴ	High	–	–	–	–	–	–	–	–
100700050502	Bad Canyon Creek	12,245	59	16	F, G, R,T, ϴ	High	–	–	–	–	–	–	–	–
100700050503	Middle Stillwater River-Magpie Creek	11,806	16	25	D, F, G, ס	Low	–	–	–	–	–	–	–	–
100700050504	Trout Creek	16,873	35	26	D, F, G, R, ●	High	–	–	–	–	–	–	–	–
100700060601	Clarks Fork Yellowstone River-Dilworth Creek	39,543	7	110	D, G, R, ϴ	Low	–	–	–	–	–	–	–	–
100700060607	Grove Creek	16,700	18	52	G, R, ϴ	Low	–	–	–	–	–	–	–	–
100700060608	Bear Creek-Clarks Fork Yellowstone River	28,441	3	54	D, G, M, R, ϴ	High	–	–	–	–	–	–	–	–
100700060903	Rock Creek-Snow Creek	26,122	90	49	D, G, R, ϴ	Mod	–	–	–	–	–	–	–	–
100700060906	Rock Creek-Stanley Draw	37,344	1	163	D, G, R, ●	High	–	–	–	–	–	–	–	–

Table 3-25. Summary of Cumulative Effects at the Watershed Scale for Moderate / High Risk Routes

6th HUC Watershed #	Watershed Name	Acres	% FS	Total Route Miles	Past, Present, Foreseeable Activities*	Cumulative Watershed Risk Rating	Actions That Reduce Risks on Mod/High Risk Routes (miles)				Actions That Increase Risks on Mod/High Risk Routes (miles)			
							Alt A	Alt B	Alt B mod	Alt C	Alt A	Alt B	Alt B mod	Alt C
100700061002	Upper Red Lodge Creek	21,693	18	29	D, G, Θ	Mod	–	–	–	–	–	–	–	–
100800100503	Crooked Creek-Gypsum Creek	15,649	6	40	F, G, M, R, ס	Low	–	–	–	–	–	–	–	–
100800100504	Big Coulee	20,370	6	22	G, M, R, ס	Low	–	–	–	–	–	–	–	–
100800140402	Sage Creek-Section House Draw	37,096	4	94	D, G, R, Θ	Low	–	–	–	–	–	–	–	–
100800140403	Sage Creek-Inferno Canyon	22,211	26	51	D, G, R, ס	Low	–	–	–	–	–	–	–	–
100800140404	Sage Creek-Piney Creek	38,861	19	70	D, G, M, R, Θ	Low	–	–	–	–	–	–	–	–
100800140405	Bear Creek-Sage Creek	22,124	54	46	G, R, ס	Low	–	–	–	–	–	–	–	–
100800140502	Dry Creek-Shoshone River	37,343	2	54	G, M, R, Θ	Low	–	–	–	–	–	–	–	–

*Watershed: Past, Present, And Foreseeable Activities
Refer to Table 3-1 for a list of reasonable foreseeable activities within the analysis area.
D - Development/ Floodplain
F - Wild Fire/ Prescribed Fire
G - Grazing/Agriculture
M - Mining
R - Recreation/ Camping
T - Timber Harvest

TMDL – Total Maximum Daily Load (Refer to Table 3-21)
NA – Not Applicable

●– High Route Risk
Θ– Moderate Route Risk
ס – Low Route Risk

3.3.1.3 Conclusion - Water Quality

Currently, some routes have documented water quality impacts and therefore, may not comply with Forest Plan direction or state and federal water quality regulations. Compliance relative to the Decision to be made for this FEIS, only pertains to those routes with a proposed action. These routes have actions proposed which are the first steps toward addressing water quality impacts. Additional activities, outside of this proposal, that would further reduce water quality impacts are identified in Appendix E - Opportunities. From a NEPA standpoint, routes with no proposed actions that have known water quality impacts are not a compliance issue relative to the Decision to be made, because this project is not the cause of those impacts (i.e. they are existing impacts). However, water quality impacts should still be addressed through measures outside this process and recommended actions for these routes are also identified in Appendix E - Opportunities. Full compliance with Forest Plan direction and state and federal water quality regulations under all alternatives would occur in the future as these actions or rehabilitation measures are implemented.

The following table summarizes effects relative to reduced or increased risks from proposed actions by alternative.

Table 3.26. Water Quality Effects Summary

Indicator	Alt. A	Alt. B	Alt. C	No Action	Alt. B Modified
Miles of actions that reduce risks on moderate and high risk routes within the project area	8.5	54.6	51.9	0	43.3
Miles of actions that increase risks on moderate and high risk routes within the project area	5.8	4.2	4.0	0	4.1

Alternatives B, C, and B Modified have between 43 and 55 miles of routes with actions that reduce risks on moderate and high risk routes with the project area. Alternative A has approximately 9 miles of routes with actions that reduce risks on moderate and high risk routes. Alternatives B, C, and B Modified have about 4 miles of routes with actions that increase risks on moderate and high risk routes with the project area. Alternative A has approximately 6 miles of routes with actions that increase risks on moderate and high risk routes.

3.3.1.4 Affected Environment – Fisheries and Aquatics

Overview of Changes from the Draft to the Final EIS

- With respect to fisheries and aquatics, few changes occurred between the Draft and Final EIS. However, among these few changes were some that provide significant additional protections for aquatic habitats and biota. The scope of the Beartooth Travel Management EIS is limited to the designation of system roads and trails. Additional protection measures that potentially improve aquatic habitat and species are included in Alternative B Modified. Additionally, Appendix E includes opportunities to reduce impacts to water quality, aquatic habitat and biota, where there are: 1) site specific impacts from existing routes not associated with the proposed action, and 2) proposed actions with potential to improve conditions but do not eliminate impacts. However, maintenance and decommissioning proposals will require future and separate NEPA decisions

- Specific changes to the fisheries and aquatics assessment were a result of public comments that requested clarification or change in the analysis. Narratives and tables under the Environmental Consequences section were expanded to meet these requests. Changes to the Route Risk Analysis are discussed in the Water Quality Section.

Applicable Laws, Regulations, and Policy

The *Clean Water Act* requires States to identify existing water bodies that do not meet water quality standards, and develop plans to meet them. *Montana Water Quality Law,* as directed by the Clean Water Act, developed a water quality classification system, developed water quality standards to be applied to various water classes, and identified water bodies that do not meet standards.

The Montana Department of Environmental Quality has classified most of the streams within the analysis area as B-1 streams under the Montana Water Classification system, with the exception of the West Fork Rock Creek drainage, which is classified as an A-1 stream. The Administrative Rules of Montana (ARM 17.30.623) require that waters classified as A-1 or B-1 are suitable for the *"growth and propagation of salmonid fishes and associated aquatic life."* Other beneficial uses associated with these classifications include; drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (Administrative Rules of Montana (ARM) 16.20.607/618).

The *1995 Presidential Executive Order 12962* directs Federal agencies to "improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunity by evaluating the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order."

As part of the *National Environmental Policy Act* (NEPA) decision-making process, proposed Forest Service programs or activities are to be reviewed to determine how an action will affect any sensitive species (FSM 2670.32). The goal of the analysis should be to avoid or minimize impacts to sensitive species. Two sensitive amphibian and one sensitive fish species are present in the project area. These include the Northern leopard frog *Rana pipiens*, Western toad (Boreal toad) *Bufo boreas,* and Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri*.

The 1987 *Custer National Forest Land and Resources Management Plan* directs that management activities should enhance habitat quality and diversity, and to provide fish-oriented recreation opportunities. Most of the critical habitat areas have been incorporated into management areas that maintain or improve these key habitats. Fisheries management is considered in all management areas and the level of habitat management is projected to increase over time. The Custer National Forest has established a list of management indicator species and habitat indicators based upon the National Forest Management Act (NFMA) and planning regulations criteria. Native-strain Yellowstone cutthroat trout are designated in the Custer National Forest Plan as an aquatic Habitat Indicator Species for cold water habitats. Other cold water trout species considered in this analysis include brook trout *Salvelinus fontinalis*, brown trout *Salmo trutta*, and rainbow trout *Oncorhynchus mykiss*.

The Custer National Forest is a cooperator in the *Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout within Montana* (MOUCA) (MFWP 2007). The management goals of the MOUCA are to: 1) ensure the long-term,

self-sustaining persistence of each subspecies distributed across their historical ranges, 2) maintain the genetic integrity and diversity of non-introgressed populations, as well as the diversity of life histories, represented by remaining cutthroat trout populations, and 3) protect the ecological, recreational, and economic values associated with each subspecies (MFWP 2007). The MOUCA specifies that maintaining, securing, or enhancing populations entail: 1) protecting, conserving, or restoring habitat (including watersheds that currently support or have a high potential to support cutthroat trout), 2) reestablishing connectivity among isolated populations, and 3) applying regulations that protect cutthroat trout (MFWP 2007).

Fish and Amphibian Distribution

The Beartooth Travel Management Plan project area spans across 45 individual watersheds (6^{th} level hydrologic unit code). Custer National Forest system lands comprise about one-half of the total acreage of the 45 watersheds (630,500 acres of 1,241,800 acres total). The project area encompasses portions of the Stillwater and West Fork Stillwater Rivers, Rock, West Fork Rock, East Rosebud, West Rosebud, and West Red Lodge Creeks of the Absaroka Beartooth Mountain Range, and Crooked, Sage, and Piney creeks of the Pryor Mountain Range. These rivers, creeks, lakes and their tributaries support several internationally known trout fisheries, as well as populations of important endemic fish and amphibians.

Yellowstone cutthroat trout are the only sensitive fish species present in the project area. Other trout species considered in this analysis include brook, brown, and rainbow trout. Potential sensitive amphibian species include the Northern leopard frog and Western toad (Boreal toad).

Yellowstone Cutthroat Trout (Oncorhynchus clarki bouvieri)

Yellowstone cutthroat trout, a member of the family Salmonidae, were first described by C. E. Bendire in 1882 based on a sample from a population in Waha Lake, Idaho; however, many explorers had made earlier observations of this subspecies in Montana and Wyoming (Behnke 1992; May 1996; as reported in Young 2001). Yellowstone cutthroat trout (YCT) historically occupied approximately 17,397 miles of habitat in the western U.S., including, from east to west, the upper portions of the Yellowstone River drainage within Montana and Wyoming and the upper Snake River drainage in Idaho, Wyoming, Nevada and Utah (Behnke 1992; as reported in May et al. 2003). In Montana, YCT were historically widely distributed throughout the upper Yellowstone River basin and its tributary streams, ranging as far downstream as the Tongue River (MFWP 2005).

Yellowstone cutthroat trout inhabit relatively clear, cold stream, river, and lake environments (Young 2001). Spawning typically occurs in spring and early summer, after flows have declined from their seasonal peak, in sites with suitable substrate (gravel less than 85 mm in diameter), water depth (9-30 cm), and water velocity (16-60 cm/s) (Varley and Gresswell 1988; Byorth 1990; Thurow and King 1994; as reported in Young 2001). Upon emergence, fry immediately begin feeding, typically in nearby stream margin habitats, but they may also undertake migrations to other waters (Gresswell 1995; as reported in Young 2001). Sexual maturity is generally achieved by age 3 or older. Yellowstone cutthroat trout and rainbow trout readily hybridize, producing fertile offspring; sympatric populations often form hybrid swarms (Allendorf and Leary 1988; Henderson et al. 2000; as reported in Young 2001).

Yellowstone cutthroat trout exhibit three primary life history patterns: resident, fluvial, and adfluvial (Gresswell 1995; as reported in MTFWP 2005). Resident life forms occupy home ranges entirely within relatively short reaches of streams; fluvial fish migrate from larger streams or rivers to smaller

streams to reproduce; adfluvial life history forms of YCT exhibit a similar pattern, but migrate, sometimes many kilometers, as mature adults from lakes to inlet or outlet streams to spawn (Young 2001).

Throughout their historic range, YCT trout have undergone substantial declines in distribution and abundance (Young 2001). Genetically unaltered YCT occupy about 7 to 25% of historical habitats (May et al. 2003). The distribution of stream resident YCT on the Custer National Forest (CNF) is restricted from its historic range; eleven genetically pure YCT populations currently occupying less than 30 miles of stream habitat on CNF (the following table). Few lake dwelling populations of YCT are thought to have existed in Montana historically (MFWP 2006). At present, a purported 179 lakes support pure populations in Montana (118 of these lakes reside in the Absaroka-Beartooth Wilderness Area; MFWP 2006). Most stream populations of YCT are at risk of extinction from either hybridization or demographic or stochastic influences (MFWP 2005). Genetically unaltered YCT inhabit about 73 lakes and 27 miles of stream in the project area. Nearly all of the lakes (68 of 73) lie within the Absaroka Beartooth Wilderness Area, while most stream populations exist outside the Wilderness Boundary. Watershed distribution and stream miles occupied by genetically unaltered YCT in the project area are provided in table below.

Table 3-27. Stream populations of genetically unaltered YCT on Custer National Forest within the project area.

Watershed (HUC 6)	Watershed Name [18]	Stream Miles with YCT
100700050502	Bad Canyon Creek	3.5
100700061001	West Red Lodge Creek (East Fork of West Red Lodge Creek)	1.5
100700050101	Stillwater River Headwaters-Upper (Goose Creek)	3.0
100700050105	Stillwater River Headwaters (Woodbine Creek)	2.0
100700050203	Lower West Fork Stillwater River (Iron Creek)	3.0
100700050501	Little Rocky Creek	3.0
100700050202	Limestone Creek (Picket Pin Creek)	3.25
100700060901	Rock Creek/Wyoming Creek (Wyoming Creek)	2.0
100800100501 100800100502	Crooked Creek	5.5
100800100801	Upper Dry Head Creek	1.75
100800140404	Sage Creek-Piney Creek (Piney Creek)	0.5

Northern Leopard Frog (Rana pipiens)

The Northern leopard frog historically ranged from Newfoundland and northern Alberta in the north to the Great Lakes region, the desert Southwest and the Great Basin in the south (Maxell 2000). A number of isolated populations historically existed in the Pacific Northwest and California (Stebbins 1985; as reported in Maxell 2000). In Montana they have been documented across the eastern plains and in many of the mountain valleys on both sides of the Continental Divide at elevations up to 6,700 feet (Werner et al. 2004).

The Northern leopard frog is found in, and adjacent to, permanent slow moving or standing water bodies with considerable vegetation, but may range widely into moist meadows, grassy woodlands

[18] Parenthesized stream name below watershed name identifies the tributary occupied by YCT if different from watershed name.

and even agricultural areas (Nussbaum et al. 1983; as reported in Maxell 2000). Adults feed on invertebrates, but may cannibalize smaller individuals. Adults overwinter on the bottom surface of permanent water bodies, under rubble in streams or in underground crevices that don't freeze. Northern leopard frogs breed from mid-March to early June (Maxell 2000). Mating occurs when males congregate in shallow water and begin calling during the day (Maxell 2000). Eggs are laid at the water surface in large, globular masses of 150 to 500 (Maxell 2000). Juveniles may move as much as 8 kilometers from their natal ponds to their adult seasonal territories (Dole 1971; as reported in Maxell 2000). Young and adult frogs often disperse into marsh and forest habitats, but are not usually found far from open water (Maxell 2000).

Over the last few decades the Northern leopard frog has undergone declines across much of the western portion of their range (Stebbins and Cohen 1995; as reported in Maxell 2000). Most Northern leopard frogs in western Montana became extinct in the 1970's or early 1980's. The only 2 population centers known to exist in western Montana are near Kalispell and Eureka (Maxell 2000). However, the northern leopard frog is still abundant and widespread in southeastern Montana and northwestern South Dakota (Reichel 1995; as reported in Hendricks and Reichel 1996). Although this species is relatively common on the Ashland District of the Custer National Forest, there have been only three recorded observations of this species within the project area. All of the sightings were recorded pre 1970 and were in the East Rosebud Creek drainage (near East Rosebud Lake). There have been no recent Northern leopard frog observations throughout the Beartooth District.

Western Toad (Boreal Toad) (Bufo boreas)

The Western toad (*Bufo boreas)* is currently recognized as two subspecies ranging from the Rocky Mountains to the Pacific Coast and From Baja Mexico to southeast Alaska and the Yukon Territory (Stebbins 1985; as reported in Maxell 2000). They are found in a variety of habitats, including wetlands, forests, sagebrush meadows and floodplains. Western toads inhabit all types of aquatic habitats ranging from sea level to 12,000 ft in elevation (Maxell 2000). The subspecies of Western toad found in Montana is the boreal toad (*Bufo boreas boreas*).

Adult and juvenile toads are freeze intolerant and overwinter and shelter in underground caverns, or rodent burrows (Maxell 2000). Adults feed on a variety of ground dwelling invertebrates and are known to eat smaller individuals of their own species. Adults must utilize thermally buffered microhabitats during the day, and can be found under logs or in rodent burrows (Maxell 2000). Because of their narrow environmental tolerance (10-25 ^{o}C throughout the year), adults are active at night and can be found foraging for insects in warm, low-lying areas (Maxell 2000). Breeding typically occurs from May to July in shallow areas of large and small lakes, ponds, slow moving streams and backwater channels of rivers (Black 1970; Metter 1961; as reported in Maxell 2000). Tadpoles metamorphose in 40 to 70 days and can be found in dense aggregations adjacent to breeding grounds (Werner et al. 2004).

In the northern Rocky Mountains Western toads have undergone declines. Surveys in the late 1990's revealed they were absent from a number of areas they historically occupied. While they remain widespread across the landscape, they appear to be occupying only 5 –10%, or less, of the suitable habitat (Maxell 2000). Based on these findings the USFS listed the Western toad as sensitive in all of Region 1's National Forests, and initiated a regional inventory in Montana. As a result, a systematic inventory of standing water bodies in 40 randomly chosen 6th level hydrologic unit code (HUC) watersheds was completed across western Montana during the summer of 2000. Results indicated they were widespread, but extremely rare. The Western toad has been documented on the Beartooth

Plateau, at altitudes as high as 9,200 ft (Werner et al. 2004). Two Western (Boreal) toad records exist for the project area. These records include a 1970 sighting on the Red Lodge Creek Plateau and one in the upper Stillwater River drainage in 2003.

Watershed Condition and Stream Habitat Characteristics

Project area streams are classified B-1 for water quality beneficial uses using the state Department of Environmental Quality water quality classification system, with the exception of a municipal watershed (West Fork Rock Creek), which is classified as an A-1 stream. The Water Quality section of this document fully details the respective designations of these classifications; significant among them for this analysis is the growth and propagation of salmonid fish.

Stream channel types in the Rosgen classification system are alphanumeric classifications of streams based on geomorphologic and stream substrate characteristics (table below). The most common Custer National Forest stream channel types are Rosgen A and B, but all types are present. Streams bearing unaltered Yellowstone cutthroat trout populations on CNF are primarily Rosgen B channels, often with inclusions of A channel types in the upper most headwaters and short C channel inclusions within lower gradient reaches of the predominant B channel.

Table 3-28. Rosgen stream channel types (Rosgen 1996)

Channel Type [19]	Gradient (%)	Entrenchment	W/D Ratio	Sinuosity	Sensitivity *	Erosion Potential*	Vegetative Control [20] *
A	>4	High	<12	Low	Low to Extreme	Low to Extreme	Low
B	2-4	Moderate	>12	Moderate	Low to Moderate	Low to Moderate	Low to Moderate
C	<2	Low	>12	High	Low to Extreme	Low to Extreme	Moderate to Extreme
D	<4	Low	>40	None	Extreme	Extreme	Moderate
E	<2	Low	<12	High	Extreme	Moderate to High	Extreme
F	<2	High	>12	High	Low to Extreme	Moderate to Extreme	Low to Moderate
G	2-4	High	<12	Moderate	Low to Extreme	Low to Extreme	Low to High

*In general, low values for these columns indicate large channel substrates (bedrock and boulder). Moderate to extreme values indicate smaller substrates (silt, sand, gravel, and cobble).

For the purpose of this analysis generalizations of watershed condition and stream habitat characteristics within watersheds relative to travel routes, were inferred from: 1) total route miles, 2) number of route stream crossings, 3) route miles within 100ft of streams, and 4) landtype association. Sediment delivery and riparian habitat loss are generally positively related to the aforementioned route related variables, and generally but not universally are indicative of reduced aquatic habitat capability (e.g., Furniss et al. 1991, Dunham and Rieman 1999, Forman et al. 2003). Habitat quality within

[19] The base channel type (A-G) is further described by a number corresponding with predominate streambed substrate within a reach (1 = bedrock, 2 = boulder, 3 = cobble, 4 = gravel, 5 = sand, 6 = silt). For example, a C4 channel is a low gradient, gravel bedded, sinuous stream that is very sensitive to disturbance, has high erosion potential and is sensitive to loss of riparian vegetation.

[20] Vegetative control number indicates the relative importance of riparian vegetation in maintaining streambank stability, and therefore stream channel form.

watersheds is variable, in part because of other land use activities and because the ultimate effects of travel routes also depend on location of those routes, geology and soils of the watershed, maintenance of the routes, and other factors (Furniss et al. 1991). A summary of cumulative watershed condition is discussed under Watershed Scale Cumulative Influences.

There is a distinction between travel route effects and the effects of various modes of travel. In most cases, the actual use, or mode of travel (motorized versus non-motorized) is inconsequential. Rather, it is the facility (road or trail) that has the potential to impact aquatic habitat and biota. In general, roads have more impacts than trails because of their wider prisms, larger cut-and-fill slopes and more extensive ditch routing systems. However, some uses have higher potential to disturb soils and increase erosion potential on both roads and trails, and therefore segregation of uses is maintained throughout the report. For example, Dale and Weaver (1974) found horses trails to be deeper than those used only by hikers. Deluca et al. (1998) found horses consistently made more sediment available for erosion than hikers or llamas. Wilson and Seney (1994) measured sediment yield from hikers, mountain bikers, motorcycles and horses and found horses produced higher sediment yields on both dry and pre-wetted trails than the other users. Facility improvements and maintenance in many cases can mitigate potential for adverse effects.

Potential effects of travel routes and various modes of travel on aquatic habitat and populations are combined under one primary aquatics issue (effects to aquatic habitat and biota). However, the issue is segregated into various components of concern. Those components are 1) Travel route impacts on stream channel form and function, including sediment delivery to streams and subsequent effects on aquatic habitat and biota; 2) Travel route impacts on riparian ecosystems; 3) Travel route impacts on habitat fragmentation; and 4) Travel route impacts on exploitation and modification of recreational and native fisheries.

Influences of Transportation Systems on Aquatic Habitat and Biota

Stream Channel Form and Function

Travel routes may affect stream channel form and function, including sediment delivery to streams and subsequent effects on aquatic habitat and biota.

Roads and trails constructed for Forest travel disturb soils and increase the potential for erosion and sediment transport and deposition in streams (Furniss et al. 1991, Forman et al. 2003). Likewise, motorized and non-motorized uses (motorcycles, ATVs, horses, mountain bikes, hikers) can further disturb soils and increase potential for erosion and sediment delivery. Sediment concerns are generally highest when roads and trails are not sufficiently drained (Furniss et al. 1991). Water and sediment can concentrate on roads and trails during spring snowmelt runoff or periods of intense rain and be delivered to streams. With sufficient drainage, water and sediment from upland segments of trails and roads can be diverted off trails or roads, filtered through forest vegetation, and not routed to streams (Furniss et al. 1991). As such, upland segments of roads and trails can generally be designed to mitigate sediment delivery concerns. One primary concern is erosion and sediment delivery from road and trail segments near stream crossings (Furniss et al. 1991, Forman et al. 2003).

Sediment entering stream channels can affect channel shape and form, stream substrates, the structure of fish habitats and the structure and abundance of fish populations (Everest et al. 1987, Hicks et al. 1991, Waters 1995, McIntosh et al. 2000). To evaluate the effects travel routes and modes of travel have on sediment and fish habitats and populations, one must project changes in erosion and sediment

delivery against the structural framework of the channel. Streams are not similar in terms of their inherent sensitivity to changes in streamflow or sediment discharge, their inherent stability, or their ability to recover from sediment related change (Rosgen 1996, Hogan and Ward 1997). Furthermore, stream habitats described in terms of pools, riffles and spawning gravel are geomorphic entities that are selectively influenced or controlled by channel type, streamflows and sediment inputs (Rosgen 1996, Hogan and Ward 1997). Potential sediment effects to trout vary according to life-stage specific habitat requirements, habitat conditions (quality) and habitat availability (quantity) (Everest et al. 1987, Bjornn and Reiser 1991, Hicks et al. 1991, Hogan and Ward 1997). This is because different life-stages utilize different habitats. Adults typically prefer pool habitats and juveniles utilize pools, runs and some riffle habitats. Sediment effects on adult and juvenile trout can occur when sediment concentrations exceed the capacity of the channel and pools fill or riffles become more embedded. Adverse effects to young trout (egg through fry life stages) can occur when fine sediment concentrations increase in spawning gravels (Bjornn and Reiser 1991, Hicks et al. 1991, Waters 1995).

Spawning gravel is the sorted product of bed scour and redeposition from which sand and finer material has been removed and transported downstream. The maintenance of good spawning gravel requires that the stream's normal sediment supply contain relatively low amounts of fine material, and that stream-flows and gradients be sufficiently high to flush out fines (Bjornn and Reiser 1991, Waters 1995, Kondolf 2000). Travel routes that minimize the influx of fine sediments will favor the maintenance of spawning gravel. If inputs exceed the stream's sediment transport capacity, then concentrations can increase in spawning gravels and affect survival of incubating eggs and emerging fry.

Pools are the result of local scour or impoundment induced by structural controls (e.g., boulders, large woody debris) in the channel or streambank (Rosgen 1996, Hogan and Ward 1997). Pools are areas of higher velocity during peak flows, but at low flows their depth creates a depositional environment for fine sediment. Increased sediment from roads and trails can influence the amount and quality of juvenile and adult pool habitat if sediment increases are sufficient to alter channel morphology by filling in pools and increase width/depth ratios. For lower-gradient, more sensitive channel types like B4 and B4c and C type reaches with moderate sensitivity to increased sediment, excessive sediment loading can reduce maximum pool depth and residual pool volume thereby reducing the quality and availability of pool habitats important to juvenile and adult salmonids (Rosgen 1996, Hogan and Ward 1997).

Riparian Ecosystems

Forest roads and trails constructed for travel activities within riparian corridors can alter or remove riparian vegetative communities, with direct and indirect impacts on riparian and stream ecosystems (Furniss et al. 1991, Forman 2003). Riparian vegetation modification may directly remove fish security cover and reduce stream shading, resulting in increased water temperatures in summer and colder temperatures in winter. Removal of riparian vegetation may indirectly result in reduced streambank stability and sediment filtering capacity of vegetation, both of which can result in increased sediment delivery rates with effects as described above (e.g., Thornton et al. 1998). Riparian vegetation modification may also change stream channel form and function, and may modify aquatic food webs and nutrient cycles. Potential for changes in channel form and function is also related to the inherent stability of various channel types. Removal of riparian vegetation in amphibian breeding, incubating and rearing habitats may reduce its suitability for those functions and may increase vulnerability of the amphibians to predation (Maxell 2000, Forman et al. 2003).

Habitat Fragmentation

Roads and trails can fragment aquatic habitats where stream crossings create barriers for upstream movement of fish and amphibians (Furniss et al. 1991, Maxell 2000). This typically occurs where culverts and fords are not designed to allow for upstream fish and amphibian passage. Crossings with culverts can be barriers usually because of outfall barriers, excessive velocities, insufficient water depths, disorienting turbulent flow patterns, lack of resting pools below the barrier or a combination of these conditions. Fish and amphibians upstream of the barrier are then geographically and hence, reproductively isolated from the downstream population. Habitat fragmentation can reduce viability of fish and amphibian populations by a variety of stochastic, deterministic and genetic mechanisms (e.g., Rieman et al. 1993).

The concern of aquatic habitat fragmentation related to travel routes has been addressed through a District culvert inventory completed in 2003 that evaluated culverts to determine fish passage capabilities. Culverts where fish passage is a concern have been replaced or prioritized for replacement. Because fish passage has been addressed through the Forest-wide culvert inventory and fish passage analysis, and because impacts can be mitigated through facility design or replacement, this component of the aquatic issue is dismissed from further detailed analysis in this report.

Exploitation of Recreational and Native Fisheries

Travel routes that lead to popular fishing destinations may have an indirect effect on fish populations by over-exploiting fish stocks that are vulnerable to high angling pressure. Over-exploitation of fish stocks may result in population declines (e.g., Rieman and McIntyre 1993). Population declines in small fish populations may render them at higher risk of extinction (Rieman et al. 1993).

The Montana Department of Fish, Wildlife and Parks (MFWP) manage fish and wildlife populations throughout the state. Lake management plans have been developed for most high mountain lakes throughout the Custer National Forest. These plans address recruitment potential and angling pressure effects. Where natural recruitment does not meet population goals, supplemental stocking is generally prescribed. Thus, the issue is largely focused on over-exploitation of native fish populations inhabiting Forest streams. The MFWP regulates over-exploitation of recreational and native stream fisheries with special regulations that either determines catch limits or prohibit keeping of fish. For example, there is currently a catch-and-release regulation in effect for native Yellowstone trout in all streams supporting native stocks. Lake management plans and special regulations effectively mitigate the over-exploitation component of the aquatics issue. Thus, this component is dismissed from further detailed analysis.

Assumptions

For the purpose of this analysis, only proposed actions related to travel routes were evaluated for effects to aquatic systems under alternatives A, B, B Modified and C. Under the No Action Alternative, no direct and indirect effects could be evaluated as no route related actions are proposed. However, the No Action Alternative is indicative of the existing condition of the project area and therefore, all routes were evaluated at the watershed scale for a summary of cumulative influences to aquatic systems for this alternative.

For the cumulative influences summary and cumulative effects analysis, route layers outside of the Custer National Forest boundary, obtained for GIS analysis, were generated from the USFS Region 1 GIS (TIGER Data) transportation layer. They included all secondary, primary, and city/county roads.

System roads that are not designated or identified for administrative use would become or remain Maintenance Level (ML) 1 system roads. This is often characterized as putting a road into "storage". The Forest Service is responsible for ensuring that, "Basic custodial maintenance is performed to keep damage to adjacent resource to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level."

Appendix E includes opportunities to reduce impacts to water quality, aquatic habitat and species where there are: 1) site specific impacts from existing routes not associated with the proposed action, and 2) proposed actions with potential to improve conditions but do not eliminate impacts. However, construction, reconstruction, maintenance and decommissioning proposals will require future and separate NEPA decisions

Transportation Systems Analysis

Roads and trails were evaluated for impacts to water quality or natural channel processes (Water Quality Section). This analysis evaluates the subsequent potential impacts to aquatic habitat and biota in relation to impacts to water quality and natural channel processes. An in depth review of effects of roads and trails on fish and amphibians, and their habitats is provided by Furniss et al. (1991), Maxell (2000), and Forman et al. (2003).

The potential for routes to impact water quality was evaluated based on the number of stream crossings (perennial and intermittent crossings), adjacency to streams (miles of route within 100ft from perennial and 100ft from intermittent, and beyond 100ft from all channels) and landtype erosion hazard.

Route values obtained from the Route Risk Analysis provide an index of potential water quality impact, or route risk to water quality. The route value is not intended to predict an absolute value or level of impact to water quality or aquatic systems, rather a hierarchical approach to prioritizing impact potential by category: Low, Moderate, and High Risk. The table below provides a summary of each route risk category by route miles and by the number of routes. Potential effects to fish and amphibian habitat and species related to proposed actions for moderate and high risk routes are evaluated under indirect effects by action alternative.

Table 3-29. Route Risk Summary

	Low	Moderate	High	Total
Miles of Routes	296	379	39	714
Number of Routes	533	89	20	642

Watershed Scale (Cumulative) Influences

To assess cumulative influences and cumulative effects to aquatic resources all routes were evaluated at the watershed scale (6^{th} level, 10,000-40,000 acre) similar to the individual route risk evaluation discussed previously.

The Water Quality section in this chapter displays the 2006 303(d) list for watersheds within the cumulative effects area of the project (Table 3-21). This list provides the best current information on watershed impairment for streams below the Forest boundary. Probable causes for aquatic life and

fisheries impairment vary from alteration of streamside vegetation to nitrate/nitrites, sedimentation, solids, fish barriers and alteration of flow regimes. For the portions of the 303(d) listed watersheds on the CNF, Bad Canyon and Crooked Creek support Yellowstone Cutthroat trout populations, and Fishtail, Lodgepole, Red Lodge, and West Rosebud Creeks support MIS trout populations. None of the 303(d) listed watersheds harbor sensitive amphibian species on CNF.

The table below provides a summary of watershed route information for aquatic sensitive species occupied watersheds. Past, present, and reasonably foreseeable activities within individual watersheds are also included in an attempt to qualify other potential sources of impact to aquatic habitat and biota. Watersheds considered to be at risk for sensitive fish and amphibian species are identified based on: 1) high risk cumulative watershed rating, 2) other known past, present and foreseeable activities, 3) TMDL listed streams, and 4) presence of sensitive fish or amphibian populations within the watershed.

Three sensitive species occupied watersheds have a High Risk cumulative watershed risk rating (table below). However, it should be recognized that there is considerable variation in: 1) stream habitat and species composition between tributaries within watersheds, 2) stream conditions on and off Forest, 3) and condition and maintenance levels among travel routes. Little Rocky, Bad Canyon, and Crooked creeks are the only sensitive species occupied streams on CNF where habitat conditions are of concern, and impacts to these watersheds are primarily related to recent wildfires, past grazing, agricultural and mining activities, and to a lesser extent, travel routes.

Table 3-30. Summary of Watershed Characteristics and Watershed Scale Influences for Sensitive Aquatic Species Occupied Watersheds.

6th HUC Watershed	Watershed Name*	Acres	% FS	Past, Present, Foreseeable Activities**	Cumulative Watershed Risk Rating	Primary Influence for Watershed Rating
100700060901	Rock Creek-Wyoming Creek[1]	32,086	71	D, F, M, R, ϴ	High	Recreation, Routes
100700050501	Little Rocky Creek[1]	12,136	66	D, G, M, R, O	High	All Listed Activities
100700050502	Bad Canyon Creek[1]	12,245	59	F, G, R,T, ϴ	High	TMDL, Fire, Grazing/Agriculture, Routes
100800100501	Crooked Creek-Commissary Creek[1]	13,739	100	F, G, M, R, T, O	Mod	All Listed Activities
100700050101	Stillwater River Headwaters-Upper[1,3]	23,500	100	M, R, O	Mod	Mining
100700050302	Middle East Rosebud Creek[2]	37,209	86	D, F, G, R, O	Mod	Floodplain Development
100700050202	Limestone Creek[1]	31,726	86	D, F, G, R, T, ●	Mod	TMDL, Grazing/Agriculture, Routes
100700061001	West Red Lodge Creek[1,3]	30,089	53	D, G, R, ϴ	Mod	TMDL, Routes
100800100502	Crooked Creek-Lost Water Creek[1]	21,618	37	D, F, G, M, R, O	Mod	All Listed Activities
100700050105	Stillwater River Headwaters-Woodbine Creek[1]	40,510	100	R, O	Low	NA
100700050203	Lower West Fork Stillwater River[1]	14,772	83	D, G, M, R, T, O	Low	NA
100800100801	Upper Dry Head Creek[1]	22,737	41	D, G, R, ϴ	Low	NA
100800140404	Sage Creek-Piney Creek[1]	38,861	19	D, G, M, R, ϴ	Low	NA

*__SENSITIVE SPECIES:__ [1] Yellowstone Cutthroat Trout, [2] Northern Leopard Frog, [3] Western (Boreal) Toad

**Watershed: Past, Present, And Foreseeable Activities

Refer to Table 3-1 for a list of reasonable foreseeable activities within the analysis area.

D - Development/ Floodplain
F - Wild Fire/ Prescribed Fire
G - Grazing/Agriculture
M - Mining
R - Recreation/ Camping
T - Timber Harvest
TMDL – Total Maximum Daily Load (Refer to Table 3-21)

NA – Not Applicable

● – High Route Risk

ϴ – Moderate Route Risk

O – Low Route Risk

3.3.1.5 Environmental Consequences – Fisheries and Aquatics

Direct and Indirect Effects-Fisheries and Aquatics

Uses Dismissed from Detailed Analysis

Winter motorized and non-motorized use
There is no literature or evidence in streams throughout the Forest that suggests winter motorized or non-motorized uses affect aquatic habitat and biota via any of the issue components. Generally, ice and snow cover over aquatic habitats provides sufficient protection from snow machines, skiers and other winter recreational activities. Therefore, winter motorized and non-motorized uses are dismissed from further analysis in this report.

Motorized use in Wilderness
Motorized uses are not allowed in designated Wilderness. Therefore, motorized uses are dismissed from detailed analysis for all Absaroka Beartooth Wilderness Area routes within the project area.

Effects Common to All Alternatives
Through the watershed route risk analysis, 83% of the total number of routes were determined to have a low potential to cause impacts to water resources and therefore, negligible to nonexistent effects to aquatic habitat and species. However, at the watershed scale, cumulative impacts could occur from a concentration of low risk routes, so low risk routes are included in the watershed scale aquatics analysis for cumulative effects.

Direct Effects
Direct effects are those resulting in the direct mortality of fish or amphibians, or the destruction of fish or amphibian habitat. Direct effects occur at the same time and place as the proposed activity. Relative to transportation systems, only the installation, reconstruction or removal of stream crossing structures, and route construction or decommissioning could result in direct effects to fish and amphibians. The proposed actions in the project area do not include any route related construction activities that would result in direct effects to aquatic habitats or biota. Therefore, no direct effects are evaluated in this analysis.

Indirect Effects
Only moderate or high risk rated routes with associated actions are evaluated for indirect effects to aquatic habitats and biota. Indirect effects occur at a later time or distance from the proposed action. Indirect effects are those resulting in changes to fish and amphibian habitat or populations as a result of changes in the aquatic environment. These effects may include altering the rate in which sediment or woody debris enters the stream channel, changes in stream bank stability due to near-bank activities, modifying temperature regimes by reducing riparian shading, and decreased embryo survival as a result of fine sediment accumulation in spawning gravels.

A summary of route related actions pertaining to moderate and high risk rated routes, and the potential for these actions to reduce or not reduce the risk of impacting aquatic systems can be found in the Water Quality Section, Effects Common to All Action Alternatives. In general terms, the only action that would tend to increase risk for moderate and high risk routes is designating non-system roads or trails for public motorized use. This action adds additional route miles to the landscape, and does not reduce the risk of indirect and cumulative effects to aquatic ecosystems.

All other proposed actions would tend to decrease risk. These actions include: 1) converting system roads to administrative use, 2) converting system roads to trails, 3) converting system roads to trails with a seasonal restriction, 4) not designating non-system routes, 5) restricting the season of use for roads or trails, 6) restricting the mode of travel for roads or trails, and 7) restricting the season of use and mode of travel for roads or trails

Alternative A

Alternative A proposes to add about 6 miles of moderate and high risk non-system routes. Effects of these routes on aquatic habitat and species are provided in the table below. Of these routes, #21407, #21415, #241412 and #241419 have the greatest potential to adversely impact sensitive species and their habitats.

Table 3-31. Indirect Effects to Fish, Amphibians, and Their Habitats by Adding Moderate and High Risk Routes to the System under Alternative A.

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Potential Effect to Aquatic Habitat and Biota
	Moderate	High		
100700060901 Rock Creek-Wyoming Creek	T-3A	--	1.96	This route is a non-motorized, maintained, hiking trail that provides access to Shelf and Moon Lakes. No measurable negative impacts to aquatics species or habitat are anticipated as result of the trail on the landscape. Adding this route to the system would increase recreational fishing opportunity. It provides access to stocked high mountain lakes with harvestable populations of cutthroat and brook trout.
100700050202 Limestone Creek	T-83	--	0.8	This route is a non-motorized, maintained, hiking trail. Trail #83 parallels Dead Indian Creek. Dead Indian Creek flows intermittently and does not support fish. No sensitive amphibians have been documented in this drainage. This route has little to no impact to aquatic habitat or species.
100700050202 Limestone Creek	R-21407*	--	0.13	Route #21407 is a user created spur road that parallels Picket Pin Creek and leads to a dispersed camping area. The route was identified as having moderate water quality impacts due to bare soil and an access trail to and across Picket Pin Creek. Picket Pin Creek harbors genetically unaltered YCT. Adding this route has moderate to high potential for impacting aquatic habitat and sensitive species.
100700050404 Lower West Rosebud Creek	R-20723	--	0.57	This road provides Powerline access for highway vehicles. It parallels an ephemeral tributary to West Rosebud Creek for a short distance (.2 miles). This route was not observed to be a risk to water quality, fisheries, or aquatic habitat.
100700061001 West Red Lodge Creek	R-21415	--	1.25	Route #21415 provides motor vehicle access to the lower end of the East Fork of West Red Lodge Creek near the CNF/State land boundary. An isolated population of genetically unaltered YCT, intermixed with brook trout, inhabits this creek. The Western (Boreal) toad has been documented in this drainage also, but up on the Red Lodge Creek Plateau, several miles from route #21415. As this route provides motor

Table 3-31. Indirect Effects to Fish, Amphibians, and Their Habitats by Adding Moderate and High Risk Routes to the System under Alternative A.

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Potential Effect to Aquatic Habitat and Biota
	Moderate	High		
				vehicle access to a sensitive species inhabited stream reach, and includes an unmaintained stream crossing, it has moderate to high potential for impacting aquatic habitat and sensitive species.
100800140401 Sage Creek-N Fork Sage Creek	R-2144D1	--	0.14	This road provides Powerline access for highway vehicles. Route #2144D1 was not observed to be a risk to aquatic habitat or species.
100700050501 Little Rocky Creek	--	R-241412*	0.09	This route includes a short road segment and a dispersed campsite. It is in close proximity to a tributary to Little Rocky Creek. Little Rocky Creek harbors genetically pure YCT. Route #241412 was identified as impacting water quality. As this route contributes sediment to the stream course it has moderate to high potential for impacting aquatic habitat and sensitive species in Little Rocky Creek.
100700050501 Little Rocky Creek	R-241419	--	0.06	This route provides access to the Benbow Mine and parallels Little Rocky Creek near its headwaters. Little Rocky Creek harbors genetically pure YCT. This route is on a steep hillside comprised of loose unconsolidated material, immediately upslope of the stream course. This route has high potential for impacting aquatic habitat and sensitive species.
100700060905 Lower West Fork Rock Creek	R-24781	--	0.04	This route provides access to a dispersed campsite on Nichols Creek. Route #2478 was identified as impaired and impacting water quality, and would likely require reconstruction to mitigate effects to water quality (#24781 is a spur off of #2478). Nichols Creek is presumably fishless and no sensitive amphibian species have been documented in this drainage. However, Nichols Creek is a tributary to the W F Rock Creek and route #2478 likely contributes sediment to this system, thereby potentially impacting aquatic habitat and species in WF Rock Creek.
100700061001 West Red Lodge Creek	--	R-21417*	0.12	Route #21417 parallels a headwater tributary to West Rosebud Creek. This route was identified as impaired and impacting water quality, and would likely require reconstruction to mitigate effects to water quality. This route has moderate to high potential to impact aquatic habitat and species in West Red Lodge Creek.
100700061001 West Red Lodge Creek	--	R-21418*	0.31	Route #21418 was identified as impaired and impacting water quality, and would likely require reconstruction to mitigate effects to water quality. Route #21418 parallels a headwater tributary to West Red Lodge Creek. This route has moderate to high potential to impact aquatic habitat and species in West Red Lodge Creek.
100700061001 West Red Lodge Creek	--	R-21419*	0.06	Route #21419 was identified as impaired and impacting water quality, and would likely require reconstruction to mitigate effects to water quality. This route is upslope and runs perpendicular to a tributary to West Red Lodge

Table 3-31. Indirect Effects to Fish, Amphibians, and Their Habitats by Adding Moderate and High Risk Routes to the System under Alternative A.

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Potential Effect to Aquatic Habitat and Biota
	Moderate	High		
				Creek. This route has moderate to high potential to impact aquatic habitat and species in West Red Lodge Creek.
100700060904 Upper West Fork Rock Creek	R-20719*	--	0.21	Route #20719 is an access road to three dispersed campsites along the West Fork of Rock Creek. Drainage from these dispersed sites and observable streambank impacts at stream access points are contributing sediment. This route has moderate potential to impact aquatic habitat and species in West Fork Rock Creek.
100700060904 Upper West Fork Rock Creek	R-207111*	--	0.05	Route #207111 is a short access road to a dispersed campsite. Drainage from the user created road crosses the dispersed site and continues down a trail to the West Fork Rock Creek. This route has low to moderate potential to impact aquatic habitat and species in West Fork Rock Creek.

***Routes that were identified through field observations as impacting aquatic resources.**

Alternative A includes 15.4 miles of route related actions that reduce the potential for risk to aquatic habitat and species. These actions are anticipated to be beneficial to the aquatic environment. However, this alternative allows unmanaged expansion of dispersed camping within 300 feet of all system routes. Field observations indicate that dispersed camping has little impact to aquatic resources across the analysis area. In most drainages dispersed camping is sporadic, often well away from stream courses, is buffered by riparian vegetation, and is generally not concentrated. Nonetheless, a few areas have received concentrated dispersed camping immediately adjacent to streams. Concentrated camping areas impacting water quality/fisheries resources were identified in Rock Creek, West Fork Rock Creek and spurs along the lower Benbow area (Little Rocky Creek). Under Alternative A, dispersed camping related impacts to aquatic resources would continue in these drainages.

Alternative B

Alternative B proposes to add 4.5 miles of moderate and high risk non-system routes. Effects of these routes on aquatic habitat and species are provided in the table below. Of these routes, #21407, #21415, and #241412 have the greatest potential to adversely impact sensitive species and their habitats.

Table 3-32. Indirect Effects to Fish, Amphibians, and their Habitats by Adding Moderate and High Risk Routes to the System under Alternative B

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Effect to Aquatic Habitat and Biota
	Moderate	High		
100700060901 Rock Creek-Wyoming Creek	T-3A	--	1.96	This route is a non-motorized, maintained, hiking trail that provides access to Shelf and Moon Lakes. No measurable negative impacts to aquatics species or habitat are anticipated as result of the trail on the landscape. Adding this route to the system would increase recreational fishing opportunity. It

Table 3-32. Indirect Effects to Fish, Amphibians, and their Habitats by Adding Moderate and High Risk Routes to the System under Alternative B

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Effect to Aquatic Habitat and Biota
	Moderate	High		
				provides access to stocked high mountain lakes with harvestable populations of cutthroat and brook trout.
100700050202 Limestone Creek	T- 83	--	0.8	This route is a non-motorized, maintained, hiking trail. Trail #83 parallels Dead Indian Creek. Dead Indian Creek flows intermittently and does not support fish. No sensitive amphibians have been documented in this drainage. This route has little to no impact to aquatic habitat or species.
100700050202 Limestone Creek	R-21407*	--	0.13	Route #21407 is a user created spur road that parallels Picket Pin Creek and leads to a dispersed camping area. The route was identified as having moderate water quality impacts due to bare soil and an access trail to and across Picket Pin Creek. Picket Pin Creek harbors genetically unaltered YCT. Adding this route has moderate to high potential for impacting aquatic habitat and sensitive species.
100700061001 West Red Lodge Creek	R-21415	--	1.25	Route #21415 provides motor vehicle access to the lower end of the East Fork of West Red Lodge Creek near the CNF/State land boundary. An isolated population of genetically unaltered YCT, intermixed with brook trout, inhabits this creek. The Western (Boreal) toad has been documented in this drainage also, but up on the Red Lodge Creek Plateau, several miles from route #21415. As this route provides motor vehicle access to a sensitive species inhabited stream reach, and includes an unmaintained stream crossing, it has moderate to high potential for impacting aquatic habitat and sensitive species.
100700050501 Little Rocky Creek	--	R-241412*	0.09	This route includes a short road segment and a dispersed campsite. It is in close proximity to a tributary to Little Rocky Creek. Little Rocky Creek harbors genetically pure YCT. Route #241412 was identified as impacting water quality. As this route contributes sediment to the stream course it has moderate to high potential for impacting aquatic habitat and sensitive species in Little Rocky Creek.

***Routes that were identified through field observations as impacting aquatic resources.**

Alternative B includes 59.1 miles of route related actions with potential to reduce risks to water quality. These actions are not anticipated to result in adverse effects to aquatic species or habitats and would likely be beneficial to aquatic systems across the project area. Some of these actions include: dispersed camping within 300 feet of all system routes, but with restrictions in the Rock Creek and West Fork Rock Creek drainages (where dispersed campsite related effects to water quality and fisheries have been identified), 32 miles of seasonal restrictions on moderate and high risk routes, and converting 7.2 miles of trail from pack/saddle use to foot only or restricting motorized and mechanized use to pack/saddle and foot only.

Alternative C

Alternative C proposes to add 4 miles of moderate and high risk non-system routes. Effects of these routes on aquatic habitat and species are provided in the following table. Of these routes, #21415 has potential to impact a sensitive species (Yellowstone cutthroat trout) and their habitat.

Table 3-33. Indirect Effects to Fish, Amphibians, and their Habitats by Adding Moderate and High Risk Routes to the System under Alternative C.

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Effect to Aquatic Habitat and Biota
	Moderate	High		
100700060901 Rock Creek-Wyoming Creek	T-3A	--	1.96	This route is a non-motorized, maintained, hiking trail that provides access to Shelf and Moon Lakes. No measurable negative impacts to aquatics species or habitat are anticipated as result of the trail on the landscape. Adding this route to the system would increase recreational fishing opportunity. It provides access to stocked high mountain lakes with harvestable populations of cutthroat and brook trout.
100700050202 Limestone Creek	T-83	--	0.8	This route is a non-motorized, maintained, hiking trail. Trail #83 parallels Dead Indian Creek. Dead Indian Creek flows intermittently and does not support fish. No sensitive amphibians have been documented in this drainage. This route has little to no impact to aquatic habitat or species.
100700061001 West Red Lodge Creek	R-21415	--	1.25	Route #21415 provides motor vehicle access to the lower end of the East Fork of West Red Lodge Creek near the CNF/State land boundary. An isolated population of genetically unaltered YCT, intermixed with brook trout, inhabits this creek. The Western (Boreal) toad has been documented in this drainage also, but up on the Red Lodge Creek Plateau, several miles from route #21415. As this route provides motor vehicle access to a sensitive species inhabited stream reach, and includes an unmaintained stream crossing, it has moderate to high potential for impacting aquatic habitat and sensitive species.

Alternative C includes 52.6 miles of route related actions that reduce the potential for risk to aquatic resources. These actions are not anticipated to result in adverse effects to aquatic species or habitats and would be considered beneficial to aquatic systems across the project area. Some of these actions include: dispersed camping within 50 feet of all system routes, 23.3 miles of seasonal restrictions on moderate and high risk routes and converting 7.2 miles of trail from pack/saddle use to foot only or restricting motorized and mechanized use to pack/saddle and foot only.

Alternative B Modified

Alternative B Modified proposes to add 4.1 miles of moderate and high risk non-system routes. Effects of these routes on aquatic habitat and species are provided in the following table. Of these routes, #21407 and #21415 could potentially impact sensitive species and their habitat. However, under Alternative B Modified route #21407 is proposed for addition only after water quality impacts are mitigated at the dispersed camp site at the end of the route. Also, route #21415 would be designated for administrative use only, and that use would be contingent on future maintenance of the stream crossing in the East Fork of West Red Lodge Creek.

Table 3-34. Indirect Effects to Fish, Amphibians, and their Habitats by Adding Moderate and High Risk Routes to the System under Alternative B Modified

Watershed # and Name	Road (R) or Trail (T) & Route Risk		Route Length (miles)	Explanation and Effect to Aquatic Habitat and Biota
	Moderate	High		
100700060901 Rock Creek-Wyoming Creek	T-3A	--	1.96	This route is a non-motorized, maintained, hiking trail that provides access to Shelf and Moon Lakes. No measurable negative impacts to aquatics species or habitat are anticipated as result of the trail on the landscape. Adding this route to the system would increase recreational fishing opportunity. It provides access to stocked high mountain lakes with harvestable populations of cutthroat and brook trout.
100700050202 Limestone Creek	T- 83	--	0.8	This route is a non-motorized, maintained, hiking trail. Trail #83 parallels Dead Indian Creek. Dead Indian Creek flows intermittently and does not support fish. No sensitive amphibians have been documented in this drainage. This route has little to no impact to aquatic habitat or species.
100700050202 Limestone Creek	R-21407* Contingent	--	0.13	Route #21407 is a user created spur road that parallels Picket Pin Creek and leads to a dispersed camping area. The route was identified as having moderate water quality impacts due to bare soil and an access trail to and across Picket Pin Creek. Picket Pin Creek harbors genetically unaltered YCT. Adding this route has moderate to high potential for impacting aquatic habitat and sensitive species.
100700061001 West Red Lodge Creek	R-21415 Admin Contingent	--	1.25	Route #21415 provides motor vehicle access to the lower end of the East Fork of West Red Lodge Creek near the CNF/State land boundary. An isolated population of genetically unaltered YCT, intermixed with brook trout, inhabits this creek. The Western (Boreal) toad has been documented in this drainage also, but up on the Red Lodge Creek Plateau, several miles from route #21415. As this route provides motor vehicle access to a sensitive species inhabited stream reach, and includes an unmaintained stream crossing, it has moderate to high potential for impacting aquatic habitat and sensitive species.

***Routes that were identified through field observations as impacting aquatic resources.**

Alternative B Modified includes 43.4 miles of route related actions that reduce the potential for risk to aquatic habitat and species. These actions are anticipated to be beneficial to the aquatic environment. Under Alternative B Modified seasonal restrictions would be implemented on 26 miles of moderate and high risk routes. Dispersed Vehicle Camping would be designated within 300 feet of all system routes, except along route #2421 (Rock Creek) and no dispersed sites would be allowed within 100 feet of West Fork Rock Creek or its tributaries. Under this alternative, eight dispersed campsite identified as impacting aquatic resources in Rock Creek would not be designated and therefore impacts would diminish over time through non-use or active rehabilitation. Additionally, this alternative attempts to manage future expansion of dispersed camping that is occurring which will minimize risks for additional impacts to develop in the future.

No Action Alternative

This alternative designates the most moderate and high risk system routes without any additional actions to reduce risks to aquatic resources. Field observations indicate that 16 of these routes impact aquatic resources. These routes could potentially impact sensitive fish species (Yellowstone cutthroat

trout) in Crooked, Picket Pin, Little Rocky, and West Red Lodge creeks. Table 3-30 displays sensitive aquatic species occupied watersheds in terms of size, proportion on CNF, route miles, past, present, and foreseeable activities, cumulative watershed risk rating, and miles of moderate and high risk route actions that reduce and do not reduce route risk. Of the aforementioned YCT occupied watersheds, all were categorized as having moderate or high cumulative watershed risk ratings (Table 3-30). Dispersed vehicle camping under this alternative would be designated within 300 feet of all system routes. Continued localized impacts along Rock, West Fork Rock, and Little Rocky creeks would be allowed to continue under the No Action Alternative. Increased sediment delivery produced from these sites would likely impact aquatic habitat and localized populations of wild and sensitive trout species.

Cumulative Effects - Fisheries and Aquatics

Effects Determination by Alternative

No Federally listed threatened or endangered fish or amphibian species, designated critical habitat, fish or amphibian species proposed for Federal listing, or proposed critical habitat occur in the project area. Forest Service sensitive fish and amphibian species within the project area include Yellowstone cutthroat trout, Western (Boreal) toad and Northern Leopard frog. Table below summarizes the potential effects to aquatic species (sensitive species of species of interest) in the project area.

Table 3-35. Determination of potential impacts to sensitive aquatic species and species of interest by alternative.

Aquatic Species Determination[21]				
Alternative	**Yellowstone Cutthroat Trout**	**Species of Interest (Wild Trout)**	**Western (Boreal) Toad**	**Northern Leopard Frog**
Alternative A	MIIH	MIIH	NI	NI
Alternative B	MIIH	MIIH	NI	NI
Alternative B Modified	NI	MIIH	NI	NI
Alternative C	MIIH	MIIH	NI	NI
No Action Alternative	MIIH	MIIH	NI	NI

Effects Common to All Action Alternatives

Cumulative effects are defined as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (CFR 40 1508.7). Past, present, and reasonably foreseeable events and activities that have and will likely continue to incrementally impact aquatic species and their habitats, in the 45 watersheds (on and off CNF) of the project area, include: wildfire/prescribed fire, mining, grazing, floodplain development, timber harvest, transportation networks**,** and dispersed camping (Table 3.1).

[21] **NI** = No Impact; **MIIH =** May Impact Individuals or Habitat but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species; **WIFV** = Likely to result in a trend to Federal listing or loss of viability; and **BI** = Beneficial impact.

Table 3-36. Summary of Cumulative Effects at the Watershed Scale.

6th HUC Watershed #	Watershed Name*	Acres	% FS	Total Route Miles	Past, Present, Foreseeable Activities**	Cumulative Watershed Risk Rating	Actions That Reduce Risks on Mod/High Risk Routes (miles)				Actions That Increase Risks on Mod/High Risk Routes (miles)			
							Alt A	Alt B	Alt B Mod	Alt C	Alt A	Alt B	Alt B Mod	Alt C
100700060901	Rock Creek-Wyoming Cr.[1]	32,086	71	55	D, F, M, R, ϴ	High	_	_	_	_	**2.0**	**2.0**	**2.0**	**2.0**
100700050202	Limestone Cr.[1]	31,726	86	61	D, F, G, R, T, ●	Mod	**2.3**	**8.4**	**8.5**	**8.4**	**0.9**	**0.9**	**0.9**	**0.8**
100800100501	Crooked Cr.-Commissary Cr.[1]	13,739	100	49	F, G, M, R, T, O	Mod	_	**8.8**	**8.8**	**8.8**	_	_	_	_
100700061001	West Red Lodge Cr.[1,3]	30,089	53	54	D, G, R, ϴ	Mod	_	**2.9**	**2.5**	**0.4**	**1.7**	**1.3**	**1.3**	**1.3**
100800100801	Upper Dry Head Cr.[1]	22,737	41	49	D, G, R, ϴ	Low	_	**5.7**	**5.7**	**4.2**	_	_	_	_
100700050302	Middle East Rosebud Cr.[2]	37,209	86	53	D, F, G, R, O	Mod	_	**0.5**	_	**0.5**	_	_	_	_
100700050501	Little Rocky Cr.[1]	12,136	66	46	D, G, M, R, O	High	_	_	_	_	**0.1**	**<0.1**	_	_
100700050101	Stillwater River Headwaters-Upper[1,3]	23,500	100	22	M, R, O	Mod	_	_	_	_	_	_	_	_
100700050105	Stillwater River Headwaters-Woodbine Cr.[1]	40,510	100	14	R, O	Low	_	_	_	_	_	_	_	_
100700050203	Lower West Fork Stillwater River[1]	14,772	83	28	D, G, M, R, T,O	Low	_	_	_	_	_	_	_	_
100700050502	Bad Canyon Cr.[1]	12,245	59	16	F, G, R,T, ϴ	High	_	_	_	_	_	_	_	_
100800100502	Crooked Creek-Lost Water Cr.[1]	21,618	37	30	D, F, G, M, R,O	Mod	_	_	_	_	_	_	_	_
100800140404	Sage Creek-Piney Cr.[1]	38,861	19	70	D, G, M, R, ϴ	Low	_	_	_	_	_	_	_	_

***SENSITIVE SPECIES:** [1] Yellowstone Cutthroat Trout, [2] Northern Leopard Frog, [3] Western (Boreal) Toad

****WATERSHED: PAST, PRESENT, AND FORESEEABLE ACTIVITIES**

D - Development/ Floodplain, **F** - Wild Fire/ Prescribed Fire, **G** - Grazing/Agriculture, **M** – Mining, **R** - Recreation/ Camping, **T** - Timber Harvest, **TMDL** – Total Maximum Daily Load (Refer to Table 3-21), **NA** – Not Applicable,

● – High Route Risk, ϴ– Moderate Route Risk, O – Low Route Risk

Under all action alternatives and for all watersheds in the analysis area (including non-sensitive species occupied watersheds; Water Quality Section, Table 3-25), actions that do not reduce risk to aquatic systems for moderate and high risk routes are negligible at the watershed scale.

At the watershed scale, proposed actions are not considered to be substantial enough to cause measurable changes in water quality, quantity or channel processes under any action alternative. Consequently, cumulative effects to aquatic species and their habitats are not anticipated to result from any of the action alternatives. However, various actions proposed under the action alternatives have the potential to reduce or not reduce the risk of impacts to adjacent aquatic habitats and species in localized areas. These localized impacts are addressed under indirect effects. Alternative B Modified includes the most route mile actions that would result in beneficial impacts (reduce risk) to aquatic systems.

The cumulative effects of the individual action alternatives (A, B, B Modified, and C) when combined with past activities and natural processes, would result in negligible negative impacts to aquatic biota, including sensitive aquatic species, and their habitats throughout the project area. However, only Alternative B Modified provides mitigation to reduce potential adverse effects to aquatic resources in relation to proposed actions that increase risk of moderate and high risk routes.

3.3.1.6 Conclusion - Fisheries and Aquatics

Proposed actions with site specific effects that potentially increase risk of adverse impacts to aquatic habitat and species are mitigated in Alternative B Modified. Compliance relative to the Record of Decision for this FEIS, only pertains to those routes with proposed actions. Under Alternative B Modified, actions related to moderate and high risk routes are expected to benefit or maintain aquatic habitats, and fish and amphibian species. Only minimal indirect effects to sensitive aquatic species are anticipated under all other action alternatives. Therefore, the Beartooth District is anticipated to move towards compliance with Forest Plan standards and state and federal water quality regulations under all action alternatives. However, Alternative B Modified initiates the most rapid rate of recovery and compliance should be achieved in the shortest timeframe under this alternative.

Appendix E includes opportunities to reduce impacts to water quality, aquatic habitat and biota where there are: 1) site specific impacts from existing routes not associated with the proposed action, and 2) proposed actions with potential to improve conditions but do not eliminate impacts. However, construction, reconstruction, maintenance and decommissioning proposals will require future and separate NEPA decisions.

Relative to sensitive fish and amphibian species, none of the alternatives are likely to result in a trend to Federal listing or loss of viability. The following table summarizes the effects determinations for sensitive aquatic species and aquatic species of concern.

Table 3-37. Fisheries and Aquatics Effects Summary

Indicator	Alt. A	Alt. B	Alt. C	No Action	Alt. B Modified
Sensitive Fish and Amphibian Species					
Number of Species with No Impact	2	2	2	2	3
Number of Species with potential to effect individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species	1	1	1	1	0
Number of Species likely to result in a trend to Federal listing or loss of viability	0	0	0	0	0
Aquatic Species of Interest (Wild Trout)					
Alternatives with No Impact	0	0	0	0	X
Alternatives with potential to effect individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species	X	X	X	X	0

3.3.2 WILDLIFE

Overview of Changes from the Draft to the Final EIS

- Open motorized route density figures for Gray Wolf and Bighorn Sheep analyses were revised to exclude the wilderness area acreage, thus becoming consistent with the Elk and General Wildlife analyses. Since motorized routes are concentrated along the Beartooth Face and in the Pryor Mountains, including the wilderness acres portrayed artificially low route densities.
- The percent of elk secure habitat in the Pryor Unit, the acres of bighorn sheep escape terrain in the Beartooth and Pryor Units, and the acres of bighorn sheep winter range on the Beartooth Unit were corrected to account for GIS process errors that occurred during analysis for the Draft EIS.
- Effects determinations for Canada Lynx, Gray Wolf and Grizzly Bear (and likewise Blue-gray Gnatcatcher and Northern Goshawk) were revised because, although the Preferred Alternative meets the standards and guidelines for these species, human activity on designated routes may cause temporary disturbance of individual animals.
- Most general life history information was removed for the Final EIS and is available in the wildlife report in the project file.

Introduction

Public concerns relative to wildlife can be summarized into two primary issues: 1) changes to habitat quality, and 2) effects to wildlife behavior. Habitat concerns include fragmentation, loss, connectivity, and availability of security habitat. Wildlife behavior effects include disturbance, displacement, and responses to noise. Effects for both issues are discussed in general terms in the General Wildlife section as well as in specific species sections relative to those species. Winter over-the-snow travel (i.e. snowmachines, cross-country skiing, etc.) is not part of the current District travel plan process and thus is not discussed. However, winter wheeled motorized vehicle use was considered during analysis.

The District provides habitat for a variety of wildlife species including federally threatened species, ungulates, carnivores, small mammals, resident and migratory birds, amphibians, and reptiles. Travel routes can affect the way many animals use an area because they may bring humans and their associated disturbances into wildlife habitat. The following table displays threatened, endangered, sensitive, and management indicator species on the District, plus other species identified during the public scoping process.

Table 3-38. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in Final EIS	Rationale and Other Information
Threatened, Endangered, and Proposed Species			
Canada Lynx (Threatened)	Variety of sub-alpine forest types typically with moderately deep winter snowfall; early successional and older forests that provide snowshoe hare habitat. Den in mature or old-growth stands. Beartooth Unit is occupied habitat; Pryors Unit is unoccupied habitat.	Analysis in FEIS.	Primary concern is human-caused mortality resulting from access to lynx habitat. Potential effects of compacted over-the-snow activities are not part of the decision to be made in this analysis.
Gray Wolf (Experimental nonessential)	Wide range of habitats where native ungulates are present. No known den or rendezvous sites in project area. Species present in Beartooth Unit.	Analysis in FEIS.	Primary concerns are maintenance of prey base, displacement due to recreational activity, and direct human-caused mortality.
Forest Service Sensitive Species			
American peregrine falcon (Falco peregrinus anatum)	Cliff habitat over 200' high with suitable ledges for nest construction. Nesting habitat consisting of three eyries within project area and one adjacent to project area.	Analysis in FEIS.	Included in Migratory Birds discussion
Baird's sparrow (Ammodramus bairdii)	Prefers native prairie but structure is more important so may nest in tame grasses. No habitat in project area.	No further analysis will be conducted.	Not in project area.
Bald Eagle (Haliaeetus leucocephalus) [22]	Riparian habitats, forested areas along rivers and lakes, wetlands, and major water bodies. May use uplands and game winter range during winter. Nesting sites usually in large forested areas near large water bodies. Beartooth Unit of project area used primarily as winter foraging habitat. No known nest sites.	No further analysis will be conducted.	Little nesting habitat and no known nests in project area. Bald eagle presence on District is primarily during winter, and winter over-the-snow travel is not part of the current District travel plan process.
Black-backed woodpecker (Picoides arcticus)	Primary habitat is recently burned forested areas, secondary habitat is spruce/fir forests. Habitat present in project area, but species presence not documented.	Analysis in FEIS.	Included in Migratory Birds discussion
Blue-gray gnatcatcher (Polioptila)	Open stands of juniper and limber pine with intermixed sagebrush. Species present in Pryors Unit.	Analysis in FEIS.	Included in Migratory Birds discussion

[22] Bald eagle delisted effective August 8, 2007 and subsequently managed as a Forest Service Sensitive Species.

Table 3-38. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in Final EIS	Rationale and Other Information
Burrowing owl (Athene cunicularia)	Open grasslands, nesting and roosting in burrows dug by mammals or owls. No habitat in project area.	No further analysis will be conducted.	Not in project area.
Greater sage grouse (Centrocercus urophasianus)	Sagebrush with intermixed grasslands. No leks in project area. Little brood-rearing or winter habitat present.	No further analysis will be conducted.	No breeding habitat in project area. No increased access to habitat is proposed in any alternative.
Grizzly Bear (Ursus arctos) [23]	Remote, well connected forested generalist. Species present in Beartooth Unit.	Analysis in FEIS.	Recent expansion into areas considered biologically unsuitable.
Harlequin duck (Histrionicus histrionicus)	Inhabit fast moving, low gradient clear mountain streams. Species present in Beartooth Unit.	Analysis in FEIS.	Included in Migratory Birds discussion
Loggerhead Shrike (Lanius ludovicianus)	Grassy pastures that are well grazed, nest in shrubs or small trees, preferably thorny such as hawthorn. Habitat present in project area. Species presence unknown.	Analysis in FEIS.	Included in Migratory Birds discussion
Long-billed curlew (Numenius americanus)	Open grasslands or prairie usually near water. No habitat in project area.	No further analysis will be conducted.	Not in project area.
Northern goshawk (Accipter gentilis)	Mature forest generalist. Species present in project area.	Analysis in FEIS.	Included in Migratory Birds discussion
Long-eared myotis (Myotis evotis)	Use a variety of habitats but are strongly associated with coniferous forests. Species present in project area.	Analysis in FEIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.
Long-legged myotis (myotis volans)	Primarily a coniferous-juniper forest bat found at moderate elevations ($\geq$6000ft) but may also inhabit riparian cottonwood bottoms and desert areas. Species present in project area.	Analysis in FEIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.
Pallid bat (Antrozous pallidus)	Arid deserts and grasslands with rock outcrops. Species present in Pryors Unit.	Analysis in FEIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.
Spotted bat (Euderma maculatum)	Desert to montane coniferous forests. Species present in Pryors Unit.	Analysis in FEIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.
Townsend's big-eared bat (Corynorhinus townsendii)	Cave and cave-like structures along with forested foraging habitat. Species present in Pryors Unit.	Analysis in FEIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.

[23] Grizzly bear delisted effective April 30, 2007 and subsequently managed as a Forest Service Sensitive Species as directed in "Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem, Interagency Grizzly Bear Study Team, March 2003."

Table 3-38. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in Final EIS	Rationale and Other Information
Black-tailed prairie dog (Cynomys ludovicianus)	Relatively flat grasslands with diggable soils, throughout the central plains. No habitat in project area.	No further analysis will be conducted.	Not in project area.
White-tailed prairie dog (Cynomys leucurus)	Xeric sites with mixed stands of shrubs and grasses from the Bighorn Basin in Montana to Utah. Species present in project area.	No further analysis will be conducted.	No increased access to habitat is proposed in any alternative.
Wolverine (Gulo gulo)	Remote subalpine and spruce/fir forested areas. Species present in Beartooth Unit.	Analysis in FEIS.	Likely present in low densities in the Beartooth Mountains.
Greater short-horned lizard (Phrynosoma hernandesi)	Areas with short, sparse grass or sagebrush; flats with pebbly or stony soil; and rock outcrops. Species present in Pryors Unit.	No further analysis will be conducted.	No increased access to habitat is proposed in any alternative.
Milk Snake (Lampropeltis triangulum)	Open sagebrush/grasslands, usually in or near rocky areas. No habitat in project area.	No further analysis will be conducted.	Not in project area.
Western hog-nosed snake (Heterodon nasicus)	Sagebrush/grassland; arid areas with gravelly or sandy soil. No habitat in project area.	No further analysis will be conducted.	Not in project area.
Management Indicator Species [24]			
Northern Goshawk *(Accipiter gentilis)* (H)	Discussed under Sensitive Species	Analysis in FEIS.	Included in Migratory Birds discussion
White-tailed deer *(odocoileus virginianus)* (H, K)	Grassland to montane conifer forest. Species present in project area.	No further analysis will be conducted.	Analysis for elk serves as surrogate for white-tailed deer.
Ruffed grouse *(Bonasa umbellus)* (H)	Primary habitat includes dense early seral staged forests dominated by aspen; secondary habitat includes other dense deciduous or conifer woodland areas. Species present in project area.	Analysis in FEIS.	Included in Migratory Birds discussion
Western kingbird *(Tyrannus verticalis)* (H)	Open or partially open country with scattered trees, including agricultural lands. Habitat not present in project area.	No further analysis will be conducted.	Not in project area.
Bullock's (Northern) oriole *(Icterus bullockii)* (H)	Open deciduous woodland and riparian areas. Habitat present in project area. Species presence unknown.	Analysis in FEIS.	Included in Migratory Birds discussion
Yellow warbler *(Dendroica petechia)* (H)	Brushy riparian especially with willows. Species present in project area.	Analysis in FEIS.	Included in Migratory Birds discussion

[24] H = Habitat Indicator Species; K = Key Species

Table 3-38. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in Final EIS	Rationale and Other Information
Oven bird *(Seiurus aurocapillus)* (H)	Mid-late successional, closed-canopied deciduous or deciduous/conifer forests with limited understory. Species present in project area.	Analysis in FEIS.	Included in Migratory Birds discussion
Spotted (Rufous-sided) towhee *(Pipilo maculatus)* (H)	Shrubby riparian areas, woody draws, and woodland undergrowth. Species present in Pryors Unit.	Analysis in FEIS.	Included in Migratory Birds discussion
Brewer's sparrow *(Spizella Breweri)* (H)	Strongly associated with sagebrush, but also uses other areas with scattered shrubs and short grasses. Species present in project area.	Analysis in FEIS.	Included in Migratory Birds discussion
Sharp-tailed grouse *(Tympanuchus phasianellus)* (H, K)	Mosaic of dense grass and shrubs with forbs for nesting, woody riparian areas in winter. No habitat in project area.	No further analysis will be conducted.	Not in project area.
Yellowstone Cutthroat trout (*Oncorhynchus clarkii bouvieri)* (H, K)	Upper Yellowstone and Upper Snake River drainages. Species present in project area.	Addressed in Fisheries and Aquatics section of FEIS	Discussed in Water Quality, Fisheries, and Aquatics section of FEIS.
Elk *(Cervus canadensis)* (K)	Grassland to forested alpine areas. Species present in Beartooth Unit.	Analysis in FEIS.	Main concerns are potential for displacement due to recreational travel, and vulnerability during hunting season.
Golden eagle *(Aquila chrysaetos)* (K)	Open hilly to mountainous areas. Habitat and species present in project area.	Analysis in FEIS.	Included in Migratory Birds discussion
Merlin *(Falco columbarius)* (K)	Patchy shrub/grassland habitats with large trees to support nesting (secondary nester). Habitat present in project area. Species presence documented in Pryor Unit.	Analysis in FEIS.	Included in Migratory Birds discussion
Mule deer *(Odocoileus hemionus)* (K)	Rugged grassland to forested alpine areas. Species present in project area.	No further analysis will be conducted.	Large habitat overlap between mule deer and elk. Impacts of travel are expected to be similar for the two species. Winter over-the-snow travel is not part of the current travel plan process.
Bighorn sheep *(Ovis canadensis)* (K)	Remote, steep, rugged terrain, such as mountains, canyons, and escarpments where precipitation is low and evaporation is high. Species present in project area.	Analysis in FEIS.	Primary concerns are potential for displacement due to recreational activity, including wheeled motorized use on winter range.
Pronghorn antelope *(Antilocapra americana)* (K)	Rolling grasslands to mixed sagebrush shrublands. Little habitat exists in project area.	No further analysis will be conducted.	No increased access to habitat is proposed in any alternative.

Table 3-38. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in Final EIS	Rationale and Other Information
Other Species of Concern			
Mountain Goat	Rugged, rocky mountainous terrain with talus slopes and shear cliffs. Species present in Beartooth Unit.	No further analysis will be conducted.	No increased access to habitat is proposed in any alternative.
Marten	Mesic, mature conifer and mixed forests. Species present in project area.	No further analysis will be conducted.	Primary concern is vulnerability to trapping. Trapping season is Dec.-Feb. Winter over-the-snow travel is not part of the current travel plan process.
Fisher	Mainly dense, structurally complex conifer and mixed forests. Habitat present. Species presence unknown but considered unlikely.	No further analysis will be conducted.	Presence of species unlikely.

Potential effects of the alternatives on the following species and/or their habitats are analyzed in detail: Canada lynx, gray wolf, grizzly bear, wolverine, elk, and bighorn sheep. Long-eared myotis, long-legged myotis, Pallid bat, Spotted bat, and Townsend's big-eared bat are included in the Bats discussion. In addition, sensitive and management indicator bird species present on the District are included in a general sense in the Migratory Birds discussion.

The list of federally Threatened and Endangered species for the Custer National Forest and counties encompassed by the Beartooth Ranger District was verified through the U.S. Fish and Wildlife Service in March 2008 (US Fish and Wildlife Service 2008). The grizzly bear was removed from the Federal threatened and endangered species list effective April 30, 2007, and the bald eagle was delisted effective August 8, 2007. Delisting of the Northern Rocky Mountain gray wolf population will become effective March 28, 2008 unless the U.S. Fish and Wildlife Service is challenged on the final rule for removing the Northern Rocky Mountain gray wolf population from the Federal List of Endangered and Threatened Wildlife.

Applicable background information regarding specific species biological requirements, and general effects including effects of roads and recreation on wildlife, were taken from the Gallatin National Forest Travel Plan Environmental Impact Statement and the Helena National Forest North Belts Travel Plan Wildlife Report.

3.3.2.1 Affected Environment – Threatened and Endangered Species Canada Lynx

Regulatory Framework

The Canada lynx was listed as a federally threatened species under the Endangered Species Act (ESA) of 1973 in March 2000. At that time, the Forest Service signed a Lynx Conservation Agreement (CA) with the U.S. Fish and Wildlife Service. Under the CA, the Forest Service agreed to consider the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al 2000) during project analysis. The CA was renewed in 2005 and the concept of occupied mapped lynx habitat was added. In 2006, the CA was amended to define occupied habitat and list the National Forests that were occupied. It was also extended until 2011 or until all relevant forest plans were revised to provide guidance necessary to conserve lynx. The Northern Rockies Lynx Management Direction (LMD), released in March 2007, was developed to fulfill the Forest Service's agreement to amend the plans.

The purpose of the Direction is to "incorporate management direction in land management plans that conserves and promotes recovery of Canada lynx, by reducing or eliminating adverse effects from land management activities on National Forest System lands, while preserving the overall multiple-use direction in existing plans" (USDA Forest Service 2007a).

Affected Environment - Canada Lynx

Lynx have been documented on rare occasion on the Beartooth Unit of the Beartooth District. Foraging and denning habitat are present, but denning has not been documented on the District.

The LMD (USDA Forest Service 2007a) discusses the effects of forest roads on lynx. Lynx have been killed by vehicle-collisions on paved, high-speed highways and high-speed gravel roads, but no lynx mortality from vehicle strikes have been documented on National Forest system roads in the LMD planning area. Lynx may use less-traveled roads for travel and foraging if good snowshoe hare habitat is present (Koehler and Brittel 1990; LCAS 2000). Lynx seem to neither prefer nor avoid roads (McKelvey et al. 2000; USDI FWS 2000; Ruggiero et al. 2000) except at high traffic volumes (Apps 2000). Unpaved roads are not considered a threat to lynx movement (USDI 2003) and lynx appear in general to have low susceptibility to displacement by humans during spring, summer, and fall (USDA Forest Service 2007a). However, lynx may move their kittens to avoid disturbance from road use during summer in denning habitat (Ruggiero et al. 2000; LCAS 2000).

Management direction in the LMD applies to occupied lynx habitat in Lynx Analysis Units (LAUs) on National Forest system lands and is recommended for application to unoccupied habitat. A LAU is an area of at least the size used by an individual lynx and is the unit for which the effects of a project are analyzed. The Beartooth District contains four LAUs. The Rock Creek, Rosebud, and Stillwater LAUs encompass the Beartooth Mountains Unit, and the Pryor Mountains LAU encompasses the Pryor Mountains Unit. The LMD classifies the Beartooth Unit as occupied lynx habitat and the Pryor Unit as unoccupied habitat. The LMD does not have objectives, standards, or guidelines that apply to the scope of this analysis. However, the LCAS provides a programmatic road density guideline of a maximum two miles/square mile for Forest backcountry roads and trails. The following Table displays the lynx habitat and the open road miles and density by Lynx Analysis Unit on the District.

Table 3-39. Designated Motorized Route Miles and Density by LAU and Alternative.

LAU	Total LAU Acres	Acres of lynx habitat in LAU	Open motorized route miles and density (mi/sq mi) by Alternative									
			Alt. A		Alt. B		Alt. C		No Action		Alt. B Modified	
			Miles	Density	Miles	Density	Miles	Density	Miles	Density	Miles	Density
Rock Creek	151,493	68,426	30	0.3	24	0.2	22	0.2	26	0.2	26	0.2
Rosebud	160,050	58,015	20	0.2	19	0.2	17	0.2	17	0.2	18	0.2
Stillwater	214,168	71,676	21	0.2	19	0.2	14	0.1	18	0.2	18	0.2
Pryors	77,972	28,357	31	0.7	22	0.5	12	0.3	28	0.6	23	0.5
Total	**603,683**	**226,474**	**97**	**0.3**	**84**	**0.2**	**65**	**0.2**	**89**	**0.3**	**85**	**0.2**

3.3.2.2 Environmental Consequences – Threatened and Endangered Species: Canada Lynx

Direct and Indirect Effects

The presence of roads and trails represents a direct loss of habitat that has already occurred, and their

use can pose a threat of lynx mortality from vehicles. Indirectly, the impacts of roads include increased access for both legal and illegal hunters and trappers, decrease in prey habitat, disruption of lynx travel and hunting patterns, and potential avoidance of human activity areas (Koehler and Brittell 1990, Brittell et al. 1989).

Effects Common to All Alternatives

Direct habitat loss would not increase under any alternative because construction of new routes is not proposed. No alternatives exceed the LCAS programmatic guideline for Forest backcountry roads and trails relative to road density of a maximum 2.0 mi/sq mi for any LAUs.

Vehicle-related lynx mortality is unlikely given the relatively low speeds and traffic volumes on National Forest system roads.

No vegetation treatment is proposed with this analysis and the components of denning and foraging habitat would not change.

Alternative A and No Action Alternative

The overall availability of lynx habitat plus grass/shrubland or riparian areas serving to connect blocks of lynx habitat would be effectively the same under Alternative A and the No Action alternative. Habitat availability would be less than and road density greater (0.1 mi/sq mi) than in Alternative B, Alternative C, and Alternative B – Modified, resulting in an increased potential for human-related lynx vulnerability or mortality. The reduction in road density and habitat availability would be small relative to the total acreage of habitat available in each LAU, as would the increased lynx vulnerability and potential for mortality.

Alternative B, Alternative C, and Alternative B Modified

The availability of lynx habitat would be effectively the same under Alternatives B, C, and B Modified and higher than in Alternatives A and the No Action alternative. Again, the 0.1 mi/sq mi decrease in road density compared to Alternatives A and No Action would be small, as would the decreased lynx vulnerability and potential for mortality.

Cumulative Effects - Canada Lynx

Based on the past and current vegetation management on the District, including timber harvest, livestock grazing, prescribed fire, the invasive species program, aspen regeneration, and other vegetation projects, forest vegetation conditions provide habitat for lynx foraging, denning, and dispersal. The impacts of different types of dispersed recreation including the outfitter/guide program; recreation residences; fire suppression; and the lands, minerals, and non-recreation special use programs on the District have been minor. Conversely, effects of a developed ski area and associated base facilities have contributed to a direct loss or modification of habitat that may be affecting lynx denning, foraging, and diurnal security habitat to some degree. Given that anticipated direct and indirect effects to lynx and habitats from any of the alternatives is small, cumulative effects of past, present, and reasonably foreseeable future activities is also expected to be small.

Consistency with Laws, Regulations, and Policy

All alternatives are consistent with the laws, regulations, policy, and Federal, Regional, and State direction, the Custer National Forest Management Plan, the Canada Lynx Conservation and Assessment Strategy, and the Northern Rockies Lynx Management Direction. Of these regulatory

directions, the latter two documents specifically address Forest roads relative to lynx conservation and recovery.

3.3.2.3 Affected Environment – Threatened and Endangered Species: Gray Wolf

Regulatory Framework

The northern Rocky Mountain wolf was listed as an endangered species under the Endangered Species Act in the lower 48 states in 1974. The U.S. Fish and Wildlife Service (FWS) approved a recovery plan for the gray wolf in the northern Rocky Mountains in 1980 and a revised plan in 1987. To further the recovery of gray wolves in the northern U.S. Rocky Mountains, the FWS in 1994 declared wolves in the Yellowstone and Central Idaho areas as experimental/nonessential. This designation facilitated the reintroduction of wolves into Yellowstone National Park and central Idaho in 1995 and 1996. All recovery criteria for wolves in the Greater Yellowstone Recovery Area were met in 2002. Unless the U.S. Fish and Wildlife Service is challenged on the final rule for removing the Northern Rocky Mountain gray wolf population from the Federal List of Endangered and Threatened Wildlife, delisting will become effective March 28, 2008.

Affected Environment - Gray Wolf

At least two packs utilize the Beartooth Unit of the District, the Rosebud and Moccasin Lake packs (Trapp 2007). Occasional wolves that are probably not associated with these packs have also been reported on the Beartooth Unit. Although no packs are known to utilize the Pryor Mountains Unit, this unit is included in the analysis because potential exists for wolves to utilize the area.

Effects of road density on wolves can vary. Wolves in the Northern Rockies do not appear to avoid areas of high road density as much as wolves in the Great Lakes region. Paved roads with high traffic volumes have served as barriers to gray wolf movement and dispersal (Claar et al. 1999), although these are typically highways rather than forest roads. Wolves often travel on lower standard forest roads and snowmobile trails because they provide easy travel routes. However, wolves are much more likely to be in proximity to humans when they use roads. Gray wolf mortality therefore tends to be higher in areas of higher road density (Fritts et al. 2003). Despite this trend towards higher mortality in areas of higher road density, recommendations for motorized access route densities within gray wolf habitat were not included in either the Northern Rocky Mountain Wolf Recovery Plan (USDI 1987) or the Montana Gray Wolf Conservation and Management Plan (Montana Department of Fish, Wildlife and Parks 2003).

Although human-caused mortality of wolves is generally higher in areas with greater open motorized route densities, it may also occur in backcountry areas away from open motorized routes. One-third of documented wolf mortality east of the central Rockies in Canada was road related (Paquet 1993) and three quarters of human-caused wolf mortality in the U.S. Northern Rockies occurred within 250 meters of a road (Boyd-Heger 1997). Roads accessing remote areas can result in collisions with vehicles and increased harvest, poaching, or disturbance of wolves. Effects of road density on wolves can vary. Gaines et al (2003) cite various authors who report that gray wolves are sensitive to road-related factors but are not particularly affected by summer recreational trails.

Research in the upper Great Lakes states examined road densities and wolf activity. Mech et al (1988) and Theil (1985) found that wolves avoided or were displaced from areas with road densities greater than 1 mi/sq mi. Authors cited in Mech and Boitani (2003) report that wolves did not recolonize areas

with road densities greater than 0.6 km/square km (0.23 mi/sq mi); that most recolonizing occurred where road density was less that 0.45 km/square km (0.17 mi/sq mi); and that as recolonization continued, wolves occupied areas with greater than 0.6 km/square km (0.23 mi/sq mi) road density. According to the 2003 Montana Gray Wolf Conservation and Management Plan, it would be difficult to extrapolate the Great Lake results to this region because of differences in human population densities, habitat characteristics, and land physiography. The underlying concern about road density in the northern Rockies stems from the potential for illegal killing. Most researchers agree that increased road densities reduced wolf survival (MTFWF. 2003). In the mountainous landscapes of the northern Rockies, wolves selected areas that were lower elevation, flatter, and closer to roads. However, an increased probability of human-caused mortality was associated with increased road use by wolves (MTFWF. 2003). Roads can also benefit wolves by providing easier travel routes. No known instances of illegal wolf mortality have occurred within the District boundary.

Open motorized route density and changes in route density from No Action are displayed in the following Table. Because it would be difficult to extrapolate route density recommendations from studies in the Upper Great Lakes region (Mech et al. 1988, Theil. 1985, and Mech and Boitani. 2003) to this region (MTFWF. 2003) densities should only be used as a relative indicator of increases or decreases from the No Action densities to indicate potential effects to gray wolf displacement, avoidance, and recolonization. Roads can also benefit wolves by providing easier travel routes.

Table 3-40. Open Motorized Route Density on Beartooth District

Area	Alternative A	Alternative B	Alternative C	No Action	Alt. B Modified
Route density (miles/square mile)					
Beartooth Unit*	0.64	0.62	0.50	0.55	0.61
Pryor Unit	1.5	1.1	0.85	1.2	1.1
Average	**0.88**	**0.72**	**0.60**	**0.73**	**0.75**
Change in Route Density from No Action					
Beartooth Unit*	+ 0.09	+ 0.07	- 0.05	0	+ 0.06
Pryor Unit	+0.30	-0.10	-0.35	0	- 0.10
Average	+0.15	- 0.01	- 0.13	0	+0.02

* Excludes Absaroka-Beartooth Wilderness Area

3.3.2.4 Environmental Consequences – Threatened and Endangered Species: Gray Wolf

Direct and Indirect Effects

Effects Common to All Alternatives

There would be no effects to den or rendezvous sites since those sites are not present on the District. This situation could change, however, if wolves den on the District in the future. Since wolves frequently use portions of the District, an adequate prey base is assumed to be present.

Alternative A

In the Beartooth and Pryors Units, Alternative A would have increase open motorized route density over No Action by 0.09 and 0.30 mi/sq mi, respectively. This is the highest motorized route density of the alternatives.

Alternative B, No Action, and Alternative B Modified

In the Beartooth Unit, Alternatives B and B Modified would increase open motorized route density

over No Action by 0.07 and 0.06 mi/sq mi, respectively. In the Pryor Unit, Alternatives B and B Modified would each decrease open motorized route density over No Action by 0.10 mi/sq mi.

Alternative C
In the Beartooth and Pryor Units, Alternative C would increase open motorized route density over No Action by 0.05 and 0.35 mi/sq mi, respectively. This is the lowest motorized route density of the alternatives.

Cumulative Effects - Gray Wolf
Projects that have improved habitat for elk, the primary prey of wolves in the Yellowstone ecosystem, are beneficial for wolves. Past projects include prescribed burning and aspen regeneration. By the same token, reasonably foreseeable future prescribed burning and aspen regeneration projects that improve elk habitat would also benefit wolves. No livestock depredation has occurred on grazing allotments on the District, thus livestock grazing on the District so far has not adversely affected wolves. However, human-caused wolf mortality resulting from livestock depredation has occurred on private lands near the District.

Consistency with Laws, Regulations, and Policy
All alternatives are consistent with the laws, regulations, policy, and Federal, Regional, and State direction, the Custer National Forest Management Plan, and the Montana Gray Wolf Conservation and Management Plan. None of these regulatory directions specifically address Forest roads relative to wolf conservation and management.

3.3.2.5 Affected Environment – Sensitive Species: Grizzly Bear

Regulatory Framework
The grizzly bear in the lower 48 states was listed by the U.S. Fish and Wildlife Service as a threatened species under the Endangered Species Act in 1975. Due to population growth of grizzly bears and development of State and Federal regulatory mechanisms, the Yellowstone grizzly bear population was determined to be recovered and was delisted effective April 30, 2007 (USDI 2007).

The Conservation Strategy for Grizzly Bear in the Yellowstone Ecosystem (ICST 2003) was developed by the Interagency Conservation Strategy Team, completed in March 2003, and updated in March 2007. The habitat and conservation standards described in the Conservation Strategy have formally been incorporated into the six affected National Forests' Land Management Plans and provide the direction for managing grizzly bear habitat on the National Forests.

Affected Environment - Grizzly Bear
Grizzly bears occur throughout the Beartooth Unit of the District and mainly inhabit the Absaroka-Beartooth Wilderness Area. However, the species has also been documented in recent years along the Beartooth Face outside the wilderness area.

Motorized access is one of the most influential factors affecting grizzly bear habitat use. Open road density has been used historically to measure human impacts to grizzly bear habitat (ICST 2007). Numerous authors discuss habitat security relative to roads. Although results vary depending on factors such as habitat quality, cover availability, traffic volume, and season, the common theme is that bears use habitat adjacent to motorized routes less than areas farther from these routes. Analysis

of bear habitat use at three spatial scales in relationship to roads demonstrated the common pattern that avoidance of roads increased as road densities and traffic volumes increased (Mace et al. 1996).

Relative to travel management, the Conservation Strategy identifies monitoring of secure habitat as the mechanism to manage grizzly bear habitat. The standard for secure habitat in the Conservation Strategy is "the percent of secure habitat within each Bear Management Subunit must be maintained at or above levels existing in 1998" (ICST 2007). The subunit on the Beartooth District is the Boulder/Slough #1. It is primarily in the Absaroka-Beartooth Wilderness Area, plus part of the Gallatin National Forest. The 1998 baseline for the Boulder/Slough #1 subunit is 96% secure habitat. Secure habitat is defined as any area more than 500 m from an open or gated motorized access route and greater than or equal to 10 acres in size. The year 1998 was chosen as the baseline because this was the access level at which the grizzly bear population recovered. Some deviations are allowed under specific conditions. Although the direction applies only to the Recovery Zone (Primary Conservation Area), land management agencies are encouraged to maintain or improve important grizzly bear habitats and to monitor habitat conditions outside the Primary Conservation Area (PCA) as well.

Ninety-six percent of the portion of the Boulder/Slough #1 subunit that is on the Beartooth District, all within the PCA, would be secure habitat in all alternatives. Availability of secure grizzly bear habitat outside the PCA is displayed in the following Table. The 1998 baseline was not available for the area outside the PCA. However, the availability of secure habitat can still be compared between alternatives.

Table 3-41: Availability of Secure Grizzly Bear Habitat outside the Primary Conservation Area

Type of Habitat	Percent of available habitat that is secure				
	Alt. A	Alt. B	Alt. C	No Action	Alt. B Modified
Biologically Suitable*	91	92	92	92	92
Biologically Unsuitable+	52	59	64	57	58
Biologically Suitable and Unsuitable Combined	79	82	84	81	82

* Present in the Beartooth Unit, + Present in the Beartooth and Pryor Units

3.3.2.6 Environmental Consequences – Sensitive Species: Grizzly Bear

Direct and Indirect Effects

Effects Common to All Alternatives

The presence of the Absaroka-Beartooth Wilderness Area and several inventoried roadless areas ensures that 96% of the portion of the Boulder/Slough #1 subunit that is on the Beartooth District, all within the PCA, would be secure habitat in all alternatives. Thus, all alternatives would meet the secure habitat standard inside the PCA. This would be the case even when considering expected increasing future motorized use as discussed in the Affected Environment – Recreation – Recreation Trends section of this document. Outside the PCA, availability of secure biologically suitable habitat would effectively be the same among the alternatives, 91% in Alternative A and 92% in the other four alternatives. This is again due to the wilderness area plus inventoried roadless areas. In addition, over 50% of habitat considered biologically unsuitable for grizzly bears would also be secure. This is pertinent in that grizzly bear use of areas considered biologically unsuitable has been documented

within the last five years.

Alternative A
Under Alternative A, 52% of biologically unsuitable habitat would be secure, the least of the alternatives. Thus, this alternative would have the least potential to accommodate grizzly bear expansion. As stated above, this is pertinent because grizzly bear use of areas considered biologically unsuitable has been documented within the last five years.

Alternative B, No Action, and Alternative B Modified
Secure habitat in biologically unsuitable areas would be effectively the same under these three alternatives, ranging from 57% to 59%. Thus, potential to accommodate grizzly bear expansion would be greater than in Alternative A, and less than in Alternative C.

Alternative C
Under Alternative C, 64% of biologically unsuitable habitat would be secure, the highest of the alternatives. Thus, this alternative would have the greatest potential to accommodate grizzly bear expansion. Again, this is pertinent because grizzly bears have been documented using such areas as recently as year 2004.

Cumulative Effects – Grizzly Bear
Evidence strongly supports the idea that activities such as grazing, timber harvest, motorized tourism, real estate development, and mining, and the roads that support such activities, displace bears from what otherwise would be occupied habitat (Craighead et al. 1995). In addition, human-caused mortality is more likely to occur in heavily roaded areas of their range (various authors *cited in* Craighead et al. 1995). Current and reasonably foreseeable future activities that may affect habitat on the Beartooth District include fuels reduction on federal land, and livestock grazing on federal and private lands. These activities may contribute to a small extent to cumulative effects. Continued housing development and increased road density on private lands adjacent to the Forest boundary are expected to gradually reduce available suitable habitat outside the Primary Conservation Area.

No human-caused mortality has been reported for the District. Two human-grizzly bear conflicts documented on the District occurred outside the geographic area analyzed for the travel plan (i.e. the southernmost portion, which is administered by the Gallatin National Forest). One control action has been taken on private land outside the Forest boundary. Increased public education and food storage order enforcement on the District would help reduce potential for human/bear conflicts.

Given that over 96% of the PCA and over 91% of the biologically suitable habitat outside the PCA would continue to be secure habitat under all alternatives, cumulative effects of past, present, and reasonably foreseeable future actions is expected to be small.

Consistency with Laws, Regulations, Policy, and Forest Plan
All alternatives are consistent with the laws, regulations, policy, and Federal, Regional, and State direction, the Custer National Forest Management Plan, Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests, and the Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem. Of these directions, the latter two discuss travel management relative to grizzly bear conservation.

3.3.2.7 Affected Environment – Sensitive Species: Wolverine

Wolverine presence has been documented in the Beartooth Mountains unit of the District and wolverines are expected to occur in low numbers across the Beartooth Mountains. Wolverines typically occupy habitats within or near forest cover. In a study of wolverines in northwest Montana, Hornocker and Hash (1981) found that the majority of wolverine locations were in large areas of mature forest and associated open, rocky and alpine areas. Subalpine fir and associated seral species were the habitat types frequently used.

Across the wolverine's range throughout North America and Eurasia, the majority of natal den sites involve areas of deep snow accumulation, with snow tunnels often forming part of the den infrastructure (Pulliainen 1968, Magoun 1985, Copeland 1996). Approximately 35,600 acres of denning habitat are present on the District.

In addition to denning habitat, refugia are also important components of wolverine habitat. Gaines et al (2003) cite various authors who report that wolverines are sensitive to road-related factors but are not particularly affected by recreational trails. Roads may lead to displacement of wolverines from security areas (refugia), as well as den sites, because of increased access for human recreation. Trapper access, and consequently wolverine vulnerability to trapping, is directly correlated to roads. Winter appears to be the most critical period for disturbance and displacement associated with road access (Copeland and Hudak 1995). Refugia may include areas such as designated wilderness areas, inventoried roadless areas, and research natural areas. Available refugia by alternative are displayed in the following Table.

Table 3-42: Wolverine Refugia Availability by Alternative

Alternative	Acres of refugia	% of Beartooth Unit available as refugia
Alternative A	346,300	66
Alternative B	389,600	74
Alternative C	389,600	74
No Action Alternative	346,300	66
Alterative B Modified	371,155	71

Motorized route densities are another method of analyzing potential disturbance effects on wolverines. Rowland and coauthors (2003) evaluated models for wolverine habitat in the northwestern United States and concluded that road densities were a reasonable proxy for human disturbance relative to wolverine occurrence on the landscape. A model developed for the Interior Columbia River Basin found wolverine occurrences to be distinguishable between low road densities (<= 0.44 km/km^2 or <= 0.7 mi/mi^2) and moderate road densities (from 0.45 to 1.06 km/km^2 or from 0.8 to 1.7 mi/mi^2). This model did not show a distinction in wolverine occurrences from moderate to high (> 1.06 km/km^2 or >1.7 mi/mi^2) road densities (Rowland et al. 2003). Another model for the Rocky Mountain region (Caroll et al. 2001) found that predicted wolverine occurrences declined when road densities exceeded 1.7 km/km^2 (2.7 mi/mi^2).

Using these apparent break points (low<= 0.7 mi/mi^2, moderate from 0.8 to 2.7 mi/mi^2, and high >2.7 mi/mi^2), comparisons were made between alternatives to present possible differences in human disturbance potential. Trails open to motorcycles and/or ATVs were included in motorized route density calculations, under the assumption that motorized access has the same disturbance effect on

wolverines regardless of the vehicle used.

3.3.2.8 Environmental Consequences – Sensitive Species: Wolverine

Direct and Indirect Effects

Effects Common to All Alternatives
Motorized route densities under all alternatives would be characterized as low (<= 0.7 mi/sq mi).

Non-denning refugia are best described in terms of availability of secure, undisturbed blocks of habitat. The Absaroka-Beartooth Wilderness Area provides 332,600 acres of habitat relatively undisturbed by human activity. Several inventoried roadless areas are well distributed across the Beartooth Face and would provide an additional 13,700 acres of relatively secure habitat under all Alternatives. Motorized route designation varies by alternative for several other inventoried roadless areas, thus the suitability of those roadless units as refugia also would vary. Even accounting for different motorized route designations in some roadless units, approximately three-quarters or more of habitat on the District would still be available as large, secure areas for wolverines under all Alternatives.

Alternatives A and No Action
At 66%, the availability of non-denning refugia would be lowest under Alternatives A and the No Action alternative. There would be a higher number of motorized routes in wolverine habitat under Alternative A and the No Action Alternative compared to the other Alternatives. The result would be somewhat higher vulnerability to human-caused disturbance or mortality.

Alternative B, Alternative C, and Alternative B Modified
Non-denning refugia availability would be the highest under Alternatives B and C (74%), and less under Alternative B Modified (71%). Thus, it would be similar among these three alternatives. The lower number of motorized route miles under these alternatives would result in somewhat lower vulnerability to human-caused disturbance or mortality compared to the other two Alternatives.

Cumulative Effects - Wolverine
Developments on the District such as Red Lodge Mountain Ski Area and past and current mining operations have likely reduced availability of summer wolverine habitat. Approved expansion of the ski area would further reduce habitat availability. Future Federal actions with potential to impact wolverine habitat include commercial and noncommercial timber harvest, noxious weed treatment, and aspen restoration. Effects of timber harvest may be positive or negative depending upon whether it improves or degrades ungulate habitat. By reducing the acreage and geographic distribution of invasive plant species, noxious weed treatment encourages an increase in native plant species which in turn improves forage for wolverine prey species. By the same token, aspen regeneration also improves forage and cover for ungulates. Overall, given that anticipated direct and indirect effects to wolverine and their habitat is small between the alternatives, cumulative effects of past, present, and reasonably foreseeable future activities is also expected to be small.

Consistency with Laws, Regulations, and Policy
The National Forest Management Act (36 CFR 219.19) directs federal agencies to manage habitat to provide for viable populations of all native and desired non-native fish and wildlife species. The

wolverine is native to the Beartooth Mountains, and is classified as a Forest Service sensitive species. Sensitive species are those for which population viability is of concern. Direction for management of sensitive species is contained in the Forest Service Manual (FSM 2672.1), which states that these species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. All alternatives are consistent with the afore-mentioned direction.

3.3.2.9 Affected Environment – Sensitive Species: Bat Species

Five Forest Service sensitive bat species (Spotted bats, Townsend's big-eared bats, Pallis bats, Long-eared myotis, and Long-legged myotis), occur on the District.

Although different bat species have specific habitat needs, some generalizations can be made. During summer, which is the reproductive season, bats may use various roost sites such as rock crevices, caves, talus slopes, snags, buildings, and bridges. Hibernacula are located in underground caverns with temperatures above freezing. Deep limestone caverns are particularly important for hibernating bats in the Rocky Mountains (Adams 2003). Hibernating bats are especially vulnerable to disturbance because when aroused from hibernation, they use winter fat needed to support them until insects are available in the spring. A single arousal most likely costs a bat as much energy as it would normally expend during two to three weeks of hibernation. Thus, frequently aroused hibernating bats may starve before spring (Harvey et al. 1999).

Most bats are very sensitive to disturbance (Schmidt 2003). Human-caused adverse impacts to bats include habitat destruction, direct mortality, vandalism, and disturbance of hibernating and maternity colonies. Disturbance to hibernacula and maternity colonies is a major factor in the decline of many bat species. Human-caused arousal from hibernation costs bats energy that may lead to starvation before spring (Harvey et. al. 1999). The body warmth from a person standing 10 feet below a hibernating bat may be enough to stimulate the bat's arousal (Adams 2003). Disturbance to summer maternity colonies may cause parents to drop or abandon their dependent young (Harvey et. al. 1999). Activities such as rock climbing or caving may take a toll on nursery colonies (Adams 2003). Surveys for hibernacula, colonial roosts, and maternity colonies have not been conducted on the District. However, hibernacula have been documented on adjacent lands outside the Forest Boundary of the Pryor Unit and potential habitat for hibernacula and colonial roosting is present on the Unit. In addition, documentation of post-lactating females suggests that maternity colonies are also likely to be present. Potential effects of the alternatives on bats in the Pryor Unit were analyzed in terms of miles of open motorized routes. The reason for using this method is that the presence of motorized routes can facilitate access to caves, thus potentially leading to adverse indirect effects by disturbance of bats at hibernacula, roosting, and maternity sites. Miles of open motorized routes are displayed in the following table.

Table 3-43. Motorized Route Miles by Alternative – Pryors Unit

Alternative	Motorized Route Miles
Alternative A	177
Alternative B	125
Alternative C	79
No Action Alternative	149
Alternative B Modified	124

On the Beartooth Unit, hibernacula are not expected to be present due to lack of caves. For the same reason, colonial roosts and maternity colonies are also not expected to occur. Roosting and maternity sites on the Beartooth Unit are more likely to occur in rock crevices in limestone outcrops along the Beartooth face, as well as in tree snags, talus, and other habitats. Sizable effects to bats in these settings are more likely to be caused by loss of habitat than by human disturbance at any particular site. Thus, effects of the Beartooth Travel Management to bats in the Beartooth Unit were not analyzed.

3.3.2.10 Environmental Consequences – Sensitive Species: Bat Species

Direct and Indirect Effects

The presence and use of roads and trails are not expected to directly affect bats or their habitat. However, the presence of motorized routes can facilitate access to bat habitat, particularly to caves, thus leading to adverse indirect effects by disturbance of bats at hibernacula, roosting, and maternity sites.

Alternative A

Alternative A would have the highest number of open motorized route miles (177) in the Pryors Unit. This alternative would provide the least protection to bat colonies because caves would be more easily accessible than under the other alternatives. The lack of seasonal restrictions would facilitate access to potential hibernacula during years when snow cover is low enough to allow wheeled motorized access to cave and mine areas. Hibernating bats would be vulnerable to disturbance during a period of their life cycle when repeated disturbance could ultimately lead to mortality.

Alternative B and Alternative B Modified

These two alternatives would have similar open motorized route miles (125 and 124 respectively) and would have lower potential to impact bat colonies than Alternative A. Seasonal restrictions would benefit bats by reducing human access to caves, especially during hibernation when bats are particularly vulnerable to disturbance. By the time seasonally restricted roads are opened in early summer, most bats are likely to have naturally aroused from hibernation.

Alternative C

Alternative C would have the lowest open motorized route miles (79) and thus would provide the most protection to bat colonies overall because caves would be less easily accessible than under the other alternatives. However, this alternative would have fewer route miles with seasonal restrictions than the other alternatives and thus would allow motorized wheeled access during low-snow winters to caves that would not otherwise be accessible. Hibernating bats in accessible areas would be vulnerable to disturbance and potentially human-induced arousal from hibernation

No Action

This alternative would have 149 miles of open motorized routes and thus would protect bat colonies overall more than Alternative A and less than the other alternatives. Access to potential hibernacula and thus potential for disturbance of hibernating bats would be similar to Alternative A.

Cumulative Effects - Bat Species

Several factors have likely contributed to cumulative effects to bats in the project area. Several

entrances to abandoned mines were closed in the 1990's. Closed entrances can affect air flow through connected tunnels, altering temperature and humidity within the mine and potentially making conditions unsuitable for bats even if other entrances to the same mine are available. Past and current spelunking may also have affected bats by disturbing day roosts, maternity sites and hibernacula, although the extent to which this is an issue is not known. On the other hand, installation of bat gates to prevent human access to several abandoned mines in the Pryor Mountains has benefited bats by minimizing potential for human disturbance of bats utilizing those mines.

Effects of past timber harvest are hard to assess. Most bat species tend to avoid large open habitats when possible. However, many species forage along forest edges. Heterogeneous habitats containing open, brushy, and forested areas provide optimal foraging conditions because of the presence of extensive habitat edge (Adams 2003). Timber harvest in the form of clearcuts occurred in the Pryor Mountains in past decades. The extent that cutting units have regenerated is variable, with some naturally regenerated to dense shrub cover, others to seedling and sapling Douglas Fir of varying degrees of canopy cover. The combination of vegetative structure and forest edge likely provides suitable foraging conditions for bats, but how the suitability would compare to an unmanaged condition at similar sites is not known.

Current and future cattle grazing can damage sensitive habitats, particularly riparian systems. Shoreline damage can lead to erosion that lowers water quality and changes stream flow dynamics. Soil damage, particularly along stream and pond shorelines, can suppress vegetation growth and thus lower the diversity of insect prey (Adams 2003). Cattle grazing occurs across much of the non-wilderness portion of the District and will continue in the future. One goal of livestock management on the District is to bring non-functioning and functional-at-risk riparian systems up to properly functioning condition. Improvement over time of degraded riparian systems would improve foraging and water quality conditions for bats and thus reduce adverse cumulative effects.

Consistency with Laws, Regulations, and Policy

The National Forest Management Act (36 CFR 219.19) directs federal agencies to manage habitat to provide for viable populations of all native and desired non-native fish and wildlife species. The five bat species analyzed are native to this area, and are classified as Forest Service sensitive species. Sensitive species are those for which population viability is of concern. Direction for management of sensitive species is contained in the Forest Service Manual (FSM 2672.1), which states that these species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. This analysis considered potential for alternative scenarios to have adverse impacts on bats and thus is consistent with the above direction.

3.3.2.11 Affected Environment – Management Indicator Species: Elk

The elk analysis serves as a surrogate for mule deer and white-tailed deer. This is because there is a large amount of overlap in habitat between deer and elk, and impacts of travel management on the District are expected to be very similar for these species.

Elk Habitat Use and Travel

Many studies have shown that motorized access influences elk habitat use (Lyon 1983,, Frederick 1991, Lyon and Christensen 2002). Elk have repeatedly been shown to avoid habitat adjacent to open

roads (Lyon et al. 1985). Declines in habitat use have been reported within 0.25-1.8 miles of open roads (Lyon and Christensen 2002), but substantial reductions in habitat use are normally confined to <0.5 miles of an open road. Many variables influence elk habitat use relative to open roads.

Observed declines in habitat use adjacent to roads have led to the development of elk habitat effectiveness models. Habitat effectiveness refers to the percentage of available habitat that is usable by elk outside the hunting season (Lyon and Christensen 1992). The literature contains several recommendations for managing open roads within summer elk habitat. Using Lyon's model for habitat effectiveness based entirely on road density (Lyon 1983), Christensen et al. (1993) recommended that habitat effectiveness should be 70% or greater (open road density <0.7 mi/sq mi) for areas intended to benefit elk summer habitat and retain high use. Areas where elk are one of the primary resource considerations should have habitat effectiveness of 50% or greater (open road density <1.9 mi/sq mi).

Areas with <50% habitat effectiveness (>1.9 mi/sq mi) were expected to make only minimal contributions to elk management goals (Christensen et al. 1993). Additionally, Canfield et al. (1999) recommended that open road densities should be less than 1.0 mi/sq mi in big game summer habitat, with scattered key areas with no roads. However, the 2005 Montana Elk Management Plan does not contain objectives or recommendations for management of open road density within summer elk habitat.

Most studies involving the effects of motorized uses on elk involved roads with passenger vehicle use rather than motorized trails where ATVs and/or motorcycles are used. Therefore, there is very little data available to use in assessing the impacts of motorized trails on elk. Wisdom et al. (2004) discussed preliminary findings from a controlled experimental study evaluating the effects of ATVs, mountain bikes, hiking, and horseback riding on elk and mule deer. Their initial results indicate that elk exhibited much higher rates of movement (or greater displacement) and probability of flight response from ATVs and mountain bikes compared to horses and hikers. Canfield et al. (1999) and Toweill and Thomas (2002) both state that the effects of open motorized trail use are likely similar to those resulting from open roads. The two uses are similar in that both allow easier access to areas that would otherwise be inaccessible without considerable effort using non-motorized transportation. Therefore, travel route densities incorporating motorized trails cannot be compared to published habitat effectiveness models, but they can be used to compare Travel Plan effects among alternatives. As with open road density and habitat effectiveness values, the existing literature does not identify a clear link between open motorized route densities and elk population demographics. Therefore, conclusions on expected travel management planning impacts can only address disturbance and displacement of elk from habitat and not population responses.

Elk Vulnerability and Travel

Studies have been conducted to determine factors influencing elk vulnerability to hunting and management solutions to the problem of low mature bull elk numbers. One of the conclusions was that motorized access is one of the major factors influencing elk vulnerability, along with hunter numbers, availability of security cover, topography, hunting season structure and length, hunting equipment technology and others. Data have consistently shown that elk mortality rates increase with increasing open road density, because the number of hunters and their distribution both tend to increase with increasing road density (Skovlin et al. 2002). This is especially true for bulls because hunting regulations have traditionally allowed greater opportunity for harvesting them compared to

cows (Vore and Desimone 1991).

Motorized access is one of the few factors affecting elk vulnerability that the Forest Service has management authority for. Hillis et al. (1991) provided guidelines for managing elk habitat to limit elk vulnerability. The key concept was to provide security areas for elk during the hunting season where they are less vulnerable to harvest. They defined secure areas as >250 acres in size and >0.5 mile from an open road, and recommended that they comprise >30% of the analysis unit. Although open roads have the largest effect on elk vulnerability, restricted roads also have an impact because they provide easier access for hunters using non-motorized transportation (Skovlin et al. 2002). Lyon and Burcham (1998) found that elk hunters are likely to use closed roads to access areas farthest from open roads. The Hillis guidelines for secure areas included a recommendation to minimize closed roads within elk security areas, but did not provide standards for accomplishing this (Hillis et al. 1991). The 30% secure habitat level should be viewed as the minimum necessary to avoid excessive bull elk mortality during the hunting season, realizing that more may be necessary in some districts due to variables such as topography, vegetation cover, and hunting pressure. Elk security habitat and open motorized route density by alternative is displayed in the following Table.

Table 3-44. Percent Elk Security Habitat and Vulnerability by Alternative

Alternative	Beartooth Unit		Pryors Unit	
	% Elk Security	Open Motorized Route Density (miles/square miles)	% Elk Security	Open Motorized Route Density (miles/square miles)
A	65	0.47	22	1.49
B	68	0.41	25	1.16
C	69	0.37	37	0.69
No Action	64	0.44	23	1.44
B Modified	66	0.39	26	1.27

The Montana Final Elk Management Plan gives population objectives and general habitat management strategies for each Elk Management Unit (EMU) (Montana Fish, Wildlife and Parks 2005). Habitat objectives stated in the plan for the Absaroka EMU (the EMU encompassing most of the Beartooth Unit) are to encourage private and public landowners to maintain or improve existing elk habitat.

Habitat objectives were not developed for the Mid-Yellowstone EMU (the EMU encompassing the Pryor Mountains) because occupied habitat in the EMU is predominately on private lands. However, elk habitat is present in the Pryors Unit of the Beartooth District and elk have been documented within the Forest boundary in the past three years. Thus, a broadscale estimate of habitat in the Pryors Unit was included in the elk analysis because there is potential for long-term elk occupancy of the area.

3.3.2.12 Environmental Consequences – Management Indicator Species: Elk

Direct and Indirect Effects

Effects Common to All Alternatives

All alternatives would meet the access and habitat standards for elk in the Beartooth Unit. Open motorized route densities would range from 0.37 to 0.47 mi/sq mi. This is within Canfield et al's (1999) recommendations to manage roads at <1.0 mi/sq mi for summer elk habitat for all alternatives.

Secure elk habitat in the Beartooth Unit would range from 64% to 69%, well above the recommended 30% minimum from Hillis et al. (1991). Under all alternatives, the majority of elk summer range security cover would be in areas adjacent to or otherwise connected to the Absaroka-Beartooth Wilderness Area.

Since elk analysis is used as a surrogate for mule deer and white-tailed deer, effects described for elk would also apply to deer.

Alternative A and No Action
On the Pryor Unit, Alternatives A and No Action would have the highest open motorized route density relative to wolves (1.5 mi/sq mi) and in elk habitat (1.49 and 1.44 mi/sq mi, respectively), plus would provide the lowest elk security cover (22% and 23%, respectively).

Alternative B and B Modified
Open motorized route density for Alternatives B and Alternative B Modified are 1.16, and 1.27 mi/sq mi, respectively and approach the density recommendation of 1 mi/sq mi. Secure elk habitat would range from 23% to 26%, which is below the recommended 30% minimum.

Alternative C
Alternative C, with open motorized route density of 0.69 mi/sq mi in elk habitat, and security cover of 37%, and would fall within the recommendations for elk.

Cumulative Effects - Elk
Several past and ongoing habitat enhancement activities on the District have improved habitat for elk. These activities include thinning and prescribed burning on elk winter range to improve forage quality and availability, and to increase the acreage of available habitat by reducing conifer species that have gradually encroached onto winter range. The long-term aspen regeneration program benefits elk by improving forage and cover. Spraying of invasive plant species reduces competition with native plants that provide forage for elk.

Current and future cattle grazing can damage sensitive habitats, particularly riparian systems. Cattle grazing occurs across much of the non-wilderness portion of the District and will continue in the future. One goal of livestock management on the District is to improve vegetative condition in areas that have been degraded by past grazing practices. Improvement in the health of native vegetation may benefit elk in the short and long term time frames.

Housing developments on private land in some areas continue to directly reduce habitat availability for elk, plus increase potential indirect habitat loss through spread of noxious weeds. In addition, disturbance of elk due to the presence of domestic dogs on developed land adjacent to the Forest adds to adverse cumulative effects. In other areas, development is precluded, at least for the near future, through ownership of large blocks of land by a few owners.

Density of motorized non-Forest Service roads within the Forest boundary is 0.03 to 0.04 mi/sq mi, depending upon the alternative. Contributions of these roads to adverse cumulative effects within the Forest boundary are expected to be minimal.

Consistency with Laws, Regulations, and Policy
All alternatives are consistent with the Custer National Forest Management Plan which contains relevant direction for management of big game populations. The goal for key wildlife species, including big game species, relative to travel management planning states, "Where necessary to protect wildlife values, access and/or traffic will be restricted in key wildlife habitats during critical periods." Key habitats are described in Appendix VII of the Forest Plan and largely occur in Management Area C relative to core elk winter range where seasonal motorized use restrictions apply.

3.3.2.13 Affected Environment – Management Indicator Species: Bighorn Sheep

Rocky Mountain bighorn sheep occur on both the Pryor Unit and Beartooth Unit. Bighorn sheep in the Beartooths include the Rock Creek/Hellroaring, West Rosebud River, and Stillwater River herds. Sheep in the Beartooth Mountains winter as high as 11,000 feet in elevation, with summer range typically occurring at lower elevations (Stewart 1975). Sheep in the Stillwater River area frequent grounds on and near the Stillwater Mine during winter. Bighorn sheep utilize the eastern portion of the Pryor Mountains during summer, but locations reported in Wockner et al (2003) show that winter use only occurs at lower elevations to the southeast outside the Forest boundary.

Numerous authors discuss behavioral responses of bighorn sheep to human disturbance. MacArthur et al (1982) found that mountain sheep elicited few responses to traffic and were more sensitive to human approach over a ridge than approach directly from a parked vehicle. The strongest reactions to human approach occurred when the person was accompanied by a leashed dog. This is not surprising since canids are traditional predators of mountain sheep. In a study by Papouchis et al (2001), desert bighorn sheep responded most severely to hikers (animals fled in 61% of encounters), followed by vehicles (17% fled), and mountain bikers (6% fled). The high response to hikers may be because they often approach sheep directly and their locations are often unpredictable.

Bighorn sheep can habituate to some common and predictable human activity (MacArthur et al 1982, Beecham et al 2007). Bunch and Workman (1993) subjected bighorn sheep, elk, and antelope in a large enclosure to disturbances from people on foot, motorcycles, four-wheeled vehicles, and other factors. The animals appeared to habituate to most disturbances in a short period of time except for people on foot and certain aircraft activity. Apparent levels of tolerance may be misleading, however. MacArthur et al (1982) and Stemp (1983) reported that responses to disturbance detected using heart rate telemetry were often not evident from behavioral cues. Even brief disturbances can have long-lasting effects on bighorn sheep heart rate and thus are probably energetically costly to animals (Hutchins and Geist 1987). Also, human presence near lambing areas may be detrimental to bighorn sheep in some locations (Beecham et al 2007).

Proximity to escape terrain is an important component of bighorn sheep habitat, particularly during lambing. Escape terrain can provide secure habitat for bighorn sheep to retreat to when disturbed, including disturbance from vehicle use and other human activity. On winter range, sheep can spend up to 86% of their time within 100m of rocky escape terrain. Specific guidelines for analyzing bighorn sheep were not found in the literature. Thus, for this analysis, we defined escape terrain as areas greater than or equal to 60% slope (based on Valdez and Krausman 1999) and greater than ½ mile from an open motorized route. One-half mile was selected to be consistent with criteria for other ungulates, namely elk. The following tables show the availability of escape terrain and winter range

under each alternative. The acreages are compared as the percent change from the No Action Alternative.

Table 3-45. Comparison of Bighorn Sheep Escape Terrain[25] by Alternative

Alternative	Escape Terrain – Pryors Unit		Escape Terrain – Beartooth Unit	
	Acres	% Change from No Action Alternative	Acres	% Change from No Action Alternative
A	3920	-11.9	5543	-1.5
B	4926	+10.9	5904	+4.9
C	6138	+28.5	5970	+6.0
No Action	4388	--	5612	--
B Modified	5129	+14.4	5809	+3.4

Table 3-46. Comparison of Bighorn Sheep Winter Range on Beartooth Unit by Alternative[26]

Alternative	Acres winter range within motorized route buffer[27]	% Change from No Action Alternative	Acres winter range outside motorized route buffer[27]	% Change from No Action Alternative
A	8373	+4.8	10,076	-4.0
B	8191	+2.7	10,258	-2.2
C	8161	+2.4	10,288	-1.9
No Action	7966	--	10,483	--
B Modified	8316	+4.2	10,129	+3.5

3.3.2.14 Environmental Consequences – Management Indicator Species: Bighorn Sheep

Direct and Indirect Effects

Effects Common to All Alternatives

The Stillwater Bighorn Sheep Herd on winter range on and adjacent to the Stillwater Mine is not expected to be affected by any of the alternatives. This is because changes in motorized route designation in this area are not proposed under any alternative.

Alternative A

The availability of escape terrain would be the least under Alternative A in both the Beartooth and Pryors Units. The acreage of winter range outside the motorized route buffer would be lowest under this alternative. Thus, potential for disturbance of bighorn sheep would be greatest under this alternative.

Alternative B

Availability of escape terrain would be greater than under Alternatives A and No Action in both the Beartooth and Pryor Units, and less than the Alternative B Modified and No Action alternatives. Winter range availability would be approximately the same as under Alternative C.

[25] Escape terrain is areas >= 60% slope and >1/2 mile from motorized routes

[26] Pryors Unit is excluded because winter range is outside Forest boundary.

[27] Buffer is area <=1/2 mile from motorized routes.

Alternative C
The availability of escape terrain would be the highest under this alternative in both the Beartooth and Pryors Units. The greatest difference would be in the Pryors, where Alternative C would provide 28.5% more escape terrain than under the No Action Alternative. This alternative would provide more winter range than Alternatives A and B Modified, and less than the No Action alternative.

No Action
Under the No Action Alternative, escape terrain availability in both the Beartooth and Pryors Units would be greater than Alternative A, and less than all other alternatives. The acreage of winter range outside the open motorized route buffer would be highest under the No Action Alternative.

Alternative B Modified
Availability of escape terrain in the Beartooth and Pryors Units would be higher than all alternatives except Alternative C. The availability of winter range outside the open motorized route buffer would be lower than all alternatives except for Alternative A.

Cumulative Effects – Bighorn Sheep
Mineral exploration activities in bighorn sheep habitat, especially in the Stillwater Complex, are not expected to contribute adversely to cumulative effects. Mitigation measures, particularly related to helicopter flight path and height above ground level, are included in current approved plans of operations to minimize disturbance of bighorn sheep. Similar measures would also be included in future plans of operations.

Several mitigation measures are conducted to minimize adverse effects of activity associated with the Stillwater Mine on bighorn sheep. Among the measures are road signs near the Stillwater Mine asking motorists to not stop when bighorn sheep are present near the road, spraying of noxious weeds, and annual monitoring of the Stillwater bighorn sheep herd. Currently, reclamation areas provide winter forage for Stillwater bighorn sheep. At the time of future mine closure, reclamation areas would continue to provide winter forage in the short term. However, forage quality on the reclaimed areas would likely decrease over time in the long term.

Noxious weed treatment on bighorn sheep range reduces competition with native plant species and is thus beneficial to bighorn sheep.

Bighorn sheep utilize areas adjacent to abandoned uranium mines identified for reclamation in the Pryor Mountains. Reclamation activities potentially may cause short-term disturbance and displacement of individual sheep. Once reclamation is completed, the disturbance factors associated with it would cease, thus contribution to cumulative effects is not expected.

Future wildfires potentially may improve bighorn sheep habitat. Stand-replacement fire in the Pryor Mountains (i.e. the 2002 Red Waffle fire) caused tree canopy removal and increased grass and forb quantity on steep slopes. The result was creation of escape habitat and forage in areas where it previously was limited or did not exist.

Consistency with Laws, Regulations, and Policy
The Custer National Forest Management Plan contains relevant direction for management of big game populations. The protection measure for key wildlife species, including big game species, relative to

travel management planning states, "Where necessary to protect wildlife values, access and/or traffic will be restricted in key wildlife habitats during critical periods." All alternatives are consistent with the above direction on occupied bighorn sheep range.

3.3.2.15 Affected Environment – General Wildlife

Focal species are species used as surrogates in assessing ecological integrity (CFR Vol 65 No 218, November 2000). The distribution and abundance of focal species can indicate the integrity of the larger ecosystems that they belong to. They also can "play key roles in maintaining community structure and processes" (Gaines et al, 2003) and thus can be indicators of species diversity. Focal species associated with each wildlife group, as selected by Gaines et al (2003) are shown in the following Table.

Table 3-47. Focal Wildlife Species

Wildlife Group	Focal Species
Wide-ranging carnivores	Grizzly bear, lynx, gray wolf, wolverine
Ungulates	Mule deer, elk, bighorn sheep, mountain goats
Late-successional-forest associated species	Northern goshawk, brown creeper, American marten, fisher, northern flying squirrel, white-breasted nuthatch
Riparian-associated species	Harlequin duck, bald eagle
Primary cavity nesters	Three-toed woodpecker

Gaines et al (2003) conducted a literature review to document the effects of roads, motorized trails, non-motorized trails, and other linear recreation routes on focal wildlife species. The most common interaction identified in the literature relative to motorized roads and trails was displacement and avoidance, where animals altered their use of habitats in response to the motorized routes. Disturbance at a specific site was also commonly identified and was usually associated with wildlife nesting, breeding, or rearing of young. Other frequently reported interactions associated with roads or road networks included collisions between animals and vehicles, and edge effects.

The interactions associated with non-motorized trails were similar to that of motorized trails and include displacement, avoidance, and disturbance at a specific site during a critical period. The interaction varied depending upon wildlife species, with some more sensitive to motorized trail use and others more sensitive to non-motorized trail use. Although both forms of recreation have effects on wildlife, motorized trails showed a greater magnitude of effects, such as longer wildlife-displacement distances, for a larger number of focal species (Gaines et al. 2003). The following Table details documented effects of roads and trails on wildlife habitat or populations.

Table 3-48. Documented Effects Associated with Roads and Trails

Road- and trail-associated factors	Effects of factors	Wildlife group affected
Hunting & trapping	Mortality from hunting or trapping as facilitated by road and trail access	Wide-ranging carnivores Ungulates
Poaching	Increased illegal take of animals as facilitated by trails and roads	Wide-ranging carnivores Ungulates

Table 3-48. Documented Effects Associated with Roads and Trails

Road- and trail-associated factors	Effects of factors	Wildlife group affected
Collisions	Death or injury resulting from a motorized vehicle running over or hitting an animal	Wide-ranging carnivores Late successional Riparian associated Ungulates
Negative human interactions	Increased mortality of animals owing to increased contact with humans, as facilitated by road and trail access	Wide-ranging carnivores Late successional Ungulates
Movement barrier or filter	Alteration of dispersal or other movements as posed by a road or trail itself or by human activities on or near a road or trail or network	Wide-ranging carnivores Late successional Riparian associated Ungulates
Displacement or avoidance	Spatial shifts in populations or individual animals from a road or trail or network in relation to human activities on or near a road or trail or network.	Wide-ranging carnivores Late successional Riparian associated Ungulates
Habitat loss and fragmentation	Loss and resulting fragmentation of habitat owing to the establishment of roads and trails, road and trail networks, and associated human activities	Wide-ranging carnivores Late successional Riparian associated Ungulates
Edge effects	Changes to habitat microclimates associated with the edge induced by roads or trails	Late successional
Snag or downed log reduction	Reduction in density of large snags and downed logs owing to their removal near roads or campsites, as facilitated by road access	Late successional Riparian associated Primary cavity excavators
Route for competitors or predators	A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise	Wide-ranging carnivores Late successional Riparian associated Primary cavity excavators
Disturbance at a specific site	Displacement of individual animals from a specific location that is being used for reproduction and rearing young	Wide-ranging carnivores Late successional Riparian associated Ungulates
Physiological response	Changes in heart rate or level of stress hormones as a result of proximity to a road or trail	Ungulates Late successional

For this analysis, road and trail factors will be grouped and discussed under the topics of Mortality and Habitat Modification/Changes to Behavior.

Mortality

Large numbers of animals are killed annually on roads. The rate of mortality is directly related to vehicle speed (Lyon 1985), although road width and traffic volume also affect roadkill rates (Forman

and Alexander 1998). Since forest roads are not designed for high-speed traffic, direct mortality on forest roads is usually not important relative to large mammals (Lyon 1985). Forest carnivores are an exception because their large home ranges make them especially vulnerable to road mortality (Baker and Knight 2000). Amphibians and reptiles are particularly susceptible on two-lane roads with low to moderate traffic (Forman and Alexander 1998).

A study that analyzed over 100 bird and mammal species in England concluded that roadkill rates may not affect population size on a national scale (Forman and Alexander 1998). However, rates of roadkill mortality can be high enough to reduce population densities at the local level (Forman et al. 2003).

The presence of roads can lead indirectly, as well as directly, to wildlife mortality. Roads provide human access that can result in hunting, trapping, and poaching. The numbers of miles of designated motorized routes on the District are as follows:

Table 3-49. Motorized Route Miles by Alternative*

Alternative	Motorized Route Miles
Alternative A	341
Alternative B	261
Alternative C	198
No Action Alternative	287
Alternative B Modified	267

* From Ch. 2 Table 2-8

Since small, slow-moving animals are susceptible to mortality even on narrow roads; motorized trails were included in the above road mileages.

Habitat Modification/Changes to Behavior

Motorized

Animals may respond either positively or negatively to the presence of a road. Response can occur through the mechanisms of shifts in home range, altered movement patterns, altered reproductive success, altered escape response, and altered physiological state (Trombulak and Frissell 1999).

Trombulak and Frissell reference numerous studies that document behavioral changes due to roads. Both black bears and grizzly bears shifted their home ranges away from areas with high road densities (Brody and Pelton 1989, McLellan and Shackleton 1988). Elk in Montana preferred spring feeding at sites away from visible roads (Grover and Thompson 1986). Mountain lion home ranges are in areas with lower densities of improved dirt roads (Van Dyke, et al. 1986). In contrast, turkey vultures preferentially establish home ranges in areas with greater road densities (Coleman and Frasier 1989), probably because of increased carrion resulting from roadkill.

Roads may also act as barriers to movement, particularly for small mammals and wetland species such as amphibians and turtles. Road width and traffic density are major factors contributing to barrier effect, whereas road surface is generally a minor factor. Some large mammals, such as wolverine, appear to not be affected by the presence of roads as far as home range size and shape is concerned (Forman and Alexander 1998). Others including pronghorn antelope (Bruns 1977) and mountain lions (Van Dyke et al 1986) seem reluctant to cross roads.

Knight and Cole (1995a) presented specific effects of recreational activities typically associated with roads and trails on wildlife. Backpacking, hiking, and horseback riding elicited flight and/or elevated heart rates, and displacement. Motorized vehicles including motorcycles, ATVs, quadricycles, dune buggies, amphibious vehicles, and air-cushion vehicles potentially cause disturbance (flight and/or stress) and redistribution.

Noise is one of the major factors in wildlife displacement and habitat loss. Noise can be defined as any "human-made sound that alters the behavior of animals or interferes with their normal functioning" (Bowles 1995). Sound is a physical disturbance medium that is usually measured in decibels (dB), discussed further in the FEIS Recreation – Affected Environment – Noise. Some sounds are either higher or lower than what humans and some terrestrial animals can hear. Characteristics such as a species hearing ability, ability to escape sound, habituation to noise, and other factors need to be considered when assessing effects of noise on wildlife (Finegold, et al 2004). Kaseloo and Tyson (2004) discuss numerous studies of effects of noise on specific species and species groups. Review of the results indicates that apparent affects of specific noise levels is quite variable between on species.

Decibel levels (dB) of some vehicles commonly used on the National Forest include: 1) automobile from a distance of 25 feet – 80 dB (Truax 1999); 2) diesel truck from 50 feet – 84 dB (Federal Interagency Committee on Noise 1992); 3) motorcycle - 88 to 100 dB (Galen Carol 2007, Truax 1999); and 4) truck without muffler – 90 dB (Earthlink 2008) Decibel levels for other vehicles pertinent to the Beartooth Travel Management, including ATV's, were not found.

A number of studies have shown that wild ungulates and carnivores increase movement in response to aircraft, snowmobiles, construction noise, road traffic, and walking visitors. Large mammals alter habitat use for 1-2 days after being disturbed by noise. Large mammals are able to adapt to predictable disturbance by avoiding an area during this time period. Mammals will habituate to noises without negative consequences, but do not habituate to being hunted, which actually amplifies their responses. Mammals can track noise and respond to noise that is approaching directly rather than to noise approaching them tangentially. Mammals may also abandon newborn young in response to noise. Startled carnivores may kill and eat their own young. Short-term aversive responses in mammals vary from mild reactions such as becoming alert to more severe activity such as running away while urinating or defecating (Bowles 1995).

In general, with repeated exposures to either motorized or non-motorized activity, animals habituate or adapt both physiologically and behaviorally. Unfamiliar noise is more likely to arouse an animal than a harmless, familiar noise. Animals may have one of three responses to noise: attraction, tolerance or aversion. Mild responses may be difficult to detect. If mammals are repeatedly exposed to the same noise stimulus without negative associations, responses decline rapidly. Vertebrates can track the direction of movement and typically respond more strongly to direct approaches than to tangential passes (Knight and Gutzweiler 1995).

Non-motorized

Non-motorized recreation can have adverse affects on wildlife, although the majority of literature deals with motorized effects. Literature documents the effects of non-motorized human activity on shorebirds, bald eagles, and various species of big game through activities such as walking, rafting,

and cross-country skiing. For instance, elk can be easily disturbed by people on foot or skis (Cassierer et al. 1992).

One study on grizzly bears in Montana found that grizzly bears use areas near motorcycle and ATV trails less than expected (Graves 2002). Another study assessing grizzly bear habitat use in relation to non-motorized trails found that bears were displaced from non-motorized trails (Mace and Waller 1996). Some differences in response by bears to trails may be due to relative amounts of recreational use on trails.

Some species do respond positively to the presence of roads and trails. Routes may increase habitat for some species that prefer edges. New microhabitats may be created along roads, such as at bridges that bats may use for roosting. Habitat enhancements may occur along roads, such as perches for raptors, increased forage from planted species, and carrion from road kills (Forman et al 2003).

To analyze the general effects of motorized and non-motorized routes on wildlife, a one km buffer on each side of a route was used as suggested by Ruediger (1996). This is considered the "virtual footprint" (Forman et al. 2003) of the route on the land. This is an average, but the true impacts of routes vary significantly with terrain, vegetation, amount and types of use on the route, species-specific behavior, and other factors. Only Forest Service routes on the National Forest were analyzed. Since research has generally shown that motorized routes have more of an impact on general wildlife species than non-motorized routes, these percentages were derived separately as well as in combination. The percent of the Beartooth Unit and the Pryor Unit untouched by the two km footprint of these routes is referred to as "core" (Core should not be confused with secure habitat for grizzly bears.) The results are shown in the following table. The percent of the District outside the two km footprint is the area where wildlife generally is undisturbed by travel routes and the activities that accompany them. Research has been conducted on the specific response of some wildlife species to motorized and non-motorized routes. Refer to other analyses for species such as grizzly bear, elk, wolverine and lynx. These analyses are tailored to the species, with reviews of species-specific research, while the analysis presented here is very general.

In general, effects of roads and trails on most wildlife species are negative (Boyle and Samson 1985). The effects may vary by wildlife species and by individual. Effects also vary by the type of activity occurring on the road or trail. Seasonal closures of routes may offer some benefit to wildlife. Some routes were selected for seasonal closures during important times of year for a particular species, particularly big game. If motorized routes are closed when and where these activities occur, animals can function with less energy expenditure and more efficiency.

Table 3-50. Percent of Unit That is Core for Wildlife

Route Type	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Beartooth Unit					
Motorized Routes	82	83	83	82	82
All Routes* (motorized and non-motorized)	56	57	57	57	57
Pryor Unit					
Motorized Routes	16	25	35	22	27
All Routes* (motorized and non-motorized)	16	25	35	22	27

*The All Routes category (motorized and non-motorized) includes routes both inside and outside the Absaroka-Beartooth Wilderness Area.

3.3.2.16 Environmental Consequences – General Wildlife

Direct and Indirect Effects

Effects Common to All Alternatives
Mortality: Approximately 16 miles of paved roads under Forest Service jurisdiction are on the District. No changes in paved roads are proposed under any alternative. In addition, no changes are proposed for higher speed unpaved roads. Thus, the potential for animal mortality caused by collision with vehicles on paved and higher speed unpaved roads would be the same under all alternatives.

Habitat Modification /Changes to Behavior: Ruediger (1996) estimates that displacement of some species, or indirect habitat loss due to roads, may average 1 km on each side of a highway in a forested area and up to 3 km on each side in open habitats. For the affected area for general wildlife, we assumed a 1 km buffer on each side of both motorized and non-motorized routes, recognizing that this is probably an overestimate of some effects and an underestimate of others in all alternatives.

The percent of the Beartooth Unit available as core habitat would be essentially the same under all alternatives.

Alternative A
Mortality: This alternative has the highest number of open motorized route miles and thus the greatest potential for mortality, particularly of small, slow moving animals.

Habitat Modification /Changes to Behavior: In the Pryors Unit, the availability of "core" habitat is 16%, the smallest of the alternatives. Thus, the potential for effects on wildlife is greatest under this alternative.

Alternative B, No Action and Alternative B Modified
Mortality: The open motorized route miles, and thus the potential for mortality, would be similar under these two alternatives. It would be less than under Alternative A, but higher than Alternative C.

Habitat Modification /Changes to Behavior: In the Pryors Unit, "core" area would be similar under these three Alternatives. It would be 5 to 11 percent greater than Alternative A and 8 to 13 percent less than Alternative C.

Controlling dispersed recreation along riparian corridors in the Main Fork of Rock Creek and West Fork of Rock Creek is proposed under Alternative B. Wildlife, especially birds and medium to small mammals, would benefit from reduced disturbance and vegetation damage in these sensitive habitats.

Alternative C
Mortality: With the lowest open motorized route miles (195), this alternative has the lowest potential for leading to wildlife mortality.

Habitat Modification/Changes to Behavior: In the Pryors Unit, availability of "core" is 35%, the highest of the alternatives. Thus, the potential for effects to wildlife is the least under this alternative.

Cumulative Effects – General Wildlife

Mortality: Most of the mortality that occurs to wildlife species occurs on high speed, paved routes such as highways. Mortality on these types of roads can be significant for some species at some times of year. This is a cumulative effect that adds to effects on National Forest System routes.

Habitat Modification /Changes to Behavior: The analysis of indirect habitat loss or displacement was presented for public Forest Service motorized and non-motorized routes on National Forest only. There is also a cumulative effect of private, county, state and federal roads on the National Forest or adjacent lands that were not considered in this analysis. There are an increasing number of private routes on private land near the Beartooth portion of the District. The impacts to wildlife on private land and displacement of wildlife from private land are a cumulative effect that is likely to continue to increase.

There are cumulative effects of the human activity associated with roads and trails. One of these is the presence of pets (usually dogs) that can provoke a predator-alarm response, harassment and energy expenditure, and occasionally direct mortality of wildlife. There are also effects of the activities that humans do when they use roads and trails, including hunting, fishing, trapping, firewood cutting, viewing wildlife, rock climbing, spelunking, etc. All of these activities can potentially disturb wildlife, and some can cause direct mortality (Knight and Cole 1995). Hiking, biking, fishing, ATV use, horseback riding, dispersed camping, and other recreational activities are projected to increase sizably over the next ten to twenty years. This will gradually add to cumulative impacts over time.

The presence of roads may allow non-native species of animals to more easily move into an area or be introduced into an area by humans. An example of this would be the introduction of non-native bullfrogs that can extirpate native amphibians and fish (Maxell and Hokit 1999). Another example would be the introduction of the raccoon into areas where it had not previously existed. Raccoons can have negative effects on birds via nest predation. The presence of roads may facilitate the introduction of these types of species into areas where they have never existed and where the native fauna is not equipped to respond well to their presence.

One important cumulative effect is the development that is occurring near the National Forest or on private inholdings within the Forest. Ruediger (1996) suggests that as roads of increasingly high quality become available in an area, one can expect development to increase along these linear features. Seasonal use may become year-round. Areas become developed with subdivisions and the supporting infrastructure. This has serious impacts on wildlife habitat that is a cumulative effect of the presence of roads.

Dispersed recreation has increased on the Forest, and the appreciation for nonconsumptive uses of wildlife has also increased. Increased human use of the Forest displaces wildlife and can degrade habitat. Recreational residence sites remove wildlife habitat and may displace wildlife in those areas. Outfitter/guides offer non-consumptive wildlife activities as well as take many hunters into the Forest. Outfitter/guiding is regulated, and probably is less impactive to wildlife than non-outfitted activities (USDA Forest Service 2006). Developed ski areas are more likely to affect wolverine and lynx and are addressed as separate topics in this EIS. Some wildlife species could be affected by removal of trees from these areas. The acquisition of private lands within the District Boundary has helped protect wildlife habitat from development. Conservation easements on private lands outside the Forest protect habitat and are beneficial to wildlife.

The presence of large wilderness areas on the District and adjacent Forests offers a refuge for many wildlife species sensitive to the presence of humans. This has led to the presence of a high percent of habitat that is non-motorized and where wildlife is relatively undisturbed by large numbers of people.

Livestock grazing will continue on the District. Improved range management practices and monitoring of range condition are expected to improve wildlife habitat. Control of noxious weeds is important for maintaining high quality wildlife habitat and will continue in the future. Efforts to restore native vegetation to the landscape or enhance species that are declining are beneficial to wildlife.

Future improvements of FS roads and motorized routes may increase the impact of these facilities to wildlife by encouraging greater use. Other routes would be closed to public use, which would benefit wildlife in general.

An increase in dispersed recreation in which many of the dispersed users are interested in wildlife may actually be somewhat detrimental to the resource they wish to see, photograph, or hunt. Additional education of the public on their wildlife resource is important so that wildlife habitat is protected as are the animals that use it. Increasing public use will decrease the ability of wildlife to fully occupy available habitat, and some species are more likely to be affected than others.

Consistency with Laws, Regulations, and Policy

The wildlife goal in the Custer National Forest Management Plan is to "manage and/or improve key wildlife and fisheries habitats, to enhance habitat quality and diversity, and to provide wildlife and fish-oriented recreation opportunities." Forest Service Manual 2672.4 requires review of "all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened, proposed, or sensitive species." All alternatives are consistent with the Custer National Forest Management Plan and Forest Service Manual direction.

3.3.2.17 Affected Environment – Migratory Birds

Regulatory Framework

Migratory bird species are protected under the Migratory Bird Treaty Act (16 USC 703-711). A January, 2001 Executive Order requires agencies to ensure that environmental analyses evaluate the effects of federal actions and agency plans on migratory birds, with emphasis on species of concern. Species of concern include those listed under the Endangered Species Act, Forest Service Sensitive Species, and those identified as species of concern by the Montana Natural Heritage Program and the Montana Department of Fish, Wildlife and Parks (MNHP 2007, MFWP 2007). This discussion addresses potential effects of the Travel Plan alternatives on migratory bird species in general, including Forest Service Sensitive Species and Management Indicator Species.

Affected Environment - Migratory Birds

The following avian Forest Service Sensitive Species are present on the District: American peregrine falcon, bald eagle, black-backed woodpecker, blue-gray gnatcatcher, Harlequin duck, loggerhead shrike, and Northern goshawk. The following birds are Management Indicator Species on the District: Northern goshawk (also a Forest Service Sensitive Species), ruffed grouse, Bullock's oriole, yellow warbler, ovenbird, spotted towhee, Brewer's sparrow, golden eagle, and merlin. It is difficult to

address effects to migratory bird species collectively, since travel management actions can have adverse effects on some species, while being neutral or benefiting others. However, it would not be practical to attempt to address all migratory bird species separately. Therefore, the migratory bird discussion addresses effects of travel management actions on bird species and habitat in general, including that for sensitive and management indicator species, and resident species Northern goshawk and ruffed grouse.

Migratory bird species are a very diverse group and thus occupy all types of habitat available on the District, including lakes, streams, wetlands, riparian areas, grasslands, shrub lands, deciduous forest, coniferous forest, mixed forest, recently burned forest, alpine tundra, rock outcrops, talus, and sheer cliff walls. Many migratory bird species use habitat on the District as breeding grounds, while others breed in more northern climes and winter here. Some species are habitat specialists and are relatively restricted to certain cover types such as wetlands, riparian, forest interior or cliff habitat. Others are habitat generalists and can occupy a wide variety of cover types. Some bird species are extremely sensitive to habitat modifications and human disturbance, particularly in breeding areas, while others are much more tolerant of human intrusions, and might actually benefit from habitat modifications resulting from human activities.

Habitat Alteration

Travel management can affect habitat fragmentation by dissecting contiguous vegetation types with road and trail corridors. Fragmentation effects have been reported to impact bird species in riparian habitat and grass/shrub lands (Joslin and Youmans 1999), but most of the attention to this issue has been focused on fragmentation of forest habitat.

Road and trail corridors through continuous forest habitat can lead to increased nest predation rates since smaller forest patches may be easier for predators to penetrate, and roads and trails provide travel corridors for predators to access forest interior from nearby open habitat (Joslin and Youmans 1999, Askins 1994).

Road and trail corridors are relatively permanent features on the landscape, and can result in forest fragmentation by creating permanent openings in the forest canopy. Since road and trail corridors remain in the same location for many years, they can become learned features used by multiple generations of predatory and/or parasitic species (Askins 1994).

Rich et al (1994) studied the impacts of forest fragmentation associated with cleared road corridors on bird species in southern New Jersey. They found significantly greater relative abundance of forest interior bird species in edge habitat along narrow (approximately 8 m or 26 ft wide) unpaved forest roads than along wider (16 m or 53 ft wide) paved secondary roads. No significant differences in forest interior bird species abundance was found between narrow unpaved Forest road edges and forest interior habitat. Based on these findings, they concluded that forest interior nesters did not perceive a difference between forest interior habitat and edge habitat along unpaved forest roads. However, although most forest interior nesting species did not appear to avoid edge habitat along paved or unpaved forest road corridors, there were differential rates of nest predation and brood parasitism along varying widths of road corridors, suggesting that some corridors, particularly wider corridors with mowed edges, may be creating ecological traps for some migratory species of forest interior nesting songbirds.

Hutto et al. (1995) examined the rate of bird detections between on-road and off-road point counts in Montana. The majority of all species detected were found in both on-road and off-road points. However, points along roads less than 10 m (33 ft) wide did not show a difference in number of species detected from off-road points, whereas point counts along wider roads detected significantly more bird species than found in corresponding off-road points. Most species detected in the on-road points were those that typically forage in forest openings and shrubby habitat often present along road corridors. Those species detected in greater proportions in off-road points were forest interior associates. The most notable differences in number of species detected for on-road and off-road points occurred in forested cover types, with closed canopy forest showing the greatest difference, followed by open forest, and then early succession forest types.

Corridor width appears to influence bird species composition and associated nest predation and parasitism rates along roadways. Studies that specifically addressed the fragmentation impacts of road corridors on bird species (Rich et al. 1994, Askins 1994 and Hutto et al. 1995) generally reported that narrow (8-10 m, 26-33 ft) road corridors had few notable impacts on nesting bird species, whereas wider corridors, particularly where shoulders were maintained with mowing, had more notable effects associated with nest predation and brood parasitism. Roadside vegetation on the Forest is periodically managed through brush removal, but only the high use roads receive treatment, and only when the need arises (i.e., there is no set schedule for brush removal). Unpaved Forest road edges are rarely ever mowed, and therefore do not typically provide the type of grassy roadside vegetation preferred by cowbirds and some edge-associated nest predators.

Disturbance

The presence of travel facilities on the landscape generally affects bird species through habitat modification and associated impacts discussed above. The presence of humans using travel facilities typically affects birds through disturbance mechanisms. Knight and Gutzwiller (1995) stated: *"human occupation and activity are clearly and directly correlated with declines in breeding populations of birds."* Human disturbance associated with travel management can elicit both physiological and behavioral responses from birds, which can affect reproductive success and survival.

Forman et al. (2003) reported that breeding birds seem to be affected by noise disturbance associated with traffic on roads and trails. Songbirds appear to be sensitive to very low noise levels. The noise level that population densities of woodland birds declined at averaged 42 decibels (dB), with a density decline occurring at 35 dB for the most sensitive woodland species. For grassland species, population densities declined when noise levels reached an average of 48 dB, with a decline occurring at 43 dB for the most sensitive species (Foreman and Alexander 1998). While most studies have shown grassland and forest birds to appear adversely affected by traffic noise, other studies have found most species to be neutral or to increase in numbers (Kaseloo and Tyson 2004).

Although noise associated with human travel is certainly a disturbance factor that can influence bird behavior, birds are able to adapt and habituate more quickly to mechanical (or motorized) noise than to human presence (Knight and Gutzwiller 1995). Therefore, non-motorized use on and off trails may be a more severe disturbance factor for some birds than motorized travel restricted to designated routes.

3.3.2.18 Environmental Consequences – Migratory Birds

Direct and Indirect Effects

Effects Common to All Alternatives
Most of the habitat alteration (e.g. modification, loss and fragmentation) associated with District travel management has already occurred. The consequences of past habitat change are likely beneficial for some bird species and detrimental to others.

Alternative A
Of the four Alternatives considered, Alternative A represents a maximum for both habitat alteration effects and disturbance impacts to migratory bird species. At a route density of 0.88 mi/sq mi, Alternative A would contain an overall higher motorized travel route density as well as total motorized route miles on the District. Adverse effects would be greatest on bird species susceptible to changes in habitat and to human disturbance.

Alternative B, No Action, and Alternative B Modified
Average motorized route density across the District would be 0.72 to 0.75 mi/sq mi for Alternatives B, No Action, and Alternative B Modified. The total number of motorized route miles would be similar for these three alternatives. Adverse affects to susceptible bird species would therefore be essentially the same, but slightly less than under Alternative A.

Alternative C
The total motorized route miles and average motorized route density (0.60 mi/sq mi) for the District would be lowest under Alternative C. Thus, adverse effects to susceptible bird species would be lowest under this alternative.

Cumulative Effects – Migratory Birds
It is difficult to address cumulative effects to migratory bird species collectively since various management actions can have adverse effects on some species, while having no effect or benefiting others. It would not be practical to attempt to address all species individually. Therefore, this section summarizes cumulative effects of land uses to bird species in general, focusing on activities considered to have the greatest impacts on birds.

Timber harvest and fuel reduction projects on the District have involved removal of understory vegetation such as shrubs, young conifers and lower tree branches, as well as removal of mature trees. Such manipulation of habitat components can influence survival and reproductive rates of migratory bird species by altering cover, forage and predator/prey relationships. Changing habitat structure through fuel reduction projects could ultimately influence bird species composition in treated areas (USDA Forest Service. 2006.)

Large-scale wildfires and human-caused fires have altered bird habitat. Most bird species, native to this area, are adapted to our fire dependent ecosystem. Large-scale high intensity burns are largely responsible for maintaining natural forest succession patterns and providing habitat diversity. Lightning-caused fires typically occur mid to late summer when most young birds are fledged and are capable of rapid and prolonged flight to escape wild fire. Human-caused fire can occur any time of year, and prescribed fires on the District are often planned for spring-time ignition in order to use high

fuel moisture levels, standing water and/or snow to help contain fire within prescribed burn units. Spring burns occur during the nesting season when birds are vulnerable, and could result in reproductive failure for some individuals.

Fire suppression has increased the proportion of mature forest on the landscape, potentially to the detriment of some grass and shrub nesting bird species. Natural fire regimes are responsible for maintaining forest succession patterns and providing habitat diversity. However, past fire suppression efforts have resulted in unnatural levels of fuel buildup, which is now having the effect of producing proportionately more catastrophic wild fires, and consequently having severe impacts on native habitat.

Livestock grazing can affect migratory birds in a number of ways, such as destruction or disturbance of ground and shrub nests, removal of ground cover, and attraction of cowbirds. Grazing on the District has lead to degradation of bird habitat in some areas, particularly in certain riparian habitats. However, improved grazing standards are helping reduce negative effects.

Construction, maintenance, and use of campgrounds, picnic areas, and other developed recreation sites have altered the vegetation at those sites. Reduction in vegetation, particularly riparian shrubs, has likely reduced key nesting habitat for some bird species. Dispersed recreation sites have likely resulted in similar impacts as developed campgrounds.

Projected effects of reasonably foreseeable programs and activities have potential for both positive and negative cumulative effects to migratory birds and their habitat. Unmanaged recreation, invasive species, unnatural fuel buildup, and loss of open space are four major ecological threats recognized by public land management entities. Generally speaking, traditional land management practices are trending toward more ecologically sensitive programs. Accordingly, management practices are being redesigned to have less negative impacts on the land, while still allowing for the maximum spectrum of land uses within the capability of resources. On the other hand, private development is occurring adjacent to the Forest boundary, resulting in permanent habitat loss and greater potential for direct mortality than most actions predicted to occur on public land (USDA Forest Service. 2006).

Consistency with Laws, Regulations, and Policy

Management of migratory bird species and their habitats are governed by a wide variety of authorities. Most direction regarding conservation of these species falls under the umbrella of the Migratory Bird Treaty Act (16 USC 703-712) and an associated Presidential Executive Order. Under this Act, which implements various treaties and conventions for the protection of migratory birds, it is unlawful to take, kill or possess any migratory birds, except as regulated by authorized hunting programs. Executive Order 13186 directs Federal agencies whose actions have a measurable negative impact on migratory bird populations to incorporate migratory bird conservation into planning processes and take reasonable steps that include restoring and enhancing habitat. The proposed District Travel direction has taken migratory bird conservation issues into account through effects analyses, and thus is consistent with the above direction.

3.3.2.19 Conclusion - Wildlife

Wildlife effects analysis was conducted based on regulatory framework for threatened, endangered, sensitive, management indicator, and other species of concern. Conservation strategy standards and

guidelines and literature-based recommended guidelines were also considered. Analysis for lynx was based on motorized route density. Analysis for grizzly bears and wolverine were based on secure habitat availability. Analysis for elk was based on both motorized route density and secure habitat. Relative comparisons of available habitat and/or motorized route density were also conducted between alternatives for species and groups lacking conservation strategies, standards, or guidelines. The following outlines effects determinations for wildlife species.

Table 3-51. Wildlife Effects Determinations[28]

Species Name	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Threatened, Endangered, and Proposed Species					
Canada Lynx (Threatened)	NLAA	NLAA	NLAA	NLAA	NLAA
Gray Wolf (Experimental nonessential)	No Jeopardy	No Jeopardy	No Jeopardy	No Jeopardy	No Jeopardy
Forest Service Sensitive Species					
American peregrine falcon *(Falco peregrinus anatum)*	MIIH	NI	NI	MIIH	NI
Baird's sparrow *(Ammodramus bairdii)*	NI	NI	NI	NI	NI
Bald Eagle *(Haliaeetus leucocephalus)*[29]	NI	NI	NI	NI	NI
Black-backed woodpecker *(Picoides arcticus)*	NI	NI	NI	NI	NI
Blue-gray gnatcatcher *(Polioptila)*	MIIH	MIIH	MIIH	MIIH	MIIH
Burrowing owl *(Athene cunicularia)*	NI	NI	NI	NI	NI
Greater sage grouse *(Centrocercus urophasianus)*	NI	NI	NI	NI	NI
Grizzly Bear (*Ursus arctos*)[30]	MIIH	MIIH	MIIH	MIIH	MIIH
Harlequin duck *(Histrionicus histrionicus)*	NI	NI	NI	NI	NI
Loggerhead Shrike *(Lanius ludovicianus)*	NI	NI	NI	NI	NI
Long-billed curlew *(Numenius americanus)*	NI	NI	NI	NI	NI
Northern goshawk *(Accipter gentilis)*	MIIH	MIIH	MIIH	MIIH	MIIH
Long-eared myotis *(Myotis evotis)*	MIIH	BI	MIIH	MIIH	BI
Long-legged myotis *(myotis volans)*	MIIH	BI	MIIH	MIIH	BI
Pallid bat *(Antrozous pallidus)*	MIIH	BI	MIIH	MIIH	BI
Spotted bat *(Euderma maculatum)*	MIIH	BI	MIIH	MIIH	BI
Townsend's big-eared bat *(Corynorhinus townsendii)*	MIIH	BI	MIIH	MIIH	BI
Black-tailed prairie dog *(Cynomys ludovicianus)*	MIIH	NI	MIIH	MIIH	NI

[28] Options for effects determinations are: For federally listed species: NE = No effect; NLAA = May effect – not likely to adverse affect; LAA = May effect – likely to adversely affect; and BE = Beneficial effect. For Forest Service sensitive species: NI = No impact; MIIH = May impact individuals but is not likely to cause a trend to Federal listing or loss of viability; WIFV = Likely to result in a trend to Federal listing or loss of viability; and BI = Beneficial impact. For management indicator species: + = Positive effect; 0 = Neutral effect; and - = Negative effect. For other species of concern: NE = No effect.

[29] Bald eagle delisted effective August 8, 2007 and subsequently managed as a Forest Service Sensitive Species.

[30] Grizzly bear delisted effective April 30, 2007 and subsequently managed as a Forest Service Sensitive Species as directed in "Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem, Interagency Grizzly Bear Study Team, March 2003."

Table 3-51. Wildlife Effects Determinations [28]

Species Name	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
White-tailed prairie dog *(Cynomys leucurus)*	NI	NI	NI	NI	NI
Wolverine *(Gulo gulo)*	NI	NI	NI	NI	NI
Greater short-horned lizard *(Phrynosoma hernandesi)*	NI	NI	NI	NI	NI
Milk Snake *(Lampropeltis triangulum)*	NI	NI	NI	NI	NI
Western hog-nosed snake *(Heterodon nasicus)*	NI	NI	NI	NI	NI
Management Indicator Species [31]					
Northern Goshawk *(Accipiter gentilis)* (H)	0	0	0	0	0
White-tailed deer *(Odocoileus virginianus)* (H, K)	0	0	0	0	0
Ruffed grouse *(Bonasa umbellus)* (H)	0	0	0	0	0
Western kingbird *(Tyrannus verticalis)* (H)	0	0	0	0	0
Bullock's (Northern) oriole *(Icterus bullockii)* (H)	0	0	0	0	0
Yellow warbler *(Dendroica petechia)* (H)	0	0	0	0	0
Oven bird *(Seiurus aurocapillus)* (H)	0	0	0	0	0
Spotted (Rufous-sided) towhee *(Pipilo maculatus)* (H)	0	0	0	0	0
Brewer's sparrow *(Spizella Breweri)* (H)	0	0	0	0	0
Sharp-tailed grouse *(Tympanuchus phasianellus)* (H, K)	0	0	0	0	0
Elk *(Cervus canadensis)* (K)	0	0	+	0	0
Golden eagle *(Aquila chrysaetos)* (K)	0	0	0	0	0
Merlin *(Falco columbarius)* (K)	0	0	0	0	0
Mule deer *(Odocoileus hemionus)* (K)	0	0	+	0	0
Bighorn sheep *(Ovis Canadensis)* (K)	0	0	0	0	0
Pronghorn antelope *(Antilocapra Americana)* (K)	0	0	0	0	0
Other Species of Concern					
Mountain Goat	NE	NE	NE	NE	NE
Marten	NE	NE	NE	NE	NE
Fisher	NE	NE	NE	NE	NE

Threatened, endangered, sensitive, Custer Forest management indicator species and other species of concern. Regarding threatened, endangered, sensitive, and Custer Forest management indicator species, all alternatives are consistent with the National Forest Management Act (36 CFR 219.19) which directs federal agencies to manage habitat to provide for viable populations of all native and desired non-native fish and wildlife species. All alternatives are also consistent with Forest Service

[31] H = Habitat Indicator Species; K = Key Species

Manual (FSM 2672.1) direction for management of sensitive species which states that these species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. The following table summarizes the effects determination.

Table 3. 52. Effects Determination Summary

Indicator	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Threatened or Endangered Species					
Number of species with No Jeopardy	1	1	1	1	1
Number of species with potential to effect, but not likely to adversely affect.	1	1	1	1	1
Number of species with potential to effect, and likely to adversely affect	0	0	0	0	0
Sensitive Wildlife Species					
Number of Species with Beneficial Impact	0	5	0	0	5
Number of Species with No Impact	14	15	15	14	15
Number of Species with potential to effect individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species	9	3	8 [32]	9	3
Number of Species likely to result in a trend to Federal listing or loss of viability	0	0	0	0	0
Management Indicator Species					
Number of Species with Positive Effects	0	0	2	0	0
Number of Species with Neutral Effects	16	16	14	16	16
Number of Species with Negative Effects	0	0	0	0	0
Other Species of Concern					
Number of Species with No effect	3	3	3	3	3

Canada Lynx. All alternatives are consistent with the laws, regulations, policy, and Federal, Regional, and State direction, the Custer National Forest Management Plan, the Canada Lynx Conservation and Assessment Strategy, and the Northern Rockies Lynx Management Direction. Of these regulatory directions, the latter two documents specifically address Forest roads relative to lynx conservation and recovery.

The anticipated direct and indirect effects to lynx, and their habitats, from any of the alternatives are small. No alternative would exceed the Canada Lynx Conservation Assessment and Strategy programmatic guideline for Forest backcountry roads and trails of a maximum 2.0 mi/sq mi road density. Average open motorized route density in lynx habitat across the Beartooth District would be 0.2 mi/sq mi under Alternative B, Alternative C and Alternative B Modified, and 0.3 mi/sq mi under Alternative A and No Action. No alternatives would exceed the Canada Lynx Conservation Assessment and Strategy programmatic guideline for Forest backcountry roads and trails of a maximum 2.0 mi/sq mi road density.

[32] Although Alternative C has fewer motorized routes than the other alternatives, it does not provide the same level of protection to some sensitive species due to lower amount of area receiving seasonal restrictions. Therefore, there is potential to effect individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species on more sensitive species in Alternative C than in Alternatives B or B Modified.

Gray Wolf. All alternatives are consistent with the laws, regulations, policy, and Federal, Regional, and State direction, the Custer National Forest Management Plan, and the Montana Gray Wolf Conservation and Management Plan. None of these regulatory directions specifically address Forest roads relative to wolf conservation and management.

To indicate potential effects to gray wolf displacement, avoidance, and recolonization changes in motorized route density from No Action are assessed. In the Beartooth and Pryor Units, Alternative A would increase open motorized route density over No Action by 0.09 and 0.30 mi/sq mi, respectively. This is the highest motorized route density of the alternatives. In the Beartooth Unit, Alternatives B and B Modified would increase open motorized route density over No Action by 0.07 and 0.06 mi/sq mi, respectively. In the Pryor Unit, Alternatives B and B Modified would each decrease open motorized route density over No Action by 0.10 mi/sq mi. In the Beartooth and Pryor Units, Alternative C would increase open motorized route density over No Action by 0.05 and 0.35 mi/sq mi, respectively. This is the lowest motorized route density of the alternatives.

Grizzly Bear. All alternatives are consistent with the laws, regulations, policy, and Federal, Regional, and State direction, the Custer National Forest Management Plan, and the Conservation Strategy for Grizzly Bear in the Yellowstone Ecosystem (ICST 2003; updated 2007). The habitat and conservation standards, described in the Conservation Strategy, have formally been incorporated into the Custer National Forest Plan. It provides the direction for managing grizzly bear habitat on the National Forest.

Within the grizzly bear Primary Conservation Area (PCA), 96% of habitat would be secure under all alternatives. This is consistent with the Grizzly Bear Conservation Strategy standard to maintain secure habitat at or above 1998 levels. Availability of secure biologically suitable habitat for grizzly bears outside the PCA would effectively be the same between the alternatives, 91% in Alternative A and 92% in the other four alternatives. In addition, the availability of secure biologically unsuitable habitat outside the PCA would effectively be the same under Alternatives B (59%), No Action (57%), and Alternative B Modified (58%); lowest under Alternative A (52%); and greatest under Alternative C (64%). The availability of biologically unsuitable habitat is pertinent because grizzly bears have been documented in such habitat on the Beartooth District within the last five years.

Wolverine. All alternatives are consistent with the National Forest Management Act (36 CFR 219.19) which directs federal agencies to manage habitat to provide for viable populations of all native and desired non-native fish and wildlife species. All alternatives are also consistent with Forest Service Manual (FSM 2672.1) direction for management of sensitive species which states that these species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing.

Open motorized route density in wolverine habitat under all alternatives would be characterized as low (<=0.7 mi/sq mi). The percent of wolverine habitat available as refugia would be the lowest under Alternatives A and No Action (66%), and effectively the same under Alternatives B and C (74%), and Alternative B Modified (71%).

Bighorn Sheep. All alternatives are consistent with the following direction on occupied bighorn sheep range. The Custer National Forest Management Plan contains relevant direction for management of

big game populations. The protection measure for key wildlife species, including big game species, relative to travel management planning states, "Where necessary to protect wildlife values, access and/or traffic will be restricted in key wildlife habitats during critical periods."

Alternative C would provide the greatest acreage of bighorn sheep escape terrain in both the Beartooth and Pryor Units, 5970 and 6138 acres respectively, and in turn, Alternative A would provide the least acreage, 5543 and 3920 acres. Alternatives B, No Action, and Alternative B Modified would fall in between, with 5904, 5612, and 5809 acres respectively in the Beartooth Unit, and 4926, 4388, and 5129 respectively in the Pryor Unit. Bighorn sheep winter range is currently utilized only on the Beartooth Unit, where the No Action Alternative would provide the greatest availability (10,483 acres) and Alternative A the least (10,076 acres). Alternatives B and C would be similar (10,258 and 10,288 acres respectively), and Alternative B Modified would provide 10,129 acres.

Elk and Deer. Because of the large overlap in habitat between elk and deer, the elk analysis serves as a surrogate for mule deer and white-tailed deer and impacts of travel management on the District are expected to be very similar for these three species.

All alternatives are consistent with the Custer National Forest Management Plan which contains relevant direction for management of big game populations. The goal for key wildlife species, including big game species, relative to travel management planning states, "Where necessary to protect wildlife values, access and/or traffic will be restricted in key wildlife habitats during critical periods." Key habitats are described in Appendix VII of the Forest Plan and largely occur in Management Area C relative to core elk winter range where seasonal motorized use restrictions apply.

Hunting season vulnerability was assessed using motorized route density and secure elk habitat. Under all alternatives, the Beartooth Unit open motorized route densities in elk habitat would range from 0.37 to 0.47 mi/sq mi. This is within the recommendation to manage roads at <1.0 mi/sq mi for elk habitat. Secure elk habitat would range from 64% to 69%, which is above the recommended 30% minimum.

On the Pryor Unit, Alternatives A and No Action would have the highest open motorized route density relative to wolves (1.5 mi/sq mi) and in elk habitat (1.49 and 1.44 mi/sq mi, respectively), plus would provide the lowest elk security cover (22% and 23%, respectively). Open motorized route density for Alternatives B and Alternative B Modified are 1.16, and 1.27 mi/sq mi, respectively and approach the density recommendation of 1 mi/sq mi. Secure elk habitat would range from 23% to 26%, which is below the recommended 30% minimum. Alternative C, with open motorized route density of 0.69 mi/sq mi in elk habitat, and security cover of 37%, and would fall within the recommendations for elk.

Wildlife in General. All alternatives are consistent with the Custer National Forest Management Plan and Forest Service Manual direction. The wildlife goal in the Custer National Forest Management Plan is to "manage and/or improve key wildlife and fisheries habitats, to enhance habitat quality and diversity, and to provide wildlife and fish-oriented recreation opportunities." Forest Service Manual 2672.4 requires review of "all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened, proposed, or sensitive species."

"Core" habitat available for wildlife in general in the Beartooth Unit would range from 82% to 83%,

effectively the same for all alternatives. On the Pryors Unit, availability of "core" habitat would be the greatest under Alternative C (35%) and the least under Alternative A (16%). The No Action alternative would provide 22% "core", and availability would be similar under Alternatives B and B Modified (25% and 27% respectively).

All alternatives have taken migratory bird conservation issues into account through effects analyses, and thus are consistent with the following direction. Management of migratory bird species and their habitats are governed by a wide variety of authorities. Most direction regarding conservation of these species falls under the umbrella of the Migratory Bird Treaty Act (16 USC 703-712) and an associated Presidential Executive Order. Under this Act, which implements various treaties and conventions for the protection of migratory birds, it is unlawful to take, kill or possess any migratory birds, except as regulated by authorized hunting programs. Executive Order 13186 directs Federal agencies whose actions have a measurable negative impact on migratory bird populations to incorporate migratory bird conservation into planning processes and take reasonable steps that include restoring and enhancing habitat.

3.3.3 SOILS

Overview of Changes from the Draft to the Final EIS
The following changes to this section were made in response to public comments:

- In response to public comment, the erosion hazard rating for the existing condition is broken out for the Beartooth and Pryor Mountains areas.
- The Soil Survey of Carbon County (USDA SCS, 1975) was used to describe the landforms and determine erosion hazard in the Pryor Mountains. The draft Terrestrial Ecological Unit Inventory (TEUI) currently under way (data on file in the Supervisor's Office, Billings, MT) was used to supplement the LTAs and help describe the landforms and ratings in the Beartooth Mountains, allowing all roads and trails to be included in the erosion hazard rating analysis.
- The county soil survey and draft TEUI were used to analyze the effects of the Alternatives.
- The discussion on landforms was removed from the FEIS, though erosion hazard rating information remains.
- A section was added on Soil Crusts (see specialist report in the project file) in response to public comment.

3.3.3.1 Affected Environment – Soils

The project area is located in the Beartooth and Pryor Mountains. The District is part of the Yellowstone Highlands and Bighorn Mountains Section[33]. The Soil Survey of Carbon County Area, Montana (USDA SCS, 1975) was used to describe the landforms and determine erosion hazard ratings in the Pryor Mountains. Information from Landtype Associations (LTAs) (Ford et al, 1997) (http://forest.moscowfsl.wsu.edu/smp/solo/GeoPath/lta/index.php) were supplemented by the draft Terrestrial Ecological Unit Inventory (TEUI) currently under way (data on file in the Supervisor's

[33] The Beartooth Mountains are part of the Beartooth Front Subsection (M331Ar), The Beartooth Mountain Subsection (M331Ah), and the Absaroka-Gallatin Mountain Subsection (M331Aa) which are within the Yellowstone Highlands Section (M331A). The Pryor Mountains are part of the Bighorn Mountains, Sedimentary Subsection (M331B) which is within the Bighorn Mountains Section.

Office, Billings, MT) to describe the landforms and determine erosion hazard ratings in the Beartooth Mountains.

Soils range from shallow to deep, are coarse to fine textured and minimally developed to well developed. This stratification of Pryor and Beartooth Units is useful because geology identifies the kind of material that soils have developed from and the landforms identify the general topography where the soils are located. Both of these infer much about the physical soil attributes which are important for predicting erosion and soil productivity impacts from surface disturbance. Soil texture, coarse fragment size and content, depth, slope, and water holding ability are correlated with these stratifications. The youthful nature of mountain soils makes the correlation between geology and soil physical attributes especially useful.

There are 15 Landtype Associations (LTAs), and multiple TEUI and soil units that contain roads and trails in the project area. The LTA units are documented and described in "Landtype Associations of the Northern Region, 1997: A First Approximation", (Ford, et al. 1997). The Carbon County Soil Survey area is available from the NRCS, as well as on the web (http://nris.state.mt.us/nrcs/soils/datapage.html or http://www.mt.nrcs.usda.gov/soils/mtsoils/official.html)

Erosion risk ratings are provided from the county soil survey, draft TEUI, LTAs and other publications (on file in the project record). They are estimates of the potential for erosion after soil disturbance and are based on the inherent soil resistance to erosion and the erosive forces acting upon them. Low hazard implies little to no potential for erosion, moderate hazard implies potential for erosion but implementing normal BMP practices are usually effective at controlling erosion, and a high hazard implies that considerable effort is necessary to control erosion, generally at a higher cost. In some cases, effective erosion control is not possible for roads and trails on high erosion risk soils.

These ratings do not mean that management (i.e. roads and trails) should not occur on soils with a specific rating but rather what types of mitigation and management are needed to minimize the impact.

The following tables display the miles of road in each erosion hazard for the different jurisdictions in the project area.

Table 3-53. Summary of Road and Trail Miles by Water Erosion Hazard Rating for the Existing Condition in the Beartooth Mountains Area.

Jurisdiction and System Status	Low	Medium	High	Very High	Grand Total
National Forest System Road	85.50	39.41	35.49	9.89	170.41
National Forest System Trail- Motorized	1.75	2.84	0.42	3.22	8.22
National Forest System Trail – Non-Motorized	124.14	76.14	63.69	11.04	275.81
Non System Trail	4.03	1.94	5.09	0.06	11.35
Non-Forest Service Routes	37.42	20.29	11.03	5.74	74.57
Grand Total	252.84	140.63	115.72	29.95	540.36

Note: Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

Table 3-54. Summary of Road and Trail Miles by Water Erosion Hazard Rating for the Existing Condition in the Pryor Mountains Area.

Jurisdiction and System Status	Low	Medium	High	Rock Outcrop and Other	Grand Total
National Forest System Road	0.11	78.92	77.62	15.10	171.74
National Forest System Trail – Non-Motorized	-	-	1.11	0.26	1.37
Non-Forest Service Routes	0	15.11	16.58	6.67	38.36
Grand Total	0.11	94.03	95.31	22.03	211.47

Note: Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

Soil Productivity

The Region 1 soil quality standards apply to lands where vegetation and water resource management are the principal objectives, that is, timber sales, grazing pastures or allotments, wildlife habitat, and riparian areas (USDA Forest Service, 1999). Roads and trails are a "dedicated use" for lands that comprise the road prism and right of way. The affected land is managed for transportation uses and is not managed for soil and vegetation productivity. Therefore, the Region 1 soil quality standards do not apply to this analysis. However, the decision made in this project will affect the amount of land in productive capability. By adding routes to the system and designating or not designating a route for specific use might have an impact on other projects and that projects ability to meet Regional policy regarding soil quality.

Roads and trails do have an impact on soil productivity, especially when users veer off the established travelway to bypass wet or muddy sections of the road or trail, bypass switchbacks, and create shortcuts. User created routes eliminates the protective vegetative cover, compacts the exposed soil surface, generates and concentrates runoff, and causes accelerated soil erosion. The travel surface is mostly removed from the productive soil base and productivity is reduced on the cut slopes and fill slopes.

Some impacts are normally accepted as a necessary cost to provide access to public lands, as long as most impacts are limited to the immediate area of disturbance, the road or trail can be maintained at a reasonable cost, and permits use as long as it's needed. Implementing Best Management Practices (BMPs) are intended to meet these objectives. There are some unclassified roads and trails that are not on the transportation system, as well as those that are on the system that are causing soil impacts beyond what is normally accepted because they fail to meet the standards of BMPs. Some of the reasons they may not meet standards are improper location, inadequate drainage to prevent accelerated erosion and deposition, or high maintenance costs. Often this leads to pioneering new routes or trails to get around sections that are difficult to traverse. This leads to more soil that is exposed, compacted, and eroded. The end result is an increasing amount of soil disturbance and associated impacts, both to the road and off-site.

Roads and trails impact and disrupt the natural function of the soil resource, and are long-term commitments to that specific use. This is considered an irretrievable commitment of the soil resource for as long as the road or trail exists. Soil function and productivity on roads and trails can be recovered and the Forest Service has considerable experience in rehabilitating old roads with fairly successful results (Kolka and Smidt, 2004).

Soil Crusts

Information on distribution and extent of soil crusts in the area is generally lacking. There are no references to soil crusts in the Soil Survey of Carbon County, for the Pryor Mountains area. Soil crusts are commonly found in more arid regions where vegetative cover is generally sparse, typically in semiarid and arid environments throughout the world. Areas in the United States where crusts are a prominent feature of the landscape include the Great Basin, Colorado Plateau, Sonoran Desert, and the inner Columbia Basin. (http://www.soilcrust.org/crust101.htm). Because of the environmental factors soil crusts are probably very limited in the Beartooth Mountains. Biological soil crusts occurrence on National Forest Lands in the Pryor Mountains are probably also fairly limited to areas with low vegetative cover (high bare ground) and lower elevations.

Soil crusts most likely do not occur on existing roads and trails due to type and level of existing disturbance. Off-road travel by motor vehicle is currently prohibited except for dispersed camping within 300 feet of the road. The majority of dispersed campsites currently have some level of disturbance; soil crusts are probably not very prevalent in these areas. These dispersed campsites are most likely not located in the dryer open areas in the area but are more generally found in areas with higher vegetative cover, some shade, and at higher elevations. (Also, see the section on vegetation and sensitive plants for additional discussion on dispersed campsite availability.) Generally, soil crusts will not be affected by designating roads and trails, since no new construction is being considered at this time.

3.3.3.2 Environmental Consequences - Soils

Direct and Indirect Effects

Effects Common to All Alternatives

Soil effects resulting from development and use of forest roads and trails have been fairly well documented (Gucinski, et al, 2001, Wilson and Seney, 1994, Weaver and Dale, 1978). Effects from roads and trails can vary by standard and condition.

Soil effects from roads and trails include removal of vegetative cover, compaction, degradation of soil structure, decreased infiltration and water holding capacity, reduction in soil organic material, accelerated erosion, and potential mass failure including landslides or slumps. These types of impacts can occur on motorized or non-motorized roads and trails. Erosion tends to be least on roads and trails with flat grades and more severe on roads and trails with steeper gradients.

Soil crusts probably do exist in the project area though the extent and distribution are not well known. There might be impacts to soil crusts mainly due to off-trail travel. Off-trail travel (i.e. "bushwacking") by stock, foot, and motorized travel could have a negative impact on soil crusts where they exist.

Roads will typically have a greater magnitude of impacts on soils, compared to trails, as cut and fill slopes normally cause greater disturbance on areas adjacent to the road tread. On average the road tread on forest roads is typically around 12 to 15 feet wide. On steep slopes the total area of disturbance can be twice the width of the tread, or around 24 to 30 feet wide. The magnitude and extent of soil impacts are generally the least on trails designed for non-motorized uses compared to

roads and motorized use trails. This is normally due to non-motorized trails not requiring large cut and fill slopes. The trail tread for non-motorized trails is usually designed to be 2 feet wide. Non-motorized trails affect a relatively narrow corridor, typically no more than 6 feet wide for the total area of soil disturbance. Trails designed for motorized uses are typically intermediate in magnitude and extent of soil impacts, compared to roads and non-motorized trails. Motorized trails generally require moderate cut and fill construction. The exact width of soil disturbance associated with motorized and non-motorized roads and trails in the analysis area has not been measured in the field.

Effects Common to All Action Alternatives

Effects on soils from roads vary by standard and condition. The area that roads and their associated disturbance occupy are removed from the productive soil base. Runoff from roads affects soil productivity by eroding soil from and adjacent to the road, and by depositing sediment on areas below the road. These effects are slight on well maintained, high standard roads. Other roads have more serious effects that tend to be localized on road segments where surface drainage is inadequate.

Roads that are not designated for public motorized use and for which no administrative use has been identified may be considered candidates for decommissioning or rehabilitation. These roads, with the exclusion of motorized traffic, should begin to revegetate and over time, continue to have improved soil productivity and eventually be brought back to the productive soil base. If these roads are identified for obliteration or rehabilitation, and which is then successfully implemented, the time frame in which these roads are brought back to the productive land base should be much more rapid.

Roads and trails that are closed to public motorized use should have reductions in erosion and runoff. Removing the disturbance should reduce the impact to soils gradually allowing revegetation and litter accumulation on the route surface.

Season of use designations will affect soils by reducing the likelihood of users creating additional disturbance to bypass wet or muddy areas. Season of use designations are established to help mitigate soil and erosion concerns by trying to ensure use when roads and trails are dry.

Comparisons of hazard ratings by alternative are found in the following Tables (Route Miles by Erosion Hazard Rating by Alternative).

Table 3-55. Route Miles By Erosion Hazard Rating For The Different Alternatives In The Beartooth Unit.

Designation	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Public Motorized					
High/Very High	29.30	23.09	18.86	26.94	25.47
Medium	34.51	23.30	19.35	26.40	26.00
Low	94.30	85.83	71.36	77.58	84.58
Public Non-motorized					
High/Very High	72.22	76.25	75.89	72.19	72.24
Medium	78.00	81.51	81.52	75.19	78.01
Low	123.59	124.17	125.94	121.65	121.92
Administrative					
High/Very High	17.37	15.19	14.65	12.86	18.37
Medium	11.23	12.51	12.90	10.41	14.59

Table 3-55. Route Miles By Erosion Hazard Rating For The Different Alternatives In The Beartooth Unit.

Designation	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Low	7.06	7.28	7.98	5.41	7.34
Not Designated					
High/Very High	6.13	8.48	7.85	13.03	8.75
Medium	11.55	17.97	21.46	23.23	16.58
Low	5.77	13.44	25.44	26.09	14.56

Note: Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

Table 3-56. Route Miles By Erosion Hazard Rating For The Different Alternatives In The Pryor Unit

Designation	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Public Motorized					
High/Very High	81.26	56.89	31.42	66.89	58.04
Medium	19.38	8.82	7.92	13.35	10.39
Low	72.11	53.61	37.65	62.06	53.02
Other	19.38	8.82	7.92	13.35	10.39
Public Non-motorized					
High/Very High	1.10	1.50	1.50	1.10	1.50
Medium	-	-	-	-	-
Low	-	-	-	-	-
Other	0.25	0.25	0.25	0.25	0.25
Administrative					
High/Very High	2.11	5.78	14.00	0.01	3.88
Medium	3.56	8.94	11.21	0.67	7.87
Low	-	-	-	-	-
Other	0.31	0.71	0.98		0.71
Not Designated					
High/Very High	5.61	25.91	43.05	22.08	26.43
Medium	8.51	21.64	35.01	21.45	24.49
Low	-	0.10	0.10	-	0.10
Other	0.63	10.79	11.43	6.98	9.26

Note: Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

Alternative A

This alternative would have the greatest impact on soils for the action alternatives. This alternative would add 6 miles of routes for administrative use and 17 miles or routes for public motorized use on landforms with high erosion hazard compared to the No Action Alternative. This includes adding routes to the system, changes in designation, and addressing non-system routes.

This alternative would prohibit motorized travel on 38 miles of routes (11 miles on landforms with high erosion hazard), allowing vegetation to reestablish. This would reduce erosion and concentrated runoff from these sites. These areas would eventually be returned to productive capability. The seasonal closures for purposes of minimizing effects of motorized use during spring breakup (27 miles) would allow portions of roads and trails to dry out and reduce the chance of rutting and subsequent erosion. The percent of total routes designated for public use that have proposed seasons

of use is 8%.

There are approximately 3 miles of non-system trails being added to the system for non-motorized use and approximately 2 miles of roads that are being converted to non-motorized use. This should lead to an overall improvement in the soil condition in these general areas.

Alternative B

This alternative would add 8 miles of routes for administrative use and decrease by 13 miles the routes available for public motorized use on landforms with high erosion hazard compared to the No Action Alternative. This includes adding routes to the system, changes in designation, and addressing non-system routes.

This alternative would prohibit motorized travel on 100 miles of routes (34 miles on LTAs with high erosion hazard), allowing vegetation to reestablish. This would reduce erosion and concentrated runoff from these sites. The seasonal closures for purposes of minimizing effects of motorized use during spring breakup (91 miles) would allow portions of roads and trails to dry out and reduce the chance of rutting and subsequent erosion. The percent of total routes designated for public use that have proposed seasons of use is 34%. Pack and saddle stock restrictions will allow vegetation to reestablish and reduce effects to soils over time.

Changes in dispersed vehicle camping along the Main Fork of Rock Creek Road (#2421) will allow 28 sites heavily impacted by repeated use to gradually revegetate, which will lead to a reduction in compaction and improved infiltration and less erosion and runoff. The remaining dispersed sites will likely continue to receive heavy use. However, expansion of new sites in the Main Fork of Rock Creek would be restricted under this alternative.

There are approximately 4.5 miles of non-system trails being added to the system for non-motorized use and approximately 2 miles of roads that are being converted to non-motorized use. In addition there are over 7 miles of roads that would be changed from motorized use to non-motorized use. This should lead to an overall improvement in the soil condition in these general areas.

Alternative C

This alternative would add 16 miles of routes for administrative use and decrease by 43 miles the routes available for public motorized use on landforms with high erosion hazard compared to the No Action Alternative. This includes adding routes to the system, changes in designation, and addressing non-system routes.

This alternative would prohibit motorized travel on 144 miles of routes (50 miles on LTAs with high erosion hazard), allowing vegetation to reestablish. This would reduce erosion and concentrated runoff from these sites. The seasonal closures for purposes of minimizing effects of motorized use during spring breakup (44 miles) would allow portions of roads and trails to dry out and reduce the chance of rutting and subsequent erosion. The percent of total routes designated for public use that have proposed seasons of use is 21%. Pack and saddle stock restrictions will allow vegetation to reestablish and reduce effects to soils over time. Reducing access for dispersed vehicle camping will allow areas heavily impacted by repeated use to gradually revegetate, which will lead to a reduction in compaction and improved infiltration and less erosion and runoff.

There are approximately 4.5 miles of non-system trails being added to the system for non-motorized use and approximately 2 miles of roads that are being converted to non-motorized use. In addition there are over 11 miles of roads that would be changed from motorized use to non-motorized use. This should lead to an overall improvement in the soil condition in these general areas.

No Action Alternative

Existing low standard roads and trails would continue to erode and concentrate runoff and erosion at present rates. The seasonal closures for purposes of minimizing effects of motorized use during spring breakup (18 miles) would allow portions of roads and trails to dry out and reduce the chance of rutting and subsequent erosion. The percent of total routes designated for public use that have proposed seasons of use is 6%. Existing sites where soil erosion is a concern will continue to erode and contribute sediment. The area of soil productivity effects would continue to expand as new trail segments are developed to get around areas that are eroded. Off-site deposition of eroded material and soil erosion from roads and trails, and concentrated runoff would continue at existing or expanded rates.

Alternative B Modified

This alternative would add 9 miles of routes for administrative use and decrease by 11 miles the routes available for public motorized use on landforms with high erosion hazard compared to the No Action Alternative. This includes adding routes to the system, changes in designation, and addressing non-system routes.

This alternative would prohibit motorized travel on 100 miles of routes (35 miles on landforms with high erosion hazard and 41 miles on landforms with medium erosion hazard), allowing vegetation to reestablish. This would reduce erosion and concentrated runoff from these sites.

The seasonal closures for purposes of minimizing effects of motorized use during spring breakup (99 miles) would allow portions of roads and trails to dry out and reduce the chance of rutting and subsequent erosion and to prohibit visitors from driving around wet or muddy sections of roads.

The percent of total routes designated for public use that have proposed seasons of use is 34%. Changes in dispersed vehicle camping along the Main Fork of Rock Creek Road (#2421) will allow 28 sites heavily impacted by repeated use to gradually revegetate, which will lead to a reduction in compaction and improved infiltration and less erosion and runoff. The remaining dispersed sites will likely continue to receive heavy use. However, expansion of new sites in the Main Fork of Rock Creek would be restricted under this alternative.

Approximately 255 miles of routes will allow public motorized use (82 miles on landforms with high erosion hazard, 79 miles on landforms with medium erosion hazard, and 84 miles on low erosion hazard landforms). Of the 161 miles of public motorized use on landforms with high and medium erosion hazards, 84 miles are designated for highway vehicles and 111 miles are designated for all motorized vehicles which might include highway vehicles. Approximately 50 miles of routes on high and medium erosion hazard landforms are designated for OHV or motorcycle use. There are 273 miles of routes that will allow non-motorized use (73 miles on high erosion hazard landforms, 78 miles on landforms with medium erosion hazard and 121 miles on low erosion hazard landforms. This could affect soil productivity by eroding soil from and adjacent to the road, and by depositing sediment on areas below the road.

This alternative also recognizes roads and trails that will be designated for motorized use contingent on completing mitigation. There are approximately 0.42 miles of motorized road in the Pryor Mountains area (portion of road 2144) that will be designated for use by OHVs less than 50 inches wide once mitigation is complete. This designation is dependent on addressing erosion, water on the road, and the subsequent user created trails bypassing this segment. These concerns have affected soil productivity in this area. This portion of the road will not be open to motorized travel until adequate erosion control measures are implemented on the specific section of road. Appropriate mitigation will be determined based on site specific inventory and analysis.

There are approximately 3 miles of non-system trails being added to the system for non-motorized use and approximately 2 miles of roads that are being converted to non-motorized use. In addition there are around 0.5 miles of roads that would be changed from motorized use to non-motorized use. This should lead to an overall improvement in the soil condition in these general areas.

Cumulative Effects-Soils

Cumulative effects occur when past present or foreseeable activities overlap in both time and space with the proposed activities. Cumulative effects would occur only where proposed activities would overlap where previous management has affected soil conditions. Activities outside of the locations of proposed management are not subject to cumulative effects because they do not overlap spatially with the lands being proposed for management in the Beartooth Travel Management Project. Soil effects do not extend off of the piece of ground where they occur.

The current logging and mining activities that do occur in the analysis area incorporate BMPs and produce relatively few soil impacts relating to roads and trails. Timber sales are audited for compliance with BMPs and are monitored to see that design features that reduce soil effects are implemented.

The continuation of livestock grazing activities will overlap with the proposed action in both time and space. They could potentially contribute to the effects. This would occur only where roads and trails are beginning to revegetate. The effect of livestock grazing has no impact on the designation of roads or trails.

A potential cumulative impact this project might have on future projects is the effect of not adding a route to the system. Soil quality standards do not apply to permanent (i.e. system) roads. Roads that are not designated and not identified as “system” roads or trails will need to be included in soil quality assessment when analyzing future projects until routes have been decommissioned or naturally revegetate.

Roads and trails identified as system routes (including conversion from non-system routes) when reconstructed, relocated, or maintained to meet standards and incorporate BMPs, would reduce soil effects from these roads and trails.

Restoration activities to improve soil conditions might include ripping, recontouring, and seeding routes not added to the system and not designated. The goal would be to reduce soil compaction and meet the direction provided in Region 1 Supplement 2500-99-1 (See Regulatory Framework and Consistency at the end of this section). In general, tilling or scarifying a compacted soil improves

productivity by reducing the resistance of soil to root penetration, and providing improved soil drainage and aeration to enhance seedling establishment and tree growth (Bulmer 1998, p 10 and 13) and improve the environment for soil organisms. The goal of soil restoration is to set the stage for the soil to begin the recovery process. Soil restoration is not an immediate result of ripping, planting, or any other activity.

Table 3-57. Route Miles By Erosion Hazard Rating For The Different Alternatives On The District

Designation	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified
Public Motorized					
High/Very High	111	80	50	94	84
Medium	54	32	27	40	36
Low	166	139	109	140	138
Other	19	9	8	13	10
Public Non-motorized					
High/Very High	73	78	77	73	74
Medium	78	82	82	75	78
Low	124	124	126	122	122
Other	0	0	0	0	0
Administrative					
High/Very High	19	21	29	13	22
Medium	15	21	24	11	22
Low	7	7	8	5	7
Other	0	1	1	0	1
Not Designated					
High/Very High	12	34	51	35	35
Medium	20	40	56	45	41
Low	6	14	26	26	15
Other	1	11	11	7	9

Note: Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

3.3.3.3 Conclusion - Soils

Although regional soil quality standards do not apply to this project, adding routes to the National Forest System and designating roads and trails for public or administrative use will have an impact on soil productivity. Roads and trails impact and disrupt the natural function of the soil resource, and are long-term commitments to that specific use. Non-system routes will revegetate or be reclaimed and eventually return to productivity. Alternative C would provide the greatest number of miles of routes to return to productive capability over time. Alternative A would provide the least number of miles. Alternative B and Alternative B Modified would provide an intermediate number of miles compared to Alternatives A and C. Alternatives B, C, and B Modified all would have fewer miles of routes available to the public for motorized use on landforms with high erosion hazard compared to Alternative A and the no-action alternative. Alternative B Modified, with the proposed seasons of use, deferred designation contingent upon mitigation, and dispersed camping constraints would allow motorized use while minimizing affects to the soil resource.

Table 3-58. Comparison of Erosion Hazard Rating by Alternative

Feature		Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
High/Very High Erosion Hazard Rating						
Miles of Motorized Routes designated for public use	Pryor	81	57	31	67	58
	Beartooth	29	23	19	27	25
	District	111	80	50	94	84
Miles of Non-motorized Routes designated for public use.	Pryor	1	2	2	1	2
	Beartooth	72	76	76	72	72
	District	73	78	77	73	74
Medium Erosion Hazard Rating						
Miles of Motorized Routes designated for public use.	Pryor	19	9	8	13	10
	Beartooth	35	23	19	26	26
	District	54	32	27	40	36
Miles of Non-motorized Routes designated for public use.	Pryor	0	0	0	0	0
	Beartooth	78	82	82	75	78
	District	78	82	82	75	78

3.3.4 VEGETATION

Overview of Changes from the Draft to the Final EIS

- *Vegetation Section.* In response to public comment, effects to vegetation below 8000' were incorporated and analysis results were addressed by land unit (Pryor and Beartooth Units) and as a total District unit.
- *Weed Section.* Some statements were clarified relative to type of use versus amount of use.
- *Sensitive Plant Section.* Analysis results were addressed by land unit (Pryor and Beartooth Units) and as a total District unit in response to public comment.

Introduction

Analysis of associated travel disturbances on vegetation, weed spread, and sensitive plants are addressed under the general heading of Vegetation.

3.3.4.1 Affected Environment – Vegetation

Introduction

There is a concern that designation of travel routes allows for disturbance of native vegetation by vehicles, camping, hiking, mountain biking, and pack and saddle stock. Vegetation has various abilities to recover from disturbance depending upon frequency, duration, and timing of disturbance and species ability to resist disturbance.

Some public comments show concern about recreational use in alpine and subalpine systems that are difficult to recover. Alpine and subalpine ecosystems occur in harsh settings; typically shallow soils and exposed to extreme climates. These areas can take many years to recover after disturbance in comparison to lower montane systems where environmental variables can allow for faster recovery.

Some concerns were voiced about vegetation disturbance from illegal motorized use off of designated routes. NEPA analysis typically assumes that there will be compliance with laws, regulations, and policy. Attempting to identify the location and extent of unauthorized off-route use is outside the scope of this analysis.

Some comments were made relative to difficult vegetation recovery from travel management activities related to frequently used areas, mostly identified in the Main and West Forks of Rock Creek. Soil compaction, change in stream channel morphology and function, change in native vegetation composition, and low ground cover have occurred in these frequently used dispersed campsite locations and have created exposed areas, denuded of vegetation. The affected environment and environmental consequences of these areas are addressed in the Water and Recreation sections of this chapter and will not be addressed further in this section.

Regulatory Framework

36 CFR 219.20 outlines direction regarding ecological sustainability. Plans should provide for maintenance or restoration of ecosystems at appropriate spatial and temporal scales determined by the responsible official. The spatial scale for this analysis is the project area and the temporal scale is the planning horizon of the decision resulting from this analysis, identified as ten years.

Overview-Vegetation

Vegetation of the Pryor and Beartooth Mountains are influenced by various environmental factors that make each mountain range floristically rich and diverse.

Pryor Mountain Vegetation

Pryor Mountain vegetation is largely influenced by sedimentary parent material. The setting within the project area is composed of subalpine meadows and ridges, montane coniferous forests, meadows, foothill grasslands, and a small portion of semi-desert. The Pryor Mountains are considered a "botanical hotspot", rich in species and community diversity. Within a 20 mile drive one can find dramatically different vegetation types from semi-desert to subalpine areas. This land unit is where three floristic provinces converge (Prairies, Rocky Mountains, and Great Basin). Floristic elements are a blend from all three provinces. Plants typical of the Prairies occur in the northeast portion of the Pryors. The Rocky Mountain elements occur on the north and northeast aspects where it is relatively moist and cool. The Great Basin species are best represented at the dryer southern portion of the Pryor Mountains. The Pryor Mountains contain the eastern most extent of Douglas-fir in Montana and the northern most extent of Utah Juniper. This area has been found to have high levels of endemism where plant species that are globally rare are found only in the Pryor Mountains and Bighorn Basin area.

As a result of inventory and compiling 17 plant lists from various botanists studying the Pryor Mountains, McCarthy documented 981 vascular plant species which represent 71 plant families in a 316,000 acre study area (McCarthy, 1996). Even though the Custer National Forest portion of the Pryor Mountains is about a quarter of that study area, species diversity and richness are still apparent. Montana Natural Heritage Program (2007) cites 72 vegetation types around the Pryor Mountain Area (Bighorn Basin Ecological Setting). It is recognized that travel management can influence activity not only on National Forest System lands, but also adjacent BLM lands which are also floristically rich and diverse.

Beartooth Mountain Vegetation

Beartooth Mountain vegetation is primarily influenced by granitic parent material, along with some volcanic and sedimentary parent material. The setting is composed of alpine ridges, mountain peaks, cirques, moraines, tundra plateaus, coniferous forests, meadows, and foothill grasslands. Montana Natural Heritage Program (2007) cites 188 vegetation types around the Beartooth Mountain Area (Yellowstone Highland Ecological Setting). The alpine areas alone contain around 400 plant species. Roughly 50% of the Beartooth Mountain flora is also found in the Arctic. The flanks of Line Creek Plateau provide habitat for some of the Bighorn Basin endemic and globally rare species.

General Cover Types

Montane and Foothill Grassland and Shrubland

Much of the montane and foothill grasslands found on the District consist of cool season grasses such as Idaho fescue, bluebunch wheatgrass, and needle-and-thread grass. These are typically found on warm (southerly aspect), well-drained sites at all elevations throughout the Forest. Although there is not a great deal of acreage in shrubland communities, such as shrubby cinquefoil or sagebrush, they are important from a species diversity perspective.

Wetlands and Riparian Communities

Plant communities dominated by moisture-loving plants along streams, wetlands, seeps, and springs occupy a small fraction (less than 5%) of the total landscape on the District. However, these sites have the greatest species diversity of all vegetation communities in our area. Many different types of wetlands / riparian areas exist, including sedge or rush dominated marshes; grass or sedge dominated wet meadows; fens, peat land, willows, red-osier dogwood, and alder.

Forested and Broadleaf Plant Communities

Open and closed canopy environments of common coniferous forest types are found on the District. The Pryor Mountains are predominantly Douglas-fir communities with some lodgepole pine, and limber pine, and the Beartooths are predominantly lodgepole, subalpine fir, Douglas-fir, and spruce. Aspen and cottonwood stands are found across the Beartooth District.

Alpine/ Subalpine Plant Communities

Alpine communities occur at the highest elevations along the Beartooth Mountain range. These communities are highly significant from a diversity standpoint, because they serve as refugia for arctic/alpine species that are topographically isolated from one another. Consequently, a number of rare native species can be found in the alpine portions of the Beartooth Mountains. Subalpine communities occur at the highest elevations along the Pryor Mountain range.

Denuded Areas

Based on observations, denuded areas from campsites and tethering are isolated and not common. They typically occur within forested settings and especially in the heavily used dispersed campsites in the Main and West Fork drainages of Rock Creek. Nine sites in these drainages were identified for closure under Alternatives B and B Modified due to impacts to riparian areas and contribution to water quality concerns. Other denuded areas include isolated areas where vehicle rutting off-route has occurred. Typically, deep rutting has a higher likelihood of occurring during spring thaw. See Soils and Water sections for further effects analysis.

Higher Elevations

Approximately 59% (319,748 acres) of the District (539,771 acres) is over 8000' in elevation where systems are typically considered subalpine and alpine. However, only about half of the high elevation country is vegetated alpine / subalpine (181,067 acres or 33% of the District).

Approximately 52 miles of existing motorized routes and about 110 miles of non-motorized routes occur within these vegetated settings. Many of the high elevation motorized routes occur through areas of open grass and forbs on gentle to moderate terrain. Natural barriers to off-route travel, such as heavier canopied forested lands, consist of about a third of the landscape at these elevations. Restoration of the travel and camping related damage can have limited success due to the severity of the environment, which restricts plant germination and growth and increases the potential for soil erosion. Rate of recovery is slow.

Lower Elevations

Approximately 41% (220,023 acres) of the District (539,771 acres) is below 8000' in elevation where systems can typically recover more rapidly from disturbance when compared to the alpine / subalpine systems in the higher elevations. These lower elevation systems consist of montane and foothill grasslands and shrublands, riparian / wetlands, coniferous forests and broadleaf stands. There is a minor component of semi-desert area in the Pryor Mountains where recovery from disturbance may not be as rapid as in the montane settings due to various environmental factors including low precipitation.

Approximately 277 miles of motorized routes and about 143 miles of non-motorized routes exist in these vegetated settings. Many of the lower elevation motorized routes occur through areas of grasslands, shrublands, and open and closed forested settings ranging from gentle to steep terrain. Natural barriers to off-route travel, such as heavier canopied forested lands, consist of about a quarter of the landscape at these elevations.

Factors Influencing Area Impacted and Severity of Impact

The overall impact of a travel use on vegetation is a function of both the area impacted and the severity of impact within the disturbed area. Travel related impacts to vegetation include disturbances from camping, vehicle use, hiking, mountain biking, and pack and saddle stock. Factors that influence the severity of vegetation impact include duration and frequency of use, vegetation resistance and resilience, and season of use.

Duration and Frequency of Use

It is recognized that impacts might occur anywhere along designated travel routes. However, there is a higher probability of more severe vegetation impacts in areas where people tend to frequent repeatedly. These areas are typically near water, vistas, trailheads, shade, and other areas on gentle terrain suitable for camping (usually 0 to 4% slopes). Sites that are used infrequently and sites that are capable of resisting deterioration will usually be less impacted than those that are used frequently and those that are readily disturbed. For example, in long-established campsites, the magnitude of vegetation impact is determined as much by the ability of vegetation to recover from disturbance as by the ability to resist disturbance.

Resistance and Resilience

Aspects of vulnerability of vegetation having impacts and ability to recover include attributes of resistance and resilience. Resistance refers to the ability of vegetation to resist change when trampled. Resilience refers to the ability of vegetation to recover following the cessation of trampling and tolerate a cycle of disturbance and recovery.

Resistant vegetation types, such as sedges, are able to absorb 25 to 30 times as much trampling as the least resistant type, such as ferns (Cole 1993b). Plant characteristics, notably the position of the plants' perennating bud and physiological characteristics such as reproductive capacity and growth rates, also influence resilience (Cole 1995). Morphological characteristics are primary factor influencing plant resistance to trampling. Grasses and sedges have flexible stems growing in mats or tufts. More fragile were woody plants and taller herbs. Complete loss of vegetation cover occurs quickly in shady forested areas, less quickly in open areas with resistant grassy vegetation (Leung & Marion, 1996). The resilience of plants, their ability to recover following trampling disturbance, varies substantially by habitat, with higher recovery in the most productive environments such as those with higher soil fertility and moisture. For example, recovery rates are high in riparian areas. Recovery in montane systems is typically moderate to high. In contrast, trampling impacts in less resilient environments, such as alpine / subalpine and arid environments, require a long time to recover. (Leung & Marion, 2000)

Season of Use

The timing of use can also influence the severity of impact. Soil moisture influences the susceptibility of vegetation to trampling damage and direct mortality from rutting. Compaction is generally higher in wetter, poorly drained soils than in well-drained soils which can also influence vegetative conditions. Soil moisture levels at any site vary during the growing season. However, the spring thaw period tends to be the most susceptible periods for rutting and erosion which can have a direct bearing on impacts to vegetation. Ruts occur when vehicle load is greater than the terrain's bearing capacity, especially in soft soils. Vehicle load, tire or tracked footprint area, and wheel slip influence the level of rutting and vegetation impacts (Affleck. 1995).

When vehicles cross wet areas, they can churn up the surface and damage vegetation, creating wet, muddy areas that other drivers want to avoid. Continued use widens trails as successive drivers seek to avoid wet and rutted areas. As ruts become deep and ponds form in the low areas, users continue to widen and braid the road to avoid these spots. Timing of use through management strategies, such as restricting use during spring breakup, can also influence the degree of impact on vegetation.

Effects Analysis Methodology-Vegetation

Both the Pryor and Beartooth Mountains are floristically rich and diverse with many plant communities, including rare elements. This section addresses impacts to plant communities, while the sensitive plant portion of the Vegetation section addresses rare elements.

General potential effects to vegetation are based on literature reviews. Geographical Information System (GIS) methods were used to assess the magnitude of area potentially impacted and potential risk categories based on various elements of frequency, duration, timing, and vegetation resistance and resilience. The magnitude of area potentially impacted is stratified by risk of impacts in low, moderate and high risk categories. Potential use within each Alternative's corridor (300 feet for

Alternatives A, B, No Action, and B Modified, and 50 feet for Alternative C) is projected to have less frequency of use (not all the area within the corridor will be traveled since one must use the most direct route to a campsite). These areas were identified through the intersection of cover type resistance / resilience groupings in each of the three risk categories with each of the Alternative's use corridors. These areas were further intersected with the risk category cover type groups within a 0 to 4% slope class. The 0 to 4% slope class represents the area with higher probability for concentrated use and severity of impact such as camping. This method is further stratified by both motorized and non-motorized and by land unit. The measurement is in acres and percent of potentially impacted acres compared to total acres.

Duration and Frequency of Use

Potential Infrequent Use Areas – Potential Use Corridors
Impacts might occur within each Alternative's potential impact corridor along designated travel routes. Sites that are used infrequently and sites that are capable of resisting deterioration will usually be less impacted than those that are used frequently and readily disturbed

The following buffers from designated routes were used to describe the Potential Use Corridor by Alternative. For designated motorized routes, a 50 foot buffer was applied under Alternative C to address a parking allowance. A 300 foot buffer was applied to all other alternatives' designated motorized routes to address access for dispersed camping allowance. For designated non-motorized routes, a 50 foot buffer was applied to all alternatives to address potential for dispersed camping. It is recognized that not all estimated acreage will be affected and therefore results will be on the conservative side.

Potential Frequent Use Areas – 0 to 4% Slopes
There is a higher probability for more severe vegetation impacts in areas where people tend to visit repeatedly or with longer duration of use. These areas are typically near water, vistas, trailheads, shade, and other areas on gentle terrain suitable for camping (usually 0 to 4% slopes).

Zero to 4% slopes are used to represent potential frequent use areas, found within each Alternative's potential use corridors, and are intersected with elements outlined in the resistance and resilience section below. The 0 to 4% slope class is used because people tend to concentrate for longer durations of use at campsites or areas in gentle terrain. It is recognized that not all estimated acreage will be affected and therefore results will be on the conservative side.

Resistance and Resilience

All vegetation cover types from satellite imagery (SILC3) are addressed within the following three risk groupings based on degree of vulnerability to resist impacts (resistance) and ability to recover (resiliency). The three groups are intersected with the frequent and infrequent use areas outlined above.

Because grasslands and shrub/grass vegetation types below alpine/subalpine zones tend to have higher resistance (lower vulnerability to trampling) and resilience (higher resiliency to recover) elements, these cover types below 8000 foot elevation are used to represent areas of low risk for impacts.

Because forested and broadleaf vegetation types tend to have lower resistance to impacts and moderate to high resiliency to recover, these cover types are used below 8000 foot elevation to represent areas of moderate risk for impacts.

Although alpine / subalpine may have some elements that are more resistant to trampling (i.e., sedge meadows), they are considered to have very low resilience for recovery once impacted, with recovery rates that are very slow. Vegetation cover types above 8000 foot elevation are used to represent areas of high risk for impacts.

Miles of designated motorized and non-motorized routes going through vegetation above and below 8000 feet are used as a measurement to assess potential impacts of recreational activities in these settings.

Season of Use
Miles of designated motorized routes going through vegetation by risk category during spring thaw are used as a measurement to assess potential impacts of motorized recreational activities in these settings. It is recognized that impacts to vegetation can come from non-motorized uses during spring thaw. However, the measurement is focused on motorized uses since weight, "footprint" size, and wheel slip features of motorized uses tend to have more impact during spring thaw.

3.3.4.2 Environmental Consequences – Vegetation

Direct and Indirect Effects-Vegetation

General Effects Common to All Alternatives

Trampling
Crushing or treading upon vegetation, either by foot, hoof, or tire, contributes to a wide range of vegetation impacts, including damage to plant leaves, stems, and roots, reduction in vegetation height, change in the composition of species, and loss of plants and vegetative cover. Trampling can quickly break down vegetation cover and create a visible route that attracts additional use. Complete loss of vegetation cover occurs quickly in shady forested areas, less quickly in open areas with resistant grassy vegetation. Regardless, studies have consistently revealed that impacts can occur with initial or low use, with a diminishing increase in impact associated with increasing levels of traffic (Hammit & Cole, 1998; Leung & Marion, 1996). Once trampling occurs, the rate of vegetative recovery can vary, depending on the site's resistance and resilience to disturbance.

Soil compaction from repeated trampling can affect plant growth by reducing moisture availability and precluding adequate taproot penetration to deeper soil horizons. In turn, the size and abundance of native plants may be reduced. Above-ground portions of plants also may be reduced through breakage or crushing, potentially leading to reductions in photosynthetic capacity, poor reproduction, and diminished litter cover. Likewise, blankets of fugitive dust raised by motorized traffic can disrupt photosynthetic processes, thereby suppressing plant growth and vigor, especially along motorized routes. In turn, reduced vegetation cover may permit invasive and/or non-native plants—particularly shallow-rooted annual grasses and early successional species capable of rapid establishment and growth—to spread and dominate the plant community, thus diminishing overall local biodiversity.

Compositional changes in the vegetation along trail corridors can have both beneficial and adverse effects. Trampling-resistant plants provide a durable groundcover that reduces soil loss by wind and water runoff, and root systems that stabilize soils against displacement by heavy traffic. Many of introduced species are disturbance-associated and are naturally limited to areas where the vegetation is routinely trampled or cut back. However, a few invasive non-native species, once introduced to trail corridors, are able to out-compete native plants and spread away from the trail corridor in undisturbed habitats. Some of these species form dense cover that crowd out or displace native plants (see Weeds Section).

Camping

Vegetation composition of campsites is not changed by infrequent camping for short periods. However, aerial plant parts will be broken and flowering in the season of impact may be affected. Long-term or frequent camping, even for one season, results in the destruction of vegetation, leaving barren compacted areas. Alpine / subalpine recover very slowly unless rehabilitation measures such as scarification, fertilization, seeding, and transplanting are practiced on protected sites (Price, 1985).

The creation of fire-rings impacts vegetation through burning, and the covering of vegetation with rocks. Revegetation is likely to be slow, because of changes in soil characteristics from such as loss of nitrogen, phosphorus, sulphur, and organic matter. The firewood used in campfires often comes from dead trees, but living trees have also been used, often to an extent which exceeds their capacity for regeneration. In alpine settings, although of sparse occurrence, trees have a significant localized influence in alpine environments through the modification of snow deposition patterns and the accumulation of nutrients. Consequently, their destruction and removal might be expected to have long-term indirect effects on neighboring vegetation (Price, 1985).

Minor impacts associated with camping include the death of vegetation covered with garbage, partly-burned wood, or rocks removed from campsites. Digging of pits for garbage disposal and the removal of rocks from campsites -result in the creation of small bare areas, which are often enlarged by erosional processes and trampling.

Vehicles

The overall impact of a vehicle on vegetation is a function of both the area impacted and the severity of impact within the disturbed area. The severity of vegetation impact within a disturbed area can be higher than hiking, mountain biking, and stock use based on weight (a dirt bike weighs 100-200 pounds, whereas typical ATV can weigh up to 900 lbs, or up to several tons for 4x4 Off Road Vehicles), power, tire-surface area (tire footprint), and wheel slip that can cause greater compression on soils and vegetation as well as vegetation shearing. Vehicle impacts to vegetation can be exacerbated by rutting during spring thaw due to low bearing capacity of soft soils (Affleck. 2005).

Direct impacts of vehicle activities on vegetation include reduced vegetation cover and growth rates, and increased potential for non-native and pioneering species to become established, thus altering vegetation communities. In certain instances, however, the impervious nature of compacted routes could result in runoff that generates greater moisture availability immediately along motorized routes. In turn, this would promote increased vegetation cover and plant abundance farther away. Repeated off-route activity results in the crushing, breaking and overall reduction of vegetative cover. Detours around snowbanks are sometimes made by vehicles, and parallel motorized routes are more widely spaced than those made by non-motorized users.

Indirect effects of vehicle activities on vegetation are tied to soil properties altered by vehicle traffic, as soil properties typically influence vegetation growth. Motorized roads and trails also create edge habitats, which can generate conditions that promote the encroachment of non-native and invasive plant species. Other indirect effects include increased amounts of airborne dust raised by traffic. Fugitive dust on plant foliage can inhibit plant growth rate, size, and survivorship. Vehicle passes can also result in indirect effects including damaging germinating seeds, and weakening plants making them more susceptible to disease and insect predation. Vehicles can result in changes in plant species composition.

Hiking

The initial impact of hiking is direct mechanical damage to the aerial parts of plants. Impacts resulting from increasing levels of use include physiological changes, and changes in species composition and plant cover.

Willard and Marr (1970) (Price, 1985) found that no permanent damage resulted from up to 20 people a year walking randomly through an area of alpine tundra in Rocky Mountain National Park. However, concentrated walking resulted in measurable change as trails formed. Two weeks' use of the study area resulted in the matting and wilting of plants, and the initial definition of trails. After seven weeks' use, it was observed that damaged plants did not bloom. Five weeks later, all of the trails had become well-defined, as most plants were damaged or dead, and vegetation cover had declined by 13 percent. After three seasons of use, the vegetation cover of the study area had been reduced to 33 percent of the original, with the few remaining plants living in the shelter of rocks. The removal of the vegetation cover had resulted in the deflation of fine soil particles from bare areas, leaving a substrate of sand and gravel. This sequence of events has been described from many alpine areas: the degree of change varies with the distribution of use in time and space, the resilience of the vegetation, site and soil characteristics, and the management strategies which are developed to minimize change.

A number of general conclusions may be drawn from studies of trampling adjacent to trails. First, vegetation cover decreases toward trails. In most cases, the extent of bare areas will increase over time, as a result of wind, water, and erosion. Second, plant species vary considerably in their susceptibility to long-term trampling. Vegetation adjacent to trails is typically dominated by a few low-growing forbs or graminoid species (i.e., grasses and sedges), most of which occur with low frequency, if at all, in undisturbed vegetation even a short distance from the trail edge. Conversely, undisturbed vegetation has a greater diversity of species, which are adjusted to the usual stresses of the alpine environment, but not the additional stress of trampling and the resulting altered microclimate. Where a species, which is particularly well-adapted to trampling, is available (i.e., many sedge species), it may come to dominate all trail-side vegetation (Price, 1985).

Mountain Biking

Short-term studies suggest that mountain biking effects on vegetation and soil are similar to hiking (Thurston & Reader 2001), though Cessford (1995) noted that there was some extra damage caused when skidding downhill, or as a result of torque-induced wheel spin when riding up steep, wet slopes. However, mountain bikers can also cover much more ground (by a factor of 5-10) in a given time than walkers, especially downhill (Switilzki and Jones. 2008).

Pack and Saddle Stock
Recreational pack and saddle stock can cause trampling damage along trails and at tethering sites, and preferential grazing of selected species. Grazing pressure and nitrogen availability (manure and urine) are greatest near trails and tethering sites. Two factors result in a significant contrast between the trampling impacts of stock as compared with hikers: distribution of pressure on the ground surface and stock behavior. For Example, typical pressures exerted by horses are from three to four times higher than hikers (Price, 1985). Thus, vegetation is more likely to be damaged by horses, and horse trails tend to be more deeply incised than hiking trails. Similarly, tethering sites are often more quickly damaged than campsites.

Differences in stock behavior include a greater tendency for horses to cut corners on switchbacks, resulting in trail widening; horses can cut across very wet meadows, around which hikers will find an alternative trail; and pack animals tend to drag their feet, loosening soil and vegetation. In general, horses keep to existing trails, so that multiple trail formation is less likely. However, detours around snowbanks are more commonly made by horses than hikers, and parallel horse trails are more widely spaced than those made by hikers. In general, trampling impacts resulting from horse use tend to be more localized and extreme than those caused by hikers.

Trail studies (Weaver and Dale. 1978) made in forests of central Montana and adjacent Wyoming show that trail widths increase slowly with increasing traffic, trails used by horses are deeper but not wider than those used by hikers alone, a relatively narrow (3-6 feet) band of vegetation at the trail side is affected, and some plants disappear at trail sides, some are largely unaffected, and others invade those sites.

The impacts of grazing are closely associated with trampling, since the two activities always occur together. Impacts from the combined influence of both activities can occur within areas of various sizes, ranging from a picket circle to entire meadow systems.

Changes in species composition will result from even very low levels of grazing in alpine meadows. Recovery of vegetation in grazed areas is slow, unless grazing animals are totally excluded and, in most cases, although a continuous cover of vegetation may develop, its species composition will be different from that of adjacent areas which have never been grazed (Price, 1985).

Weeds
An effect of travel and trampling can be the establishment and spread of weeds. These effects are further described in the Weed portion of the Vegetation section.

Magnitude and Settings of Potential Effects on Vegetation
The following table summarizes potential amount of vulnerability for vegetation impacts for each Alternative by risk categories based on various elements of frequency, duration, timing, and vegetation resistance and resilience. It is further stratified by motorized and non-motorized routes and by land unit. It is recognized that not all estimated acreage will be affected and therefore results will be on the conservative side.

Table 3-59. Potential Vegetation Impacts by Risk Category

Attributes	Land Unit	Alt. A	Alt. B	Alt. C	No Action	Alt. B Modified
High Risk Areas[34] - Motorized Routes						
Acres Potential Frequent Use Areas (% of High Risk Area)	Pryor[35]	221 (2%)	202 (2%)	52 (<1%)	217 (2%)	173 (2%)
	Beartooth[36]	21 (<1%)	20 (<1%)	2 (<1%)	11 (<1%)	22 (<1%)
	Total[37]	195 (<1%)	218 (<1%)	102 (<1%)	228 (<1%)	195 (<1%)
Acres Potential Infrequent Use Areas (% of High Risk Area)	Pryor	1851 (16%)	1481 (13%)	291 (3%)	1581 (14%)	1497 (13%)
	Beartooth	1442 (1%)	1411 (1%)	237 (<1%)	1256 (1%)	1685 (1%)
	Total	3293 (2%)	2892 (1%)	528 (<1%)	2837 (1%)	3570 (2%)
Miles in High Risk Area	Pryor	29	23	21	25	20
	Beartooth	23	21	17	17	22
	Total	52	44	38	42	42
High Risk Areas - Non-Motorized Routes						
Acres Potential Frequent Use Areas (% of High Risk Area)	Pryor	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Beartooth	42 (<1%)	44 (<1%)	44 (<1%)	44 (<1%)	42 (<1%)
	Total	42 (<1%)	44 (<1%)	44 (<1%)	44 (<1%)	42 (<1%)
Miles through High Risk Area	Pryor	1	1	1	1	1
	Beartooth	109	109	109	109	107
	Total	110	110	110	110	108
Moderate Risk Areas - Motorized Routes						
Acres Potential Frequent Use Areas (% of Moderate Risk Area)	Pryor[38]	19 (<1%)	13 (<1%)	1 (<1%)	17 (<1%)	14 (<1%)
	Beartooth[39]	40 (<1%)	39 (<1%)	4 (<1%)	25 (<1%)	49 (<1%)
	Total[40]	59 (<1%)	52 (<1%)	5 (<1%)	42 (<1%)	63 (<1%)
Acres Potential Infrequent Use Areas (% of Moderate Risk Area)	Pryor	2231 (8%)	1524 (5%)	108 (<1%)	1860 (7%)	1679 (6%)
	Beartooth	1800 (3%)	1513 (3%)	211 (<1%)	1639 (3%)	1792 (3%)
	Total	4031 (5%)	3037 (4%)	319 (<1%)	3499 (4%)	3471 (4%)
Miles in High Risk Area	Pryor	26	17	7	22	17
	Beartooth	22	18	15	19	17
	Total	48	35	22	41	34
Moderate Risk Areas – Non-Motorized Routes						
Acres Potential Frequent Use Areas (% of Moderate Risk Area)	Pryor	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Beartooth	6 (<1%)	6 (<1%)	6 (<1%)	6 (<1%)	6 (<1%)
	Total	6 (<1%)	6 (<1%)	6 (<1%)	6 (<1%)	6 (<1%)

[34] All Vegetation Types above 8000' Elevation (alpine/subalpine)
[35] Pryor Unit alpine/subalpine high risk area = 11,470 acres
[36] Beartooth Unit alpine/subalpine high risk area = 184,797 acres
[37] Combined Pryor and Beartooth Unit's alpine/subalpine high risk area of the Beartooth District = 196,267 acres
[38] Pryor Unit montane forest moderate risk area = 28,197acres
[39] Beartooth Unit montane forest moderate risk area = 58,556acres
[40] Combined Pryor and Beartooth Unit's montane forest moderate risk area of the Beartooth District = 86,753 acres

Table 3-59. Potential Vegetation Impacts by Risk Category

Attributes	Land Unit	Alt. A	Alt. B	Alt. C	No Action	Alt. B Modified
Miles through Moderate Risk Area	Pryor	1	1	1	1	1
	Beartooth	37	38	38	37	36
	Total	38	39	39	38	37
Low Risk Areas - Motorized Routes						
Acres Potential Frequent Use Areas (% of Low Risk Area)	Pryor [41]	191 (<1%)	168 (<1%)	19 (<1%)	202 (<1%)	197 (<1%)
	Beartooth [42]	292 (<1%)	280 (<1%)	42 (<1%)	220 (<1%)	360 (<1%)
	Total [43]	483 (<1%)	448 (<1%)	61 (<1%)	422 (<1%)	557 (<1%)
Acres Potential Infrequent Use Areas (% of Low Risk Area)	Pryor	7399 (19%)	5268 (14%)	681 (2%)	6257 (16%)	5874 (15%)
	Beartooth	6684 (6%)	5411 (5%)	1016 (<1%)	5643 (5%)	6682 (6%)
	Total	14083 (10%)	10679 (8%)	1697 (1%)	11900 (8%)	12556 (9%)
Miles in Low Risk Area	Pryor	119	83	49	100	84
	Beartooth	111	89	76	92	94
	Total	230	172	125	192	178
Low Risk Areas – Non-Motorized Routes						
Acres Potential Frequent Use Areas (% of Low Risk Area)	Pryor	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Beartooth	29 (<1%)	29 (<1%)	30 (<1%)	27 (<1%)	28 (<1%)
	Total	29 (<1%)	29 (<1%)	30 (<1%)	27 (<1%)	28 (<1%)
Miles through Low Risk Area	Pryor	<1	<1	<1	<1	<1
	Beartooth	104	111	113	102	102
	Total	104	111	113	102	102

All Risk Categories

Potential for motorized related impacts to vegetation is less under Alternative C compared to all other alternatives largely due to allowance for parking only versus 300 foot vehicle access for dispersed camping.

High Risk - Frequent Use Areas

Alternatives A, B, B Modified and No Action

Potential impacts from frequent *motorized* use constitute about 2%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District high risk areas, respectively. Potential impacts from *non-motorized* use constitute about 0%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District high risk areas, respectively.

Alternative C

Potential impacts from frequent *motorized* use constitute less than 1% in each of the Pryor Unit, Beartooth Unit, and Beartooth District high risk areas, respectively. Potential impacts from *non-motorized* use constitute about 0%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth

[41] Pryor Unit grass / shrub low risk area = 38,256 acres
[42] Beartooth Unit grass / shrub low risk area = 103,343 acres
[43] Combined Pryor and Beartooth Unit's grass / shrub low risk area of the Beartooth District = 141,599acres

Unit, and Beartooth District high risk areas, respectively.

High Risk - Infrequent Use Areas

Alternatives A, B, B Modified and No Action
Potential impacts from infrequent *motorized* use constitute about 13-16%, 1 to less than 1%, and 1-2% of the total Pryor Unit, Beartooth Unit, and Beartooth District high risk areas, respectively.

Alternative C
Potential impacts from infrequent *motorized* use constitute about 3%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District high risk areas, respectively.

Moderate Risk - Frequent Use Areas

Alternatives A, B, B Modified and No Action
Potential impacts from frequent *motorized* use constitute about less than 1% of each of the total Pryor Unit, Beartooth Unit, and Beartooth District moderate risk areas, respectively. Potential impacts from *non-motorized* use constitute about 0%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District moderate risk areas, respectively.

Alternative C
Potential impacts from frequent *motorized* use constitute less than 1% in each of the total Pryor Unit, Beartooth Unit, and Beartooth District moderate risk areas, respectively. Potential impacts from *non-motorized* use constitute about 0%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District moderate risk areas, respectively.

Moderate Risk - Infrequent Use Areas

Alternatives A, B, B Modified and No Action
Potential impacts from infrequent *motorized* use constitute about 5-8%, 3%, and 4-5% of the total Pryor Unit, Beartooth Unit, and Beartooth District moderate risk areas, respectively.

Alternative C
Potential impacts from infrequent *motorized* use constitute less than 1%, in each of the total Pryor Unit, Beartooth Unit, and Beartooth District moderate risk areas, respectively.

Low Risk - Frequent Use Areas

Alternatives A, B, B Modified and No Action
Potential impacts from frequent *motorized* use constitute less than 1% in each of the total Pryor Unit, Beartooth Unit, and Beartooth District low risk areas, respectively. Potential impacts from *non-motorized* use constitute less than 1% in each of the total Pryor Unit, Beartooth Unit, and Beartooth District low risk areas, respectively.

Alternative C
Potential impacts from frequent *motorized* use constitute less than 1% in each of the total Pryor Unit, Beartooth Unit, and Beartooth District low risk areas, respectively. Potential impacts from *non-*

motorized use constitute about 0%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District low risk areas, respectively.

Low Risk - Infrequent Use Areas

Alternatives A, B, B Modified and No Action
Potential impacts from infrequent *motorized* use constitute about 14-19%, less than 1%, and less than 1% of the total Pryor Unit, Beartooth Unit, and Beartooth District low risk areas, respectively.

Alternative C
Potential impacts from infrequent *motorized* use constitute about 2%, less than 1%, and 1% in the Pryor Unit, Beartooth Unit, and Beartooth District low risk areas, respectively.

Season of Use
The spring thaw period tends to be the most susceptible periods for rutting, compaction, and erosion which can have a direct bearing on impacts to vegetation. When vehicles cross wet areas, they can churn up the surface and damage vegetation, creating wet, muddy areas that others wants to avoid. Continued use widens trails as successive drivers seek to avoid wet and rutted areas. As ruts become deep and ponds form in the low areas, users continue to widen and braid the road to avoid these spots. Ruts could occur when vehicle load is greater than the terrain's bearing capacity, especially in soft soils during spring breakup.

Timing of use through management strategies, such as restricting use during spring thaw, can also influence the degree of impact on vegetation. Most of the Beartooth Unit road subgrades are rocky and hard (granitic parent material) where damage from vehicles during spring thaw is less of an issue. Portions of the Red Lodge Creek road are proposed for closure during spring thaw due to the finer grained nature of the soils in that location. Many of the routes in the Pryor Unit do not support loads well when wet (sedimentary parent material). Spring thaw restrictions in the Pryor Unit range from 19 miles in Alternative C, to 58 miles in Alternative B Modified, to 60 miles in Alternative B.

Under Alternative B Modified, seasonal restrictions on six miles of motorized routes for purposes of minimizing impacts during moose calving (Meyers and Lodgepole routes) will afford additional protection to vegetation resources since the closure time is concurrent with spring thaw.

Cumulative Effects-Vegetation
Fuels reduction, prescribed burning, livestock grazing, and timber management projects are currently planned and will continue to be planned for the District. These projects and any associated road use or construction have potential to impact vegetation. Projects are designed to minimize impacts to vegetation.

Use of existing designated routes and associated 300 foot allowance for access to vehicle camping, in combination with the proposed actions, have potential to impact vegetation within the project area. There is potential to affect all vegetation at all elevation gradients. The following table displays the potential magnitude and risk of impact to vegetation for designated routes by alternative.

Implementation of any of the alternatives considered in this EIS would not be expected to contribute to significant cumulative effects associated with native vegetation. Anticipated future projects or

activities are fewer in number and less disruptive from a resource extraction point of view than those projects or activities that have taken place in the past.

3.3.4.3 Conclusion - Vegetation

Because it is seldom possible to control or even document the past use or predict future use, estimates of the impacts caused by different use frequencies are imprecise. The ability to predict the effects of different intensities of various uses is low. However, the amounts of potentially affected area, projected within the context of high risk categories based on various elements of frequency, duration, timing, and vegetation resistance and resilience are displayed in the following summary table. It is recognized that not all estimated acreage will be affected and therefore results are on the conservative side.

Table 3-60. Summary of Potential Vegetation Impacts in High Risk Areas

Feature	Unit	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
High Risk Areas - Motorized Routes						
Acres Potential Frequent Use Areas (% of High Risk Area)	Pryor Unit	221 (2%)	202 (2%)	52 (<1%)	217 (2%)	173 (2%)
	Beartooth Unit	21 (<1%)	20 (<1%)	2 (<1%)	11 (<1%)	22 (<1%)
	District	195 (<1%)	218 (<1%)	102 (<1%)	228 (<1%)	195 (<1%)
Acres Potential Infrequent Use Areas (% of High Risk Area)	Pryor Unit	1851 (16%)	1481 (13%)	291 (3%)	1581 (14%)	1497 (13%)
	Beartooth Unit	1442 (1%)	1411 (1%)	237 (<1%)	1256 (1%)	1685 (1%)
	District	3293 (2%)	2892 (1%)	528 (<1%)	2837 (1%)	3570 (2%)
Miles in High Risk Area	Pryor Unit	29	23	21	25	20
	Beartooth Unit	23	21	17	17	22
	District	52	44	38	42	42
High Risk Areas - Non-Motorized Routes						
Acres Potential Frequent Use Areas (% of High Risk Area)	Pryor Unit	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Beartooth Unit	42 (<1%)	44 (<1%)	44 (<1%)	44 (<1%)	42 (<1%)
	District	42 (<1%)	44 (<1%)	44 (<1%)	44 (<1%)	42 (<1%)
Miles through High Risk Area	Pryor Unit	1	1	1	1	1
	Beartooth Unit	109	109	109	109	107
	District	110	110	110	110	108

Frequency and duration of motorized and non-motorized activities are difficult to separate. However, potential for impacts from motorized use activities typically tends to be higher than non-motorized activities due to higher mobility for increased frequency and a bigger footprint for increased effects (weight, size, wheel slip, etc.) than most modes of travel. There is likelihood for more impacts from compaction due to higher pressure from more surface area that vehicles pose.

Although miles of motorized and non-motorized routes do not differ substantially by alternative, the potential areas for effects do differ. Alternative C has fewer areas exposed to potential impacts when compared to the other alternatives largely due to the distance from a motorized route where vehicle parking could occur (50 feet used for analysis purposes) when compared to the other Alternatives'

distance of a 300 foot allowance for vehicle access to dispersed campsites.

Under all alternatives, when compared against similar vegetation types, potential impacts from *frequent* use within the 0 to 4% slopes of the route's corridor in high, moderate, and low risk areas is less than 1% of each risk setting, respectively. High risk category potential impact ranges from 146 to 272 acres across all alternatives. Moderate risk category potential impact ranges from 11 to 69 acres across all alternatives. Low risk category potential impact ranges from 91 to 585 acres across all alternatives.

In addition, when compared against similar vegetation types, potential impacts from *infrequent* use within the route's corridor in high, moderate, and low risk areas is about <1-2%, <1-5%, and 1-10% of each risk setting, respectively.

Timing of use through management strategies, such as restricting use during spring thaw, can also influence the degree of impact on vegetation. Most of the Beartooth Unit road subgrades are rocky and hard (granitic parent material) where damage from vehicles during spring thaw is less of an issue. Portions of the Red Lodge Creek road are proposed for closure during spring thaw due to the finer grained nature of the soils in that location. Many of the routes in the Pryor Unit do not support loads well when wet (sedimentary parent material). Spring thaw restrictions in the Pryor Unit range from 19 miles in Alternative C, to 58 miles in Alternative B Modified, to 60 miles in Alternative B.

While impacts resulting from camping, vehicles, hiking, mountain biking, and stock use can be locally very significant, the total area of impact is small when compared to various ecosystems of the project area. The level of acceptable impact over a given area is within the discretion of the deciding official for this project as outlined in the regulatory framework for this section. Selection of any alternative would be consistent with the regulatory framework relative to vegetation sustainability at the level of this project's scale.

3.3.4.4 Affected Environment – Weeds

Introduction

There is concern that travel management can influence the spread of noxious weeds and invasive plants. Also, the Forest Service has identified invasive species as one of the top threats to the health of National Forests. Additionally, the Forest Service Manual 2080 (1. b.(5)) requires a weed risk assessment be conducted for all projects that could spread weeds. In this document, the terms "weeds", "noxious weeds' and "invasive plants" are used synonymously. We define invasive weeds as any non-native plant, which when established is or may become destructive and difficult to control by ordinary means of cultivation or other control practices. "Noxious" weeds are those non-native plants that are legally listed as weeds by the state or county.

Use of motorized and non-motorized roads and trails contribute to the spread of invasive weeds. Invasive plants can significantly alter the composition of native plant communities resulting in decreases in habitat quality for wildlife, reduced forage for livestock, increased erosion and increased sediment levels in streams, and decreases in aesthetic/recreational quality of wild lands (Sheley, R and J. Petroff. 1999).

The Forest follows many strategies to reduce populations of invasive weeds and to prevent further infestation. For instance: best management practices are followed (Forest Service Manual Section

2080 (FSM2080)); standard and special provisions are included in timber sale contracts; a Forest-wide special order requiring weed-free hay and feed for livestock has been implemented; weed-free gravel in road construction projects is required, reseeding disturbed sites is done with native vegetation, and all districts on the Forest have implemented integrated weed management programs that include prevention through public education, along with biological, mechanical and chemical weed suppression. The Beartooth Weed Management Area is an organization that consists of several agencies and other cooperators in Carbon and Stillwater Counties to facilitate cooperation and to provide more efficient and effective use of funding sources.

Regulatory Framework

Nearly all users and interested parties desire complete prevention and eradication of noxious weeds on the Forest, but not necessarily at the expense of their use and enjoyment of the Forest. Neither are there sufficient resources or technology available to completely eradicate existing weed infestations within the planning horizon. The 1987 Custer National Forest Plan (Forest Plan - FP) directs control of noxious weeds as a priority item (FP Page II-3) where the goal is to implement an "integrated pest management program aimed at controlling new starts, priority areas of minor infestations. Holding actions will be implemented on areas of existing large infestations." The Forest Plan also directs that noxious weed control program be developed for the Absaroka-Beartooth Wilderness Area in order to maintain wilderness values (FP Appendix II, p. 156). Additional regulatory framework for integrated weed management is found in the 2006 Custer NF Weed Management FEIS (project file), which is incorporated by reference into this analysis. The overall goal of is to maintain or restore healthy plant communities that are relatively weed resistant, while meeting other land-use objectives such as forage production, wildlife habitat maintenance, or recreational land maintenance.

Affected Environment - Weeds

An extensive scientific literature review was recently conducted for the 2006 Custer NF Weed Management EIS (project file). Weeds have many vectors for dispersal, such as people, wind, water, and animals. Although wind and water contribute to weed dispersal, travel management does not influence these forms of seed dispersal; consequently, they are not addressed in this analysis.

Once introduced into an area, a weed's ability to spread depends on its physiology and whether this physiology can take advantage of the local soil characteristics and other site conditions such as sunlight, and moisture. Forcella and Harvey (1983) studied Eurasian weed infestations in western Montana. They concluded that some undisturbed ponderosa pine sites were infested with weeds even without disturbance, while subalpine sites were essentially weed free regardless of disturbance, and some Douglas-fir sites were infested only if the site was disturbed.

Different weed species have different physiological attributes that allow them to out-compete native plants. One example is spotted knapweed, which has a competitive advantage over native plants because it may produce chemicals that inhibit the growth of other plants (Bais, et al. 2003).

Site disturbance caused by many factors can provide a competitive advantage to weeds over native plants. Disturbance associated with road building is a good example. Clearing of vegetation for roads provides the opportunity for noxious weeds to establish themselves and out-compete native plants. Once they become established on or along roads, vehicles and animals can transport their seeds the entire length of the road system.

Vehicles are vectors of weed spread. However, the number of weeds per vehicle varies substantially. This variability may be associated with characteristics such as the season, the site, and whether the vehicle had been driven on paved or unpaved roads (Lonsdale and Lane. 1994; Hodkinson and Thompson. 1997). One study found that vehicles driven several feet through a spotted knapweed infestation can accumulate more than 2,000 seeds, and ten percent of the seeds remained on the vehicle ten miles from the infestation site (Sheley and Petroff. 1999).

Two different studies looked at the type of route (primary, secondary roads, and non-motorized trails) in relation to the abundance of weeds. A recent study by Gelbard and Belnap (2003) concluded that paved roads had more weeds than gravel roads or two-track roads in Utah's Canyonlands National Park. They determined the process of constructing paved roads disturbed more land (23 feet each side of the road) than the two-track road (3 feet). A similar study in Glacier National Park (Tyser and Worley. 1992) found spotted knapweed and yellow toadflax along primary and secondary roads but not along backcountry (non-motorized) trails. Also, weed abundance was higher within the first 25 meters than at 100 meters, suggesting that the roads were the primary source for weed dispersal.

Research has shown that motorized vehicles tend to have a greater capacity for spreading weeds than non-motorized travel (Tyser and Worley, 1992). The current weed inventory for the Custer National Forest shows this same correlation; more weeds are present along motorized routes than along non-motorized routes. The bulk of the remaining Beartooth District infestations occur in areas that have been burned by wildfire. According to the Custer weed survey data as of 2006, of the infestations occurring near motorized routes, about 70 percent of the infestations occur within the first 100 feet of motorized routes.

Current Weed Conditions

Some weed species are extremely hardy, competitive, and have the ability to displace native plant species and permanently alter the structure, composition and function of native plant communities. These species are considered very invasive and are typically listed as noxious by States. Of the 2000 plus vascular plant species that have been documented on the Custer National Forest, 14 are considered noxious weeds on the District. Currently there are approximately 394 recorded acres infested with noxious weeds in the District boundary. The infested acres include 367 acres of National Forest System lands and 27acres of private lands. Sites are generally small and widely scattered with many populations occurring along main National Forest System roads. Canopy density averages between 5-15 percent. Canada thistle, spotted knapweed, houndstongue, and leafy spurge are the predominant noxious weed species, comprising 93 percent of the District inventory.

The following tables display the District's Weed Acreage. Due to some sites having multiple weed species the actual infested acreage may be slightly overestimated.

Table 3-61. Noxious Weed[44] Acreage Summary by Ownership Within NFS Boundary[45]

Common Name	Category[46]	USFS Gross[47]	USFS Infested[48]	Private Gross	Private Infested	Total Gross	Total Infested
Leafy Spurge	1	29.5	13.9	5.1	4.2	34.6	18.1
Spotted Knapweed	1	2145.9	127.8	12.8	9.5	2158.7	137.3
Canada Thistle	1	2448.0	142.9	1.0	0.3	2449.0	142.2
Field Bindweed	1	7.4	0.8			7.4	0.8
Houndstongue	1	851.8	57.8	0.9	0.7	852.7	58.5
Dalmatian Toadflax	1	55.4	5.1	3.0	3.0	58.4	8.1
Yellow Toadflax	1	7.1	3.9			7.1	3.9
Oxeye Daisy	1	29.2	3.8			29.2	3.8
Sulfur Cinquefoil	1	201.4	8.5	12.6	9.4	214.0	17.9
Meadow Hawkweed	2	0.1	0.1			0.1	0.1
Common Tansy	2	3.3	3.3			3.3	3.3
Common Mullein	Roadside Weed	Trace					
Musk Thistle	Roadside Weed	Trace					
Total		**5779**	**367**	**35**	**27**	**5814**	**394**

The general locations of noxious weeds in the project area occur mostly along motorized routes. Detailed locations of weeds on the District are located in the project record (CNF Weed Management FEIS).

Human Influence

People and their activities have been, and will continue to be, the greatest influence on the introduction and spread of noxious weeds. If education and prevention efforts are effective, the introduction of new weeds and the spread of existing weeds will be reduced, but not eliminated. It is not practical to contact, inform or change attitudes of all users prior to their arrival onto the National Forest.

Human activities of grazing, timber harvest, road construction, recreation (camping, fishing, hunting, trail riding, back packing) and forest administration contribute, to various degrees, to the introduction and spread of weeds. Motorized vehicles and equipment contribute the most to introduction and spread of noxious weeds because of vehicle mobility and size, and/or distance of travel within a given time. Weed seeds become stuck in tire tread and in under carriage mud, pulled off and lodged in the framework, drug out upon unloading from passenger and cargo compartments or deposited with contaminated cargo (e.g., gravel, hay, straw).

Backpackers and workers can spread weeds by transporting weeds or seeds caught in the lugs of

[44] As Of 6-15-2006
[45] Acreage falls within Beartooth Weed Management Area.
[46] Category 1, Wide Spread, Category 2, Rapid Spreading, Category 3, New Invader
[47] Gross acreage is a mapped unit around infestations and does not necessarily represent actual infested acres.
[48] Infested acreage is the estimated infested portions of an overall gross mapping unit and more closely represents areas receiving actual treatment.

boots, fabric of clothes, or in equipment. Livestock spread weeds by having seeds caught in the hair, transported in stomach contents (if the animal has not been on clean weed seed free feed for several days prior to coming to the Forest), or in the manure in stock trailers.

Where weed seed is deposited depends on how far and where the person travels. Most often it is along system roads or trails, but some people travel off of the system roads and trails depositing weed seed in isolated and hard to find places. The amount and speed of introduction and spread of noxious weeds depends upon the: amount, type and location of use; the amount, type and location of weeds; origination of the user, and effectiveness of noxious weed prevention and control measures.

Trend

Since the late 1800's exotic plant species have been spreading across the Pacific Northwest and Northern Great Plains. It is clear when studying distribution records of exotic plant species over time that the plants are increasing and expanding their range once they are established. Based on these historic trends, these patterns of expansion will continue due to transport of seeds from increasing intercontinental travel and trade, and through continued disturbance on all lands (through agricultural, residential, recreational, and commercial developments). Nationally, National Forest System lands have an estimated six to seven million acres that are infested with noxious weeds. This figure is increasing at an exponential rate of 8-12 percent per year. For example, 10 acres of spotted knapweed left unmanaged today in a disturbed environment has the potential of increasing to 1,000 acres in ten years.

The following table displays an increase in inventory and is due, in large part, to large scale wildfires and better inventory. The total cost of control is greater than the Forest is budgeted to accomplish on an annual basis. In addition to annual appropriations, various grants and partnerships have been successful in adding resources to annual control measures. Treatment priority criteria are used because resources are generally not sufficient to treat all infestations (CNF Weed Management FEIS, 2006). Spread vector areas such as roads and trailheads, are high in priority for treatment.

Table 3-62. Inventoried Net Acres

Species	1985 Inventoried Net Acres [49]	2006 Inventoried Net Acres
Leafy Spurge	3	14
Spotted Knapweed	114	128
Dalamtian toadflax	12	5
Canada Thistle	6	143
Sulfur cinquefoil	-	9
Yellow toadflax	-	4
Oxeye Daisy	-	4
Common Tansy	-	3
Houndstongue	-	58
Field Bindweed	-	0
Total	**135**	**368**

The Custer National Forest could experience further invasion of spotted knapweed, leafy spurge,

[49] The 1985 inventory was taken from the 1986 Custer Forest Plan.

houndstongue, Canada thistle, sulfur cinquefoil, Dalmatian toadflax, and/or yellow toadflax in the very near future, especially in light of some of the large scale wildfires that have occurred and will likely continue to occur. Ground disturbing catastrophic events, such as a wildfire, create an environment most prone to the spread of noxious weeds. Weeds typically establish most quickly on previously forested areas having burned under high intensity and high severity conditions. Prior to recent large wildfires, shading by conifers inhibited noxious weeds from spreading into areas with unburned overstories. The recent large wildfires that occurred on the District[50] opened the overstory forest canopy and reduced understory vegetation on about 18% of the District landscape which allowed a prime seedbed for competing weeds. Post-fire monitoring indicates a definite increase in the number of weeds, especially Canada thistle, Spotted Knapweed, and Leafy Spurge following the fires. These large scale fire areas are most prone to long-term invasion.

Once established, the noxious weed can then proliferate and spread using its most effective adaptation. Some weed species produce seeds at an enormous rate (i.e., spotted knapweed). Seeds of various species are adapted to facilitate different modes of travel. Some are sticky or have hooks and barbs that attach themselves (i.e., houndstongue), some are light and feathery and others are edible. Leafy spurge extends its roots up to 40 feet deep, re-sprouting from nodes along the root system, and have seeds that "explode" from the plant. Because of these and other adaptations, seeds are often readily transported by natural factors of wind, water, birds, or wildlife.

To counter the continuing spread, the Forest has had an active prevention and control program to reduce the impacts of invasive noxious weeds for over 25 years. Prevention efforts have included: 1) public education (identification and impacts of noxious weeds, risks and methods of spread, and ways of reducing the risk) including speaking to schools and special interest groups, posting signs and educational materials, sponsoring media advertisements, and visiting with members of the public at campgrounds and trailheads; 2) enforcing a special order requiring certified weed free feeds on all NFS lands within the state of Montana; 3) implementing Best Management Practices (BMPs) such as doing risk assessments and adding appropriate prevention requirements in contracts, permits and project plans (e.g., washing equipment, minimizing soil disturbance, certified weed free seed, etc); 4) restricting motorized cross-country travel on all NFS lands per the Tri-state OHV Decision by the Regional Forester in 2001 and the National OHV Policy CFRs issued in December 2005.

Control efforts have included: mechanical, chemical, and biological. Mechanical hand-pulling provides partial control of weeds, reducing spread and density of weeds by reducing seed production, where the use of chemicals is not appropriate. These areas generally include campgrounds, administrative sites, areas of low infestations, and in areas where sensitive plant species are known to exist.

Chemical weed control has historically been the primary tool for noxious weed control on the project area. Chemical weed control is done in accordance with the 2006 Final Environmental Impact Statement for the control of noxious weeds on the Custer National Forest, and the label constraints for the regulated herbicide being applied. Various factors (location, funding, weather, fire activity, new infestations) determine the number of acres that are treated each year. Priority of treatment has been: 1) new, small infestations, especially a new species; 2) road corridors and trailheads; 3) large upland

[50] 1988 Storm Creek – 56,856 acres, 1991 Robertson Draw- 3,300 acres, 1996 Shepard Mountain – 14,890 acres, 2000 Willie - 1,503 acres, 2002 Red Waffle - 5,859 acres, and 2006 Derby Mountain-15,484 acres

infestations.

Effects Analysis Methodology

It is difficult to show that different types of motorized vehicles spread weeds at different rates. Also, locations of weed infestations on the Beartooth District have a strong correlation to motorized routes. Consequently, all forms of motorized vehicles were grouped together in the risk analysis. A route was considered to be at a higher risk to weed invasion if it was used by motorized vehicle than if it was used by non-motorized vehicle.

The degree of risk from some of the most threatening species can be evaluated when completing project weed risk assessments. The susceptibility of an area to species' establishment, the level of threat to susceptible areas, and the probability of exposure of each site to plant propagules affecting dispersal can be evaluated. Overlaying weed inventories and designated public motorized routes, with this susceptibility assessment can further identify areas that are potentially at risk from invasion.

Level of Risk

Susceptibility, threat, and probability of exposure can be combined to model the degree of risk across a project area from some of the most threatening exotic species. Proposed disturbance information can be combined with vegetation data to identify which areas are susceptible to invasive plant species analyzed.

Three variables were used to determine risk level; susceptibility, threat, and exposure.

Table 3-63. Level of Risk

Susceptibility	Threat	Exposure	Risk
Low to No Susceptibility	Low to None	Any level	No to Low Risk
Susceptible	High	High	High

A risk assessment (Mantas, 2003) was completed for several weeds occurring in the USFS Northern Region, East of the Continental Divide (http://www.fs.fed.us/r1/cohesive_strategy/datafr.htm). Data, literature sources, and expert opinion were used to determine if a species could become established in each vegetation type. Expert opinion came from a panel of botanists and ecologists who were convened to review the findings from data and literature. This information was referenced in determining area susceptibility and threat levels.

In addition, the three variables outlined above were used to model estimated risk. A spatially explicit analytic model using a Geographic Information System (GIS) was used to map and calculate the acres at risk to invasive weeds (Project Record).

Weed Susceptibility

Susceptibility is an estimate of the vulnerability of different habitats to colonization and establishment of a weed species. Even without any disturbance on the landscape, some areas are susceptible to the infestation by invasive plants. The District supports a very diverse mixture of plant communities. Vegetation runs from open, dry grasslands and sagebrush/grass in the valley bottoms, to dense lodgepole, subalpine fir and Douglas fir forest in the mid elevations. Subalpine/alpine grasslands, tundra and rock barrens dominate the high elevations. Wetlands and riparian areas are scattered throughout the Forest.

Forested and high elevation vegetation dominates the majority of the lands on the District. However, the areas dominated by lower elevation non-forest vegetation encompass the highest species and plant community diversity. Some of these areas are also at the greatest risk for invasion by exotic species. Because most of the weed species that occur on the District are considered aggressive in most non-alpine, non-forested, and sparsely forested settings, these areas are considered to be in the susceptible class.

Approximately 17% percent or roughly 92,500 acres are naturally susceptible to weed invasion on the District. The following table quantifies the acreage at risk of invasion by cover type if the current weed populations are allowed to grow unchecked.

Table 3-64. Cover Type Susceptibility to Weed Infestation[51]

Cover Type	Beartooth District
	Open or Open Canopied Ac. Below 8000'
Non-irrigated Ag Land	60
Irrigated Ag Land	15
Non-native Grassland	1037
Very Low Cover Grassland	11983
Low / Moderate Cover Grassland	27030
Moderate / High Cover Grassland	7367
Mesic Shrublands	2260
Xeric Shrublands - Sagebrush	6960
Aspen	8657
Mixed Broadleaf / Cottonwood	1058
Whitebark Pine	4968
Limber Pine	12549
Ponderosa Pine Open Canopy <25%	1300
Douglas Fir Open Canopy <25%	5990
Juniper	1300
Acreage Susceptible to Weeds	**92534**
Vulnerable Acreage % of Beartooth District (539,771 Total Ac)	**17%**

Alpine Plant Communities: Although exotic species can occur on these sites, these communities are generally not susceptible by the species currently identified as invaders because these sites are incompatible for the growth and establishment of the invader species.

Montane and Foothill Grassland and Shrubland: Much of the montane and foothill grasslands have some level of infestation. With any degree of disturbance or introduction of exotic seeds, these sites are susceptible. Shrublands are also susceptible to exotic species invasion, because environmental conditions in these vegetation types are very similar to the conditions where many invader species originated.

[51] Acreage is within NF Boundary and includes private and state inholdings. Based on Silc3bnd04 Grids (postfire version CNF cover types).

Wetlands and Riparian Communities: Riparian / Wetlands are susceptible to weed invasion. Some wetlands tend to out-compete many invasives, while other riparian areas in a drier setting are at higher susceptibility to invasion. A small amount of inventoried weeds are found in riparian systems (mostly Canada thistle). Canada thistle can be deleterious to native wetland and riparian communities of the District. Canada thistle grows in dense colonies of disturbed wet meadows and riparian areas, especially areas affected by wildfire. Other wetland/riparian weeds that have not been found on the District include purple loosestrife, reed canarygrass, tall buttercup, and water milfoil. Purple loosestrife and reed canarygrass has been found in adjacent lands within Carbon County, Montana. Tall buttercup and water milfoil have not been found in any wetland or riparian environments in or near the project area. Although leafy spurge is not considered a moisture-loving plant, it can flourish in well-drained river cobbles and gravel bars along stream courses.

Coniferous Forest and Broadleaf Plant Communities: Most closed canopy environments of common forest types found on the District are not conducive to invasion and infestation by exotic species. Even those species that can flourish in a coniferous forest setting need more sunlight, some degree of disturbance, or a combination of the two. However, in more open and / or disturbed conditions, nearly all but the wetland/riparian invaders can occur.

Many invader species are more successful in the more open canopy, drier forest types (dominated by Douglas fir or ponderosa pine), especially when there is some type of disturbance such as a road, skid trail, livestock grazing, or high recreational use. On the District, the most noticeable and widespread invaders in this situation are spotted knapweed, houndstongue, Canada thistle, Dalmatian toadflax, and leafy spurge. Other species, however, are rapidly spreading such as sulfur cinquefoil.

To help assess indirect effects for Alternatives A, B, No Action and B Modified, a 400 foot buffer from each side of a motorized route was used. This accounts for allowable dispersed camping within 300 feet of a route, along with a 100 foot addition for potential weed spread beyond the 300 foot dispersed camping allowance. For Alternative C, a 100 foot buffer from each side of a motorized route was used. This accounts for allowable parking within 50 feet of a route, along with a 50 foot addition for potential weed spread beyond the 50 foot parking allowance. The assumption used for only a 50 foot addition to allow for weed spread is less that the 100 foot addition to the other alternatives given that there is likely to be less duration of activity and less site disturbance by parking versus dispersed camping.

These specific Alternative buffers were intersected with areas rated as susceptible to weed infestation in the Table above (entitled Cover Type Susceptibility to Weed Infestation). The indirect effect for each alternative is based on the total number of acres susceptible to weeds that intersected the respective Alternative's buffer of motorized routes. For each Alternative, about half of the buffered areas are susceptible to weed infestations. The areas of high susceptibility are summarized in the following Table:

Table 3-65. Cover Type Susceptibility to Weed Infestation by Alternative

Cover Type Below 8000'	Alternative A – 400' Buffer Acres	Alternative B – 400' Buffer Acres	Alternative C – 100' Buffer Acres	No Action Alternative – 400' Buffer Acres	Alternative B Modified– 400' Buffer Acres
Ag Land	4	5	0	3	4
Grassland	9870	7293	1498	8851	8789
Moist Shrub	696	566	80	482	646
Dry Shrub	1765	1222	314	1344	1388
Mixed Broadleaf	1266	867	152	1144	1283
Forested - Open	1689	1076	167	1263	1180
Total Susceptible Acres	**15290**	**11029**	**2211** [52]	**13087**	**13290**
Percent of Susceptible Route Buffer Acres Compared to All Susceptible Acres (92,534 Acres)	**17%**	**12%**	**2%**	**14%**	**14%**

Weed Threat: Threat refers to the estimated degree of change in structure, function or composition that a weed species would have on a potential natural vegetation type. Because the noxious weed species that occur on the District are considered aggressive, they all occur in the high threat class.

Other weeds species that are less aggressive and less of a threat are considered to be in the low to no threat category.

Weed Exposure: Exposure refers to the probability that an area would be exposed to seeds from noxious weeds. The exposure classes used in this analysis are high exposure (motorized routes designated for public use) and low to no exposure (motorized routes designated for administrative use only [53] and non-motorized travel).

An average of 70% of a road related infestations occur within the first 100 feet of the buffer, 82% occurs within the first 300 feet, and 95% occurs within the first 400 feet of motorized routes.

A 400 foot buffer from motorized routes was used to assess direct effects from exposure to weeds since most of the weed infestations, associated with motorized routes, are found within this distance. There are a few infestations that go somewhat beyond the motorized routes, but to a large degree, the remaining weed infestations are associated with effects from wildfire or in areas extremely difficult to access for weed control efforts (steep, rocky, remote). The effects analysis assumption used is that weed establishment in areas susceptible to weed infestation can spread within this 400 foot distance

[52] For comparison, a 400 foot buffer under alternative C equates to about 3,121 acres.

[53] Motorized routes designated for administrative use only (between 30 and 73 miles, varied by alternative) fall within a controlled setting either through permit with associated terms and conditions or use by Forest Service employees where best management practices are required. Also, these routes tend to have less frequent travel and low duration of use which also lessen impacts compared to more frequent use by the general public who always are not aware of protective measures to take in preventing and combating noxious weeds.

within the ten year planning horizon of the travel management decision if left untreated. However, road related infestations are given high priority for treatment since motorized routes are typically primary vectors for spread. Exposure to weed spread within 400 feet of a motorized route is less that that portrayed in the following table due to the likelihood of weed treatment and the fact that the bulk of road-related infestations occur within the first 100 feet. Therefore, the 400 foot buffer was used as a conservative approach for an analysis measurement.

Table 3-66. Acres Current Weed Infestations within 400 Feet of Motorized Routes

Common Name	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
Canada Thistle	86	81	73	98	81
Dalmatian toadflax	3	1	0	3	1
Other	Trace	Trace	Trace	Trace	Trace
Yellow toadflax	Trace	Trace	Trace	Trace	Trace
Field Bindweed	6	5	5	19	5
Houndstongue	48	45	39	53	45
Leafy Spurge	5	4	4	4	4
Meadow Hawkweed	21	21	21	21	21
Oxeye Daisy	4	4	4	3	4
Spotted Knapweed	76	71	68	75	71
Common tansy	Trace	Trace	Trace	Trace	Trace
Sulphur cinquefoil	5	5	4		5
Total Infested Acres	**254**	**236**	**218**	**277**	**236**
400' Route Buffer Percent of 368 Inventoried Acres of Weeds[54]	**69%**	**64%**	**59%**	**75%**	**64%**

3.3.4.5 Environmental Consequences – Weeds

Direct and Indirect Effects-Weeds

Effects Common to All Alternatives

Types of Use: Research has shown that motorized vehicles tend to have a greater association for spreading weeds than non-motorized vehicles (Tyser and Worley. 1992). The current weed inventory for the Custer National Forest also shows this same correlation; more weeds are present along motorized routes than along non-motorized routes. This may be because of the greater number of vehicles and greater area traveled per unit contributing to the amount of use, rather than from the nature of the vehicle itself. Greater surface area coming in contact with weeds and greater area of ground disturbance allowing seed germination may be contributing factors. All forms of motorized vehicles were grouped together in the risk analysis. The route was considered to be at a higher risk to weed invasion if it was used by motorized vehicle than if it was used by non-motorized vehicle.

Pack and saddle stock are significantly less contributors to weed introduction and spread only if weed seed free feed is fed several days prior to and during the time they are on the Forest. The special order requiring certified weed free feed during the time on the Forest has been partially effective, but there

[54] Most of the remaining acreage not occurring adjacent to motorized routes are a result of wildfire effects or animal vectors.

is little evidence that feeding weed seed free feed several days prior to coming to the Forest has been largely adopted by visitors. Increased weed infestations tend to occur at trail heads and campgrounds where vehicles are parked and livestock are unloaded, fed and tied. The origin of the visitor (i.e., from a weed infested area) is a major factor in the introduction of new weed species, or new infestations of existing weed species, without regard to the type of use.

Seasons of Use: Under all alternatives, portions of proposed seasons of use occur during the growing season and when seeds are ripe. Plant propagules and seeds can be attached to vehicles, livestock, and humans, and potentially be spread, regardless of each alternative's seasons of use.

Direct and Indirect Effects-Weeds

Weeds spread by way of many different vectors; animals, water, wind, and people. Since motorized travel routes have a very high association with weed occurrence (Tyser and Worley. 1992; Gelbard and Belnap. 2003; Banks, et. al. 2004) it seems reasonable to conclude that motorized vehicles function as a major vector.

The direct effect of motorized travel routes within susceptible areas for weed invasion is an increase in weed density and distribution. The effect of treating weeds was analyzed in the recent Custer National Forest Weed Management Final EIS (2006); this analysis tiers to that document.

The following table is used to make Alternative comparisons. No Action Alternative has the most buffer acres currently infested with weeds (277 acres), and Alternative C produce the least (218 acres), for a range of 59 acres. Alternatives A, B, B Modified, and No Action are similar in terms of area impacted with motorized travel and existing weeds.

Table 3-67. Weed Infestations and Public Motorized Routes

	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
Miles of Designated Public Motorized Routes	341	261	198	287	267
Total Susceptible Areas	15,290	11,029	7,808	13,087	11,097
Total Infested Acres within 400' Buffer	254	236	218	277	236
Percent Infested within Total Susceptible Buffer	1.7%	2.1%	2.8%	2.1%	2.1
Percent of Infested within 368 Inventoried Acres of Weeds [55]	70%	64%	59%	75%	64%

The following table summarizes indirect effects. Indirect effects include the risk of a motorized vehicle introducing weeds into an area that is susceptible to weed infestation. Once weeds are introduced into the susceptible area, it would continue to spread and displace native plants, even if the area is not disturbed.

Alternative A has the greatest area at high-risk of weed invasion near motorized travel routes (15,290 acres), while Alternative C has the least (2,211 acres), for a range of 13,079 acres. Alternatives B, B Modified, and the No Action Alternative are somewhat similar to Alternative A in regard to number

[55] Most of the remaining acreage not occurring adjacent to motorized routes are a result of wildfire effects or animal vectors.

of acres at risk (between 11,029 and 15,290 acres) in comparison the Alternative C's 2,211 susceptible acres. All Alternatives have about one half of the motorized routes going through susceptible areas. The percent of susceptible buffer acres under Alternatives A, B, B Modified, and No Action range between 12 and 17% of all District susceptible acres while Alternative C's susceptible acres is 2% of all District susceptible acres.

Table 3-68. Cover Type Susceptibility to Weed Infestation by Alternative

Cover Type Below 8000'	Alternative A – 400' Buffer Acres	Alternative B – 400' Buffer Acres	Alternative C – 100' Buffer Acres	No Action Alternative – 400' Buffer Acres	Alternative B Modified
Susceptible Acres	15290	11029	2211	13087	11,097
Percent of Susceptible Route Buffer Ac. Compared to All Susceptible Ac. (92,534)	17%	12%	2%	14%	12%

Cumulative Effects-Weeds

All of the activities identified as past, present, and future activities in the beginning portion of this chapter, have the potential to affect the spread of noxious weeds.

Most of the existing weeds on the District are associated with past resource management or activities. The common elements associated with most weed infestations are ground disturbance, wildfire, and use of motorized vehicles. Once the weeds are introduced into an area they generally continue to spread into adjacent areas. The current weed treatment programs were addressed in the recent Custer National Forest Weed Management EIS (2006). Historically, the District has treated 150 to 200 acres of weeds annually, out of the 368 inventoried infested acres. The acres treated could increase if more funding becomes available.

Weeds will continue to be spread as a result of resource management and other human activities. The recently developed mitigation measures that are addressed in the Forest Service Manual 2080 are being implemented and will help to slow the spread of weeds.

Other travel management planning decisions on the Lewis and Clark, Gallatin, Helena, Beaverhead-Deerlodge National Forests, Bureau of Land Management, State of Montana and private lands will have varying effects, depending upon the decisions made, on the spread of noxious weeds to, and in, the project area. The more travel is restricted in those decisions there could be increased use and potential of weed spread in the analysis area.

The weed risk assessment considered high-risk areas as those areas that do not require any additional disturbance in order for weeds to invade (e.g., natural meadows and grasslands). If a disturbance (such as a fire or timber harvest) occurred in a high-risk area with an existing weed problem and the area has motorized routes, the cumulative impact will exasperate the problem. In this situation the weeds may spread quickly to new areas and may rapidly increase in density. For example, after a wildfire burns an area with existing weeds, the first plants to colonize the site are usually the invasive weeds and they quickly displace native plants. Having motorized travel in these areas will help to carry the weeds to new locations. Conversely, the motorized route will provide rapid access for weed treatment provided that funding is available for treatment. The best management practices outlined in

Forest Service Manual 2080 will help to reduce the spread rate but it will not prevent the spread altogether.

On the other hand, if a severe disturbance occurs in a low-risk area (e.g., forested environment), the area could support invasive weeds until new vegetation forms a dense canopy cover and out-competes the weeds (except for a few species that grow under a closed canopy or shaded environment such as orange hawkweed).

Any ground or severe vegetation disturbing activity, such as mining has the potential to increase the spread of noxious weeds. This risk comes from: 1) the equipment and people 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.

Current on-going activities may have a cumulative negative effect by increasing the introduction and spread of noxious weeds. Livestock grazing may transport weed seed between private or other lands and the Forest, or from place to place on the Forest, by carrying seed in the hair or digestive tract. Livestock may also increase seed germination by reducing vegetation competition in areas of excessive grazing and by ground disturbance in areas of excessive trailing. Wildlife and birds can similarly transport weed seed in hair, feathers and digestive tracts. Weed seeds are also transported by wind and water and wildfire provides improved germination.

All of these specific activities and natural forces combine with activities affected by travel management planning to cumulatively introduce and spread noxious weeds in the project area.

3.3.4.6 Conclusion - Weeds

Since there is a high association with motorized routes and weed infestations, Alternatives A and No Action have a higher probability for weed spread, Alternative C has a lower probability, and Alternatives B and B Modified have an intermediate probability for weed spread.

Many agents will continue to transport weeds and weed seeds, regardless of the decision on travel, but the fewer the agents, the less weed spread. However, removing all use would defeat the purpose of the public lands, and is not public policy, and still would not totally eliminate the spread of weeds. Therefore, noxious weed management requires a balance of use restriction, public education, implementation of best management practices (BMPs), and effective treatment measures. The more the public voluntarily accepts and implements weed prevention practices, less restrictions and expensive weed control will be required.

Per existing policy, a noxious weed risk analysis will be done for each project and appropriate BMP measures (FSM 2080, R1 Supplement 2000-2001-1) included in each environmental analysis, permit, and contract and will help reduce cumulative effects. Each project and public use area will be monitored for noxious weeds and the implementation and effectiveness of BMP mitigation measures, prioritized by the degree of risk. The Forest Service will continue prevention, public education and appropriate weed treatment measures.

All action alternatives are consistent with the Laws, Regulations, Policy, and Federal, Regional, State,

and Custer Forest Plan. Of these regulatory directions, only the FSM 2080 addresses travel management with respect to weed management. A weed risk assessment is part of this analysis and meets this manual requirement.

3.3.4.7 Affected Environment – Sensitive Plants

Introduction

The three plants listed on the Threatened or Endangered Species List as "threatened" and occurring in Montana are water howellia (*Howellia aquatilis*), Spalding's catchfly (*Silene spaldingii*), and Ute ladies'-tresses (*Spiranthes diluvialis*). Species occurrences and suitable habitat are only known on Forests west of the Continental Divide for water howellia and Spalding's catchfly, and in the Missouri, Jefferson, Beaverhead, Ruby, and Madison River drainages for Ute ladies'-tresses. No further analysis will be conducted for the threatened species.

Forest Service sensitive species are defined as "Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a) significant current or predicted downward trends in population numbers or density or b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." The current USFS Northern Region (R-1) sensitive plant species list was developed October 28, 2004.

Many species are listed as sensitive for the Custer National Forest. Portions of the Custer Forest fall within various ecological settings, ranging from the Northern Great Plains, the Northern Great Basin, and the Northern Rocky Mountains. As a result of a review of existing information relative to species extent of distribution and ecological requirements, a list of sensitive plant species have been screened as to its potential habitat by district. As a result, not all Custer listed sensitive species can be found on all three districts. Only species with potential habitat on the Beartooth District are addressed in the analysis.

Regulatory Framework

The *1987 Custer National Forest Land and Resource Management Plan* (Forest Plan) provides management guidance to natural resource managers within the framework of Congressional intent (36 CFR 217). The Forest Plan provides general management direction (page 3) that indicates; "the goal for the management of Threatened and Endangered plant and animal species is to provide habitat that contributes to the recovery of the species". Page 17 of the Plan indicates that no federally listed threatened or endangered plant species occur on the National Forest units of the Custer National Forest at the time the Forest Plan was prepared (1986). Since that time, there continues to be no plants designated as Threatened or Endangered that occur within the Custer National Forest. Within the framework of the Custer Forest Plan, direction is given to manage for retention of habitat of unique plant species which include sensitive species (Forest Plan, p. 20 and Appendix VII).

Forest Service Manual 2670.22 Sensitive Species provides the following direction for sensitive plants: 1) Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions; 2) Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest system lands, and 3) Develop and implement management objectives for populations and/or habitat of sensitive species.

Forest Service policy regarding biological evaluations is summarized in Forest Service Manual (FSM) 2672.4. The intent of the biological evaluation process is to assess the potential impacts of proposed management activities, and ensure that such activities will not jeopardize the continued existence of species listed, or proposed to be listed, as Endangered or Threatened by the U. S. Fish and Wildlife Service and species designated as sensitive by the Regional Forester.

Affected Environment – Sensitive Plants

Only species with known locations or potential habitat on the District are addressed in the analysis and outlined in Table 3-69. Six species are known to occupy habitat and have documented occurrences in the District. An additional five species are suspected to be present on the District.

During public scoping of this analysis, Platte cinquefoil (*Potentilla plattensis*) was identified as a potential species of concern located within the Pryor Mountains. Although not listed as a Northern Region Sensitive plant species, it has been identified as a BLM sensitive species. However, there is currently a recommendation from Montana Natural Heritage Program (MNHP) for BLM to de-list this species since the species has not been conclusively documented from BLM administered lands to date (MNHP, 2006). Reports of the species are due to the large imprecision associated with the mapping of historical collections (1937) with vague locality data. During public scoping, an unsubstantiated population was indicated to occur along the Punchbowl Road # 2144. Since the species status and known locations are in question, and to be on the conservative side, Platte cinquefoil will be addressed in the analysis. Its habitat occurs in moist to wet alkaline meadows within the sagebrush ecosystem, commonly associated with Baltic rush and shrubby cinquefoil.

Table 3-69. R-1 Sensitive Plant Species - Beartooth District, Custer National Forest

Common and Scientific Name	Type [56]	Global Rank [57]	State Rank [57]	Habitat	Closest known population	Flowering Period	Fruiting Period
RIPARIAN							
Giant helliborine *Epipactis gigantea* Suspected – Possible Habitat	3	G4	S2	Streambanks, fens with springs/seeps, often near thermal waters. 2,900 – 6,200' elevation. Perennial forb	Bluewater Fish Hatchery – approx. 15 air miles from Beartooth RD	June – Early August	June – Early August
Mealy Primrose *Primula incana* Suspected - Historically Documented [58] (1923)	3	G4 / G5	S2	Wet meadows, springs and shores, often where alkaline; calcareous bog meadows; wet meadows & quaking bogs; Not found in alpine or subalpine areas. Perennial forb	Historically known to occur near East Rosebud Lake	May to June	Through July

[56] Scale of risk, per Region 1 Species at Risk Protocol: Type 1: Threatened, Endangered or Proposed (ESA); Type 2: Range-wide Imperilment; Type 3: Regional/State Imperilment.

[57] The international network of Natural Heritage Programs employs a standardized ranking system to denote global (range-wide) and state status (Association for Biodiversity Information 2001). Species are assigned numeric ranks ranging from 1 (critically imperiled) to 5 (demonstrably secure), reflecting the relative degree to which they are "at-risk". 1 = Critically imperiled because of extreme rarity and/or other factors making it highly vulnerable to extinction; 2 = Imperiled because of rarity and/or other factors demonstrably making it vulnerable to extinction; 3 = Vulnerable because of rarity or restricted range and/or other factors, even though it may be abundant at some of its locations; 4 = Apparently secure, though it may be quite rare in parts of its range, especially at the periphery; 5 = Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery; T = Rank for subspecific taxon (subspecies, variety, or population); appended to the global rank for the full species, e.g. G4T3.

[58] Historically documented means that the species was historically known to occur, but not recently documented.

Table 3-69. R-1 Sensitive Plant Species - Beartooth District, Custer National Forest

Common and Scientific Name	Type [56]	Global Rank [57]	State Rank [57]	Habitat	Closest known population	Flowering Period	Fruiting Period
Small yellow lady's slipper *Cypripedium parviflorum* Suspected - Historically Documented (1922-1937)	3	G5	S2 S3	Fens, damp mossy woods, seepage areas, and moist forest-meadow ecotones in valley to lower montane. 2,520 – 6,200' elevation. Perennial forb	Stillwater Co. (State)– within close proximity to Beartooth Ranger District boundary	May-June	July
Three-ranked Humpmoss [59] *Meesia triquetra* Suspected - Historically Documented (1971)	3	G5	S2	Rich fens having surface waters with high pH and calcium concentrations. It can also be found in alkaline swampy birch and willow woods. Bryophyte	West Fork Rock Creek		
Hiker's gentian *Gentianopsis simplex* Known (Documented 1989 – 1991)	3	G4	S1	Fens, meadows, and seeps, usually in areas of crystalline parent material, in the montane and subalpine zones. 4,460 – 8,400' elevation. Annual small forb	East Rosebud	July - August	July - August
MONTANE SAGEBRUSH / GRASSLAND							
Jove's Buttercup [60] *Ranunculus jovis* Known (Documented 2005 – 2007)	3	G4	S2	Sagebrush grasslands to open forest slopes in the montane and subalpine zones. Perennial forb	Head of Crooked Cr./Commissary-Pryor Mtns.	April - June	April - June
Beartooth goldenweed *Haplopappus carthamoides var. subsquarrosus* Known (Documented 1993 – 2006)	2	G4G 5T2 T3	S2	Grasslands and sagebrush steppe on sandy calcareous soils in the foothills and montane zones. 5,520 – 7,200' elevation. Perennial forb	Main Fk Rock Cr, Robertson Draw, and Sage Creek	July - August	July - August
EXPOSED LIMESTONE							
Shoshonea *Shoshonea pulvinata* Known (Documented 1084 – 1999)	2	G2G 3	S1	Open, exposed limestone outcrops, ridgetops and canyon rims, in thin rocky soils. 6,440 – 7,800 elevation. Perennial forb	Pryor Mountains and BLM Meeteetsee Spires	May - July	May - July
MONTANE - MOIST							

[59] *Meesia triquetra,* although not listed in the Region 1 2004 sensitive plant list for the Custer NF, has been added due to new information that there are suspected populations of this regional sensitive species on the District. Concurrence by Regional Botanist, July 2007.

[60] *Ranunculus jovis,* although not listed in the Region 1 2004 sensitive plant list for the Custer NF, *R. jovis* has been added due to new information that there are known populations of this regional sensitive species on the District. Concurrence by Regional Botanist, June 2005.

Table 3-69. R-1 Sensitive Plant Species - Beartooth District, Custer National Forest

Common and Scientific Name	Type [56]	Global Rank [57]	State Rank [57]	Habitat	Closest known population	Flowering Period	Fruiting Period
Musk-root *Adoxa maschatellina* Known (Documented 1994-2006)	3	G5	S2	Vernally moist places in the mountains at the bottom of undisturbed, open rock slides that have cold air drainage. Generally shaded, montane to subalpine. 4,400-6,000' elevation. Musky-scented perennial forb.	East Rosebud Creek and Spread Creek.	June-early July	Through July
Hall's rush *Juncus hallii* Suspected – Possible Habitat	3	G5	S2	Moist to dry meadows and slopes from valley to montane. 4,000 – 8,860' elevation. Perennial grass-like	Gallatin NF – approx. 80 air miles	July - August	July - August
ALPINE – MOIST SHRUB							
Barratt's willow *Salix barrattiana* Known (Documented 1970 – 1993)	3	G5	S1	Forms extensive thickets in alpine habitats. Grows on boggy meadows, moist open hillsides in mountains, lakeshores, streambanks, rock slides and recent alluvial deposits. Soils range from very calcareous to very acidic. 6,800 - 10,500 elevation. Shrub.	Line Cr Plateau	July - August	July - August

Habitat for eleven sensitive plant species and one suspected species of concern exists on the District. Only six sensitive species of the twelve species have known populations that occur on the Forest. Most of the listed sensitive plant species are located in riparian or wetland areas, one species in alpine, and a few species in drier open cover types.

The following table outlines routes where potential impacts could occur and season of use by Alternative.

Table 3-70. Motorized Routes Adjacent to Sensitive Plant Populations & Associated Season of Use.

Route Name	Route ID#	Sensitive Plant	Alt. A - Season of Use	Alt. B - Season of Use	Alt. C - Season of Use	No Action Alt. - Season of Use	Alt. B Mod. Season of Use
Beartooth Unit							
Robertson Draw	2008	Beartooth Goldenweed	4/15 - 12/1	4/15 - 12/1	4/15 - 12/1	4/15 - 12/1	4/15 - 12/1
W Fk Rock Creek	2071	Three-ranked Humpmoss	4/15 - 12/1	4/15 - 12/1	4/15 - 12/1	4/15 - 12/1	4/15 - 12/1
East Rosebud	2177, 21771	Mealy Primrose	Yearlong	Yearlong	Yearlong	Yearlong	Yearlong
East Rosebud	2177	Hiker's Gentian	Yearlong	Yearlong	Yearlong	Yearlong	Yearlong
Pryor Unit							
Commissary Ridge (upper portion)	2092	Jove's Buttercup, Platte Cinquefoil	Yearlong	6/15 – 4/15	6/15 – 4/15	Yearlong	5/22 – 4/15

Table 3-70. Motorized Routes Adjacent to Sensitive Plant Populations & Associated Season of Use.

Route Name	Route ID#	Sensitive Plant	Alt. A - Season of Use	Alt. B - Season of Use	Alt. C - Season of Use	No Action Alt. - Season of Use	Alt. B Mod. Season of Use
Cave Ridge	2094	Platte Cinquefoil	Yearlong	6/15 – 4/15	Designated for Adm. Use Only	Yearlong	Designated for Adm. Use Only
Beaverslide	2097	Jove's Buttercup, Platte Cinquefoil	Yearlong	6/15 – 4/15	Designated for Adm. Use Only	Yearlong	6/15 - 4/15
Pryor Road from head of Crooked Creek to Wild Horse North boundary)	2308	Jove's Buttercup, Platte Cinquefoil	Yearlong	6/15 – 4/15	6/15 – 4/15	Yearlong	5/22 – 4/15
Pryor Road from head of Crooked Creek to Sage Cr. Boundary)	2308	Beartooth Goldenweed	Yearlong	Yearlong	Yearlong	Yearlong	5/22 – 4/15
Dryhead Loop	2308B	Platte Cinquefoil	Yearlong	N/A - Route not designated	Yearlong	Yearlong	N/A - Route not designated
Upper Burnt Timber Ridge	2308 from Dryhd Overl. South to E Bdry	Shoshonea, Platte Cinquefoil	Yearlong	6/15 – 4/15	6/15 – 4/15	Yearlong	6/15 - 4/15
Pryor Powerline Road	2500	Beartooth Goldenweed	Yearlong	Yearlong	Yearlong	Yearlong	Yearlong
Pryor Powerline Road East Spur	25001	Beartooth Goldenweed	Yearlong	Designated for Adm. Use Only	N/A– Route not designated	Yearlong	Designated for Adm. Use Only

Effects Analysis Methodology-Sensitive Plants

No systematic ground surveys were completed for the alternatives addressed in this analysis. The analysis is based on known sensitive plant occurrences as provided by the Montana Natural Heritage Program (MNHP 2006), recent survey findings, and habitat potential or habitat/site characteristics (landtype, habitat type, aspect, and elevation). Information used came from data on file at the Custer National Forest, literature review (Beatty et. al. 2004; Ladyman. 2005, Lesica. 1995; Lyman. 2005; McCracken. 2005-2007; Mergen. 2006; Mincemoyer. 2006; MNHP. 2006; NatureServe. 2007; Rocchio and Anderson. 2006; Shelly. 1988; USDA. 1999; USDA, 2000; USDI. 2005; and WYNDD. 2005), and personal communications with resource specialists with knowledge of vegetation and travel management effects.

There are no new non-motorized routes being proposed for public use designation that occur near known populations or habitat components. Therefore, the analysis area for sensitive plants will focus on populations in close proximity to motorized routes designated for public use by alternative. The measures used in the effects analysis are the intersection of buffered designated motorized routes

with known sensitive plant populations and sensitive plant habitat suspected to be in the area. Alternatives include variations on motorized route designations and associated parking or dispersed camping along the routes. Designated routes with known plant occurrences or probabilities of sensitive plant habitat have been identified.

The potential direct effects are direct mortality which may come from more frequent ground disturbing activities within or near sensitive plant populations, such as parking or camping or infrequent disturbance from accessing dispersed campsites. To estimate frequent disturbance potential, a 0-4% slope was overlain in GIS within the motorized route access corridor for parking/vehicle access to dispersed camping (50 foot buffer for Alternative C parking and 300 foot buffer for vehicle access to dispersed camping for the remaining alternatives).

Indirect effects may come from frequency and duration of parking and/ or camping use resulting in more difficult recovery due to soil compaction and vegetation composition change (including weeds) which may out-compete sensitive plants. A 100 foot buffer is applied to Alternative C's designated routes to address parking allowance and additional area for weed spread potential (an additional 50 feet). A 400 foot buffer was applied to all other alternatives' designated routes to address access to dispersed camping allowance (300 feet) and additional area for weed spread potential (an additional 100 feet). Weed spread assumptions are found in the Weed section of this chapter.

Direct and indirect vulnerabilities and exposures are evaluated to make a biological assessment effects determination on each species.

3.3.4.8 Environmental Consequences – Sensitive Plants

All Alternatives

The degree of risk to sensitive plants from travel management depends on the vulnerability of the habitat to anticipated activities and the magnitude and duration of exposure.

Vulnerability

Two known species' populations are most vulnerable to direct effects from travel management. Seven of the species habitats have potential for being susceptible to noxious weed spread as an indirect effect of travel management (see Weed section of this chapter). Population or habitat vulnerabilities to direct and indirect effects are displayed in the following Table.

Table 3-71. Sensitive Plant Vulnerability

Species	Direct Effects – Populations / Habitats Vulnerable to Direct Disturbance	Indirect Effects - Habitat Vulnerable to Weed Spread
Species with Known Populations		
Barratt's willow	Low; too wet for typical driving, camping, or parking; known population occurs in Research Natural Area which is closed to motorized use	Low, species habitat is in mesic alpine where weed spread is unlikely
Beartooth Goldenweed	High; known populations immediately adjacent to motorized routes; habitat in gentle to moderate terrain amendable to parking or accessing dispersed camp areas	High; habitat can be vulnerable to weed spread
Hiker's Gentian	Low; too wet for typical driving, camping, or parking	Moderate; habitat can be vulnerable to weed spread

Table 3-71. Sensitive Plant Vulnerability

Species	Direct Effects – Populations / Habitats Vulnerable to Direct Disturbance	Indirect Effects - Habitat Vulnerable to Weed Spread
Jove's Buttercup	Moderate to High – Alternatives A and No Action; known populations immediately adjacent to motorized routes; habitat in gentle to moderate terrain amenable to parking or accessing dispersed camp areas. Moderate - Alternatives B, B Modified and C season of use lessens vulnerability to impacts during growing season.	High; habitat can be vulnerable to weed spread
Musk-root	Low; known populations are not located near motorized routes; habitat most often in areas not conducive to foot travel (talus slopes, rock slides).	Low; species habitat in forested canopy cover where weed spread is unlikely in shaded areas.
Shoshonea	Low; known populations have rough access terrain with no reasonable area for parking or dispersed camping access.	Low, species habitat is in exposed shallow limestone where weed spread is unlikely
Suspected Species		
Giant Helleborine	Low; too wet for typical driving, camping, or parking	Moderate; habitat can be vulnerable to weed spread
Hall's Rush	Low; no known populations, however, habitat components could occur within parking or access to dispersed camping	Moderate; habitat can be vulnerable to weed spread
Mealy Primrose	Low, too wet for typical driving, camping, or parking; no known populations	Moderate; habitat can be vulnerable to weed spread
Platte Cinquefoil	Moderate to High – Alternatives A and No Action; known populations immediately adjacent to motorized routes; habitat in gentle to moderate terrain amenable to parking or accessing dispersed camp areas. Moderate - Alternatives B, B Modified, and C season of use lessens vulnerability to impacts during growing season.	High; habitat can be vulnerable to weed spread
Small Yellow lady's-slipper	Low; too wet for typical driving, camping, or parking	Moderate; habitat can be vulnerable to weed spread
Three-ranked Humpmoss	Low; too wet for typical driving, camping, or parking; known location	Low; habitat in highly saturated peat where weed spread is unlikely

Exposure

The following table outlines acres of potential frequent (0-4% slopes) and infrequent exposure (route corridor)[61] to direct effects on known sensitive plant populations and suspected species habitat by Alternative. The acreage displayed is total potential acreage. However, the likelihood of repeated, frequent dispersed camping or parking will be significantly less than the following total acreage since these activities often occur near areas with water, vistas, or other known dispersed use areas.

[61] See Vegetation section for further background on frequent and infreqent access impacts.

Table 3-72. Potential for Frequent Exposure to Direct Effects

Species	Land Unit	NFS Population Total Size (Acres)	Alt. A	Alt. B	Alt. C	No Action Alt.	Alt. B Mod.
Known Populations – Acres (% of Population) Sensitive Plants in 0-4% Slope Class along Motorized Corridors							
Barratt's Willow	Beartooth	8	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hiker's Gentian	Beartooth	8	<0.06 (<1%)	<0.06 (<1%)	0 (0%)	<0.06 (<1%)	<0.06 (<1%)
Musk-root	Beartooth	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Three-ranked Humpmoss	Beartooth	124	0.5 (<1%)	0.5 (<1%)	0 (0%)	0.5 (<1%)	0.5 (<1%)
Beartooth Goldenweed	Beartooth	607	0.4 (<1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Beartooth Goldenweed	Pryor	482	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Shoshonea	Pryor	155	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Jove's Buttercup	Pryor	25	<0.03 (<1%)	<0.03 (<1%)	0 (0%)	<0.03 (<1%)	<0.03 (<1%)
Suspected Species – Acres (% of Population) Sensitive Plants in 0-4% Slope Class along Motorized Corridors							
Hall's Rush	Beartooth	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mealy Primrose	Beartooth	1514	5.1 (<1%)	5.1 (<1%)	0.3 (<1%)	3.9 (<1%)	5.1 (<1%)
Small Yellow Lady's Slipper	Beartooth	2823	7.7 (<1%)	7.7 (<1%)	0.6 (<1%)	0 (0%)	7.7 (<1%)
Giant Helleborine	Pryor	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Platte Cinquefoil	Pryor	13,459	48.7 (<1%)	46.9 (<1%)	15.0 (<1%)	56.5 (<1%)	46.9 (<1%)
			62.5	60.3	15.9	61.0	60.3

The following table outlines acres of potential exposure to direct effects (trampling and compaction within 50 feet and 300 feet of motorized routes under Alternative C and remaining alternatives, respectively) to known sensitive plant populations and suspected species habitat.

Table 3-73. Potential for Infrequent Exposure to Direct Effects

Species	Land Unit	Population Total Size (Acres)	Alt. A	Alt. B	Alt. C	No Action Alt.	Alternative B Mod.
Known Populations – Acres (% of Population) Sensitive Plants in Motorized Corridor							
Barratt's Willow	Beartooth	8	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0)
Hiker's Gentian	Beartooth	8	1 (8%)	1(8%)	0 (0%)	1 (8%)	1 (8%)
Musk-root	Beartooth	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0)
Three-ranked Humpmoss	Beartooth	124	19 (15%)	19 (15%)	3 (2%)	19 (15%)	19 (15%)
Beartooth Goldenweed	Beartooth	607	53 (9%)	15 (2%)	1 (<1%)	11 (2%)	15 (2%)
Beartooth Goldenweed	Pryor	482	36 (7%)	23 (5%)	6 (<1%)	25 (<1%)	23 (5%)
Shoshonea	Pryor	155	2 (<1%)	2 (<1%)	1 (<1%)	2 (<1%)	2 (<1%)
Jove's Buttercup	Pryor	25	18 (71%)	18 (71%)	3 (10%)	18 (72%)	18 (71%)

Table 3-73. Potential for Infrequent Exposure to Direct Effects

Species	Land Unit	Population Total Size (Acres)	Alt. A	Alt. B	Alt. C	No Action Alt.	Alternative B Mod.
Suspected Species – Acres (% of Population) Sensitive Plants in Motorized Corridor							
Hall's Rush	Beartooth	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0)
Mealy Primrose	Beartooth	1,514	119 (8%)	119 (8%)	24 (2%)	109 (7%)	119 (8%)
Small Yellow Lady's Slipper	Beartooth	2823	9 (<1%)	9 (<1%)	1 (<1%)	0 (0%)	9 (<1%)
Giant Helleborine	Pryor	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0)
Platte Cinquefoil	Pryor	13,459	849 (6%)	753 (6%)	156 (1%)	850 (6%)	762 (6%)

The following table outlines acres of potential exposure to indirect effects (trampling, compaction, weed infestation within 100 feet and 400 feet of motorized routes under Alternative C and remaining alternatives, respectively) to known sensitive plant populations and suspected species habitat.

Table 3-74. Potential Exposure to Indirect Effects

Species	Land Unit	Population Total Size (Acres)	Alt. A	Alt. B	Alt. C	No Action Alt.	Alt. B Mod.
Known Populations							
Barratt's Willow	Beartooth	8	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hiker's Gentian	Beartooth	8	2 (23%)	2 (23%)	0 (0%)	2 (23%)	2 (23%)
Musk-root	Beartooth	5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Three-ranked Humpmoss	Beartooth	124	26 (21%)	26 (21%)	6 (5%)	26 (21%)	26 (21%)
Beartooth Goldenweed	Beartooth	607	67 (11%)	20 (3%)	3 (<1%)	15 (2%)	24 (4%)
Beartooth Goldenweed	Pryor	482	46 (10%)	33 (7%)	10 (2%)	36 (7%)	30 (6%)
Shoshonea	Pryor	155	3 (2%)	3 (2%)	2 (1%)	3 (2%)	3 (2%)
Jove's Buttercup	Pryor	25	21 (83%)	21[62] (83%)	5 (21%)	21 (86%)	21 (86%)
Total - Known			**139**	**79**	**20**	**77**	**106**
Suspected Species							
Hall's Rush	Beartooth	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Mealy Primrose	Beartooth	1,514	155 (10%)	155 (10%)	41 (3%)	149 (10%)	223 (15%)
Small Yellow Lady's Slipper	Beartooth	2823	15 (1%)	15 (1%)	1 (0%)	0 (0%)	17 (1%)
Giant Helleborine	Pryor	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Platte Cinquefoil	Pryor	13,459	1112 (8%)	992 (7%)	268 (2%)	1123 (8%)	1036 (8%)
Total - Suspected			**1282**	**1162**	**310**	**1272**	**1276**

[62] Under Alternative B, the proposed season of use would help minimize additional direct effects to Jove's Buttercup during its growth cycle as well as minimizing potential of motorized vehicles from going off-road, around snow banks, and through populations during these growth and seed set periods.

Direct and Indirect Effects-Sensitive Plants

Actions proposed in all Alternatives have the potential to affect known populations of sensitive plants. The potential direct effects from motorized routes are direct mortality of plants which may come from ground disturbing activities within sensitive plant populations, such as parking adjacent to motorized routes, accessing dispersed camping sites, and dispersed camping. The potential direct effects from non-motorized routes are direct mortality of plants which may come from ground disturbing activities within sensitive plant populations such as dispersed camping.

Indirect effects may come from parking, accessing dispersed camp areas, and camping use. These uses can create more difficult plant recovery due to soil compaction and vegetation composition change (including weeds) which may out-compete sensitive plants.

Some activities associated with the roads and trails do have the potential to negatively affect individual plants, but should not cause population viability losses. Vehicle, stock, or human travel outside the road or trail prism could negatively impact plants through direct removal or damage. Weed establishment along roads and trails could out-compete desired vegetation and negatively affect sensitive plant species. Most road and trail maintenance activities that stay within the existing prism would not pose a direct threat to those plant populations that are established along roads or trails.

There are no direct or indirect effects to Barratt's willow, musk root, Hall's rush, or giant helliborine. Direct or indirect effects to hiker's gentian and three-ranked humpmoss are unlikely because of wetness of habitat. Under Alternative's B, B Modified, and C, there are reduced direct or indirect effects to Jove's buttercup due to seasonal restriction during its growth cycle. There could be direct or indirect effects to the remaining species.

Direct and indirect vulnerabilities and exposures, outlined in previous tables, were given an adjective rating and evaluated to make a biological assessment effects determination for each species as displayed in the following table. Implementation of any alternative would not be anticipated to move any sensitive plant species within the project area toward federal listing.

Table 3-75. Effects Determination

Species	Effects Components	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
Known Populations						
Barratt's Willow	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	Low	Low
	Vulnerability - Indirect	Low	Low	Low	Low	Low
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI[63]	NI	NI	NI	NI
Beartooth Goldenweed	Vulnerability - Direct	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Moderate to High
	Exposure - Direct	Low	Low	Low	Low	Low
	Vulnerability - Indirect	High	High	High	High	High
	Exposure - Indirect	Low	Low	Low	Low	Low

[63] NI = No Impact

Table 3-75. Effects Determination

Species	Effects Components	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
	Effects Determination	MIIH [64]	MIIH	MIIH	MIIH	MIIH
Hiker's Gentian	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	Low	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI	NI	NI	NI	NI
Jove's Buttercup	Vulnerability - Direct	Moderate to High	Moderate	Moderate	Moderate to High	Moderate
	Exposure - Direct	Moderate	Moderate	Low	Moderate	Moderate
	Vulnerability - Indirect	High	High	High	High	High
	Exposure - Indirect	Moderate	Moderate	Low	Moderate	Moderate
	Effects Determination	MIIH	MIIH	MIIH	MIIH	MIIH
Musk-root	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	Low	Low
	Vulnerability - Indirect	Low	Low	Low	Low	Low
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI	NI	NI	NI	NI
Three-ranked Humpmoss	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	Low	Low
	Vulnerability - Indirect	Low	Low	Low	Low	Low
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI	NI	NI	NI	NI
Shoshonea	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	Low	Low
	Vulnerability - Indirect	Low	Low	Low	Low	Low
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI	NI	NI	NI	NI
Suspected Species Habitat						
Giant Helleborine	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	None	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	No Impact	No Impact	No Impact	No Impact	No Impact
Hall's Rush	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	None	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	No Impact	No Impact	No Impact	No Impact	No Impact
Mealy Primrose	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	None	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI	NI	NI	NI	NI

[64] MIIH = May Impact Individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species

Table 3-75. Effects Determination

Species	Effects Components	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
Platte Cinquefoil	Vulnerability - Direct	Moderate to High	Moderate	Moderate	Moderate to High	Moderate
	Exposure - Direct	Moderate	Moderate	Low	Moderate	Moderate
	Vulnerability - Indirect	High	High	High	High	High
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	MIIH	MIIH	MIIH	MIIH	MIIH
Small Yellow Lady's Slipper	Vulnerability - Direct	Low	Low	Low	Low	Low
	Exposure - Direct	Low	Low	Low	None	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low	Low	Low
	Effects Determination	NI	NI	NI	NI	NI

Cumulative Effects-Sensitive Plants

Fuels reduction and timber management projects are currently planned and will continue to be planned for the District. These projects and any associated road use or construction have the potential to detrimentally impact individual plants and/or populations through direct plant removal or damage, ground disturbance, forest vegetation successional shifts, or habitat alteration (e.g. shade reduction) within or adjacent to plant populations. Prescribed burning and/or wildfire (natural and human-caused) also have the potential to detrimentally impact sensitive plants. These actions may kill individual plants or entire populations, modify habitat (understory and overstory vegetation) to an unsuitable condition, or remove the habitat entirely. Permitted grazing has potential to impact sensitive plants. However, prior to implementation of future management decisions, site-specific analysis and field surveys, where appropriate, would be completed to identify sensitive plant populations, determine potential effects to the populations from the actions, and design alternatives and/or prescribe mitigation measures to minimize impacts. Typically, adverse actions to plant populations would be avoided.

Invasive plant populations have established adjacent to numerous roads and trails on the District. At least one sensitive plant species is found near current weed infestations. Roadside low density infestations of spotted knapweed, Dalmatian toadflax, and houndstongue are found adjacent to three Beartooth goldenweed populations on the District. These situations currently occur in Sage Creek, Robertson Draw, and Eastside Road/Seeley Creek.

Travel along these routes by Forest users increases the potential that weed seed will be spread to other portions of the road and trail system and may establish within or adjacent to sensitive plant populations. Invasive species pose a risk to sensitive plants through direct competition. Herbicide application to manage invasive species also has the potential to kill sensitive plants. To help protect sensitive species, the 2006 Custer Weed Management EIS and Record of Decision directs that periodic inspections of known populations for the presence of invasive weeds is done. Treatment efforts are more effective and less disruptive when only treating a few weeds. If spotted knapweed or other invasive weeds become well established, then the herbicide broadcast treatment may be detrimental to sensitive plants, leaving backpack spot treatment or possibly only individual wicking applications and hand-pulling as options. Herbicide applications along roads and trails would comply with product label requirements and protection measures described in the 2006 Custer Weed Management EIS.

Implementation of any of the alternatives considered in this Environmental Impact Statement would not be expected to contribute to significant cumulative effects. Anticipated future projects or activities are fewer in number and less disruptive from a resource extraction point of view than those projects or activities that have taken place in the past. Past activities or projects have not precluded the establishment and existence of known sensitive plant populations throughout the project area where appropriate habitats are found. Therefore, continuation of less impactive projects or activities would not be anticipated to contribute significantly to cumulative effects.

3.3.4.9 Conclusion - Sensitive Plants

Under all alternatives, nine of the 12 species assessed are anticipated to have no impact. Any alternative 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 relative to two known species (Beartooth goldenweed, Jove's buttercup) and one suspected species(Platte cinquefoil).

Table 3-76. Effects Determination Summary

Species	Alternative A	Alternative B	Alternative C	No Action Alternative	Alternative B Modified
Known Populations					
Barratt's Willow	No Impact[65]	No Impact	No Impact	No Impact	No Impact
Beartooth Goldenweed	MIIH[66]	MIIH	MIIH	MIIH	MIIH
Hiker's Gentian	No Impact	No Impact	No Impact	No Impact	No Impact
Jove's Buttercup	MIIH	MIIH	MIIH	MIIH	MIIH
Musk-root	No Impact	No Impact	No Impact	No Impact	No Impact
Three-ranked Humpmoss	No Impact	No Impact	No Impact	No Impact	No Impact
Shoshonea	No Impact	No Impact	No Impact	No Impact	No Impact
Suspected Species Habitat					
Giant Helleborine	No Impact	No Impact	No Impact	No Impact	No Impact
Hall's Rush	No Impact	No Impact	No Impact	No Impact	No Impact
Mealy Primrose	No Impact	No Impact	No Impact	No Impact	No Impact
Platte Cinquefoil	MIIH	MIIH	MIIH	MIIH	MIIH
Small Yellow Lady's Slipper	No Impact	No Impact	No Impact	No Impact	No Impact

Table 3-77. Summary of Number of Species by Effects Determination

Effects Determination	Alt. A	Alt. B	Alt. C	No Action Alt.	Alt. B Mod.
Number of Species with No Effect	9	9	9	9	9
Number of Species with potential to effect individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species	3	3	3	3	3

[65] NI: No Impact

[66] MIIH: May Impact Individuals or Habitat but will not Likely Contribute to a trend towards Federal Listing or Loss of Viability to the Population or Species

All alternatives are consistent with the Laws, Regulations, Policy, and Federal, Regional, State, and Custer Forest Plan. Selection of any alternative would be consistent with the regulatory framework relative to sensitive plants.

3.3.5 INVENTORIED ROADLESS AREAS

Introduction
Travel Plan revision proposals would make changes to how recreationists use certain roads and trails. Changes in types of use may have an effect on certain characteristics of roadless lands on the Custer National Forest. The public has identified a concern over motorized recreation within roadless lands, and the potential that motorized activities have to diminish roadless characteristics, and possibly the future designation of some roadless areas as Wilderness.

Overview of Changes from DEIS to FEIS
- This section on Inventoried Roadless Areas was added in response to public comment related to the need to analyze effects to this resource.

3.3.5.1 Affected Environment – Inventoried Roadless Areas

Applicable Laws, Regulations, and Policy
Federal laws and agency policy that provide for the management of inventoried roadless lands are:
- *Forest Service Manual FSM 1923:* Outlines what activities are appropriate in roadless areas that are recommended for wilderness.
- *Forest Service Handbook 1909.1_70:* Describes the process for identifying and evaluating potential wilderness in the National Forest System. And,
- *Forest Service Handbook 1909.15:* Provides direction to complete an Environmental Impact Statement for proposals that would substantially alter the undeveloped character of roadless lands 5,000 acres or greater in size.

Roadless Final Rule 5.13.2005 36 *CFR Part* 294: Special Areas; State Petitions for Inventoried Roadless Area Management; Roadless Area Conservation National Advisory Committee; Final Rule and Notice.

Custer National Forest and National Grasslands Land and Resource Management Plan 1987: Identifies the Inventoried Roadless Areas recommended for designation as Wilderness through that planning effort. Forest plan management area prescriptions determined whether roadless parcels not recommended for wilderness designation would be considered for road construction, timber harvest, or some other surface disturbing management action at some future point or managed as without roads.

Inventoried Roadless Area Setting & Background
The 587,490-acre Beartooth Ranger District has a large component of roadless lands, including designated Wilderness and lands recommended for wilderness classification. An inventory of roadless lands has been maintained on the Forest since the early 1970s. The current inventory was displayed most recently in the 2001 Roadless Area Conservation Final Rule (hereafter, RAC Final Rule)(36 CFR 294, USDA 2001) and may also be found in Appendix C of the Forest Plan (USDA 1987). The

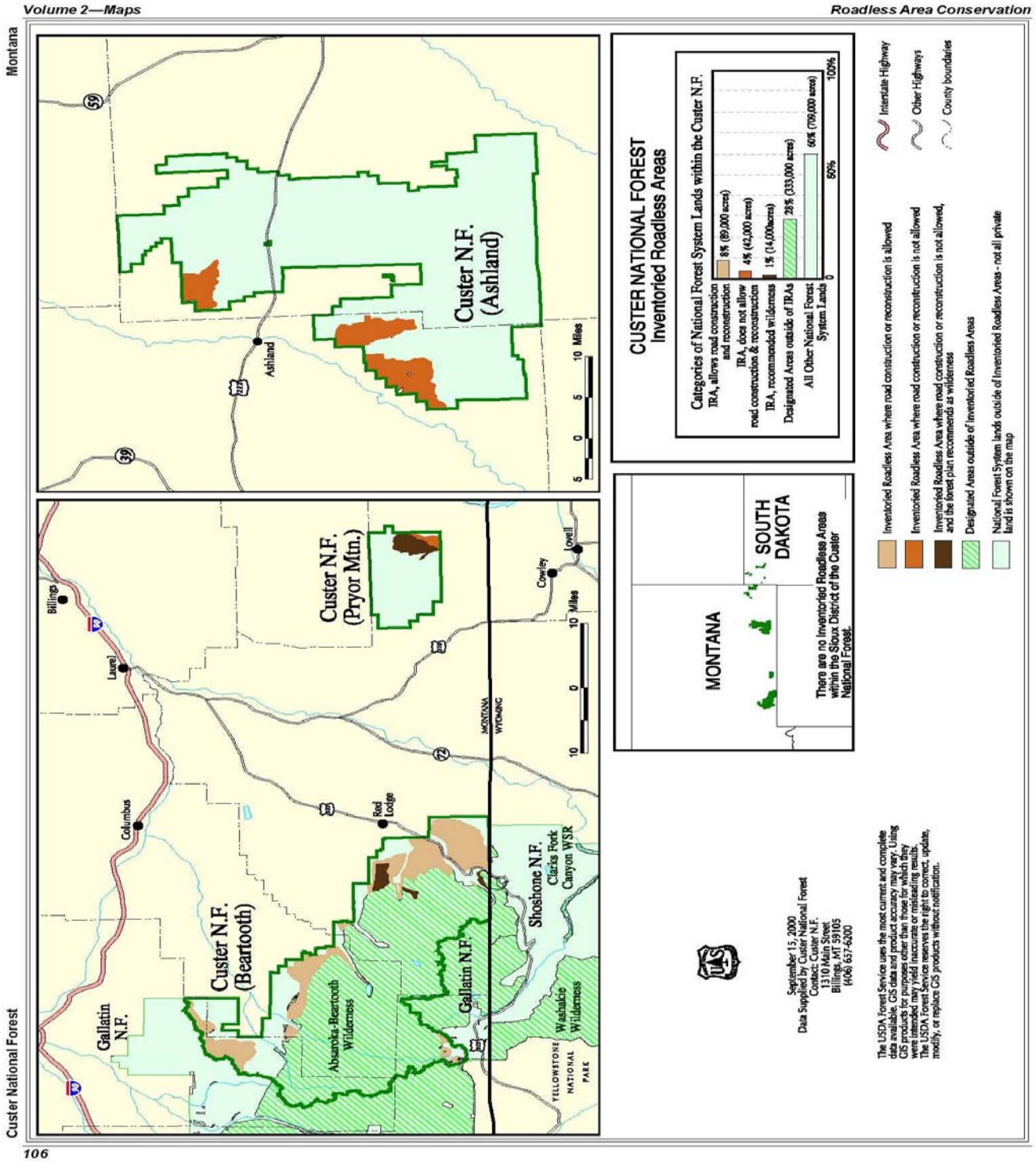
following table summarizes the roadless inventory acres, designated Wilderness, recommended wilderness, and roaded lands on the Forest. Figure 3-2 below is a map of the current roadless inventory of the Forest from the Roadless Area Conservation website (USDA 2001 and http://www.roadless.fs.fed.us/).

Table 3-78. Acreages Reported in Table 1 of the Forest Plan Record of Decision and GIS Projected Acreage Used and Reported in the Roadless Area Conservation Final Rule.

ROADLESS AREA NAME	ORIGINAL RARE II ACRES	1983 INVENTORYACRES	RECOMMENDED WILDERNESS (MA-H)		AVAILABLE FOR DEVELOP-MENT per FOREST PLAN (column c minus d-1)	ROADLESS AREA CONSERVATION FINAL RULE/GIS PROJECTED ACRES	AVAILABLE FOR DEVELOPMENT (column f minus d-2)
a	b	c	d-1 (Forest Plan acreage)	d-2 (GIS projected acreage)	e	f	g
01363 Red Lodge Crk Hellroaring	28,280	14,760	800	802	13,960	17,237	16,435
01364 Burnt Mountain[67]	0	9,320	4,200	3,917	5,120	10,702	6,785
01368 Black Butte[67]	0	880	0	0	880	929	929
01369 West of Woodbine[67]	2,000	2,000	0	0		2,083	2,083
01371 North Absaroka	19,240	22,500	0	0	22,500	21,249	21,249
01911 Line Crk Plateau	20,680	20,680	0	0	20,680	24,831	24,831
01912 Beartooth	1,180	1,180	0	0	1,180	1,160	1,160
01913 Rock Creek[67]	0	200	0	0	200	100	100
Fishtail Saddleback	20,360	16560	500[68]	303	16,060	16,687	16,384
State Line	0	0	500	811	0	811	0
01362 Lost Water Canyon	9,800	9,800	5,812	6,805	3,988	6,805	-[69]
Total Acres	101,540	97,880	11,812	12,638	84,568	102,594	89,956

[67] West of Woodbine, Black Butte, Burnt Mountain, and Rock Creek were originally part of other roadless areas.
[68] These acres can probably be attributed to Mystic Lake. Mystic Lake was not part of the Fishtail Saddleback IRA, per se, but the 500 acres in Table 1 of the Forest Plan ROD recommends wilderness designation of this area closest to the Fishtail Saddleback IRA.
[69] Some acres in the southeastern corner of the Pryor Mountains were allocated to Management Area Q, Pryor Mountain Wild Horse Range.

Figure 3-2. Map of Inventoried Roadless Areas on the Custer National Forest from the Roadless Area Conservation Final Rule Website.



The original inventory of roadless lands took place in the early 1970s during the Roadless Area Review and Evaluation (RARE) I evaluations, and then again in the late 1970s during RARE II. The inventory displayed in the current Forest Plan EIS, Appendix C, is an output of the RARE II inventory. A total of fourteen separate Inventoried Roadless Areas (IRAs) were identified on the Montana portion of the Forest through this process. Of the fourteen IRAs identified on the Montana portion of the Forest, eleven of these areas are on the Beartooth Ranger District. Complete descriptions of these areas can be found in Appendix C of the Forest Plan FEIS (USDA 1987).

The above table is provided to show context regarding decisions that have been made concerning Wilderness, recommended wilderness, and Inventoried Roadless Areas in the Forest Plan, as well as the Roadless Area Conservation Final Rule. Acreages in the table are those that have been reported in the Forest Plan, as well as GIS projected acres reported and/or utilized in the Roadless Area Conservation Final Rule.

During the analysis for the current Forest Plan, all inventoried roadless areas were reviewed and alternatives considered whether to recommend these areas for designation as Wilderness. This review was originally mandated by the RARE I and then RARE II processes, and modified yet again by direction contained in the National Forest Management Act (NFMA) and subsequent planning regulations tied to it (36 CFR 219.17). The results of that roadless review can be found in the Forest Plan for the Custer National Forest FEIS Appendix C (USDA 1987). The preferred alternative for the Forest Plan recommended an additional 11,812 acres of roadless lands be designated as Wilderness (USDA 1987). These are areas allocated to Management Area H (recommended for wilderness classification), approximately 6,000 acres of which lie in the Beartooth Unit and 5,812 acres lie in the Pryor Unit. Some of these areas have a dual designation for Research Natural Areas (MA-L) and Recommended Wilderness (MA-H) as a result of NEPA decisions to complete establishment of Research Natural Areas. The areas allocated to the Research Natural Area lies within the larger H Management Area.

None of these recommended wilderness additions have yet been designated as Wilderness by Congress and are managed under the MA-H (recommended wilderness) prescription in the Forest Plan. Of the approximately 97,880 acres of roadless on the Beartooth Ranger District evaluated in the Forest Plan, approximately 89,956 acres were allocated to management prescriptions that allowed road construction/reconstruction or other land managing activities that could alter roadless character. However, since the 2001 Roadless Area Conservation Final Rule went into effect, road construction/reconstruction is not allowed in inventoried roadless areas, unless a proposed road meets one of the five exceptions to the Final Rule (USDA 2000). Motorized access on existing routes and road maintenance of system routes is allowed (USDA 2000).

The total inventoried roadless areas in the previous table (approximately 102,594 acres) are those shown in the Roadless Final Rule EIS (USDA, 2001). The acreages in the following table, 102,594 acres, are slightly less than those shown in the Roadless Area Conservation Final Rule. Discrepancies in total roadless acreage shown in the Forest Plan on page 118 of the FEIS and Table 1 of the Forest Plan ROD (97,880 acres) and the 103,000-acre figure displayed in the Roadless Final Rule are primarily due to mapping conventions (the hand drawn maps vs. GIS mapping used for the Final Rule, map scale(s), different methods for calculating acres (planimeter, vs. dot grids), and data conversion differences). The inventory lines themselves have not been changed since the Forest Plan was published.

Table 3-79. Land base of the Custer National Forest (National Forest System lands only) using GIS projected acres, except as noted.

Land Type	Approximate Acres	Percent
Wilderness:		
Absaroka Beartooth [70]	345,599	
Wilderness Total	345,599	58.8 %
Inventoried Roadless:		
Recommended for Wilderness [71]	12,638	
Not Recommended for Wilderness	89,956	
Inventoried Roadless Total	102,594	17.4 %
Roaded Lands:		
Roaded Lands Total	139,406	23.8%
Total Acres	587,599	100.0 %

There are currently 13.6 miles of system routes across IRAs on the Beartooth Ranger District (Table 3-81). Management activities consistent with the 1987 Forest Plan were allowed within inventoried roadless areas provided the appropriate NEPA was conducted approving that activity, until the 2001 RAC Final Rule was put into effect. Thereafter, management actions that did not require the construction of new roads were allowed, including timber harvest for clearly defined, limited purposes, development of valid claims of locatable minerals, and grazing of livestock. Existing system roads may be maintained and used for the above noted actions and other actions as well.

The fact there are roads in inventoried roadless areas is the result of several factors. The roadless inventory used for this analysis was originally created during Forest Planning in the mid-1980s. This inventory was digitized and transformed into an electronic map used in GIS analysis in the late 1990s, with no changes or corrections to the original lines. The original maps were done at the fairly gross scale of l/2-inch to 1 mile, and were not very accurate. Private lands and roads were included in gross drawing of IRA boundaries. When digitized for GIS mapping, differences occurred. Private lands and roads were included. Therefore, using the original map units in a modem mapping world, roads now appear in roadless, when in reality the roads were there all the time.

Another factor is that the Forest Plan allowed land management activities such as grazing, fence building, mineral exploration and development, timber harvest as part of the allocation of those lands to Management Areas B, C, D, E, F, R, and T, to occur. Therefore, consistent with the Forest Plan grazing has occurred, roads have been constructed/reconstructed, minerals developed, and timber harvested.

A third factor has to do with the definition of a road in terms of roadless lands. Forest Service Handbook 1909.12 provides direction on when to count lesser-developed roads as an improvement that would disqualify an area from roadless consideration. Roads generally must have engineered improvements and be passable by standard passenger car type vehicles to be counted as a road that would exclude the area from the roadless inventory. Some roads, primarily those labeled administrative or project, and in some cases backcountry roads would not be counted as a road in

[70] Land Areas of the National Forest System, Table 8 (USDA, 2006)
[71] GIS projected acres.

terms of the roadless inventory. The general concept is that if the road could easily be restored to a "natural condition" by removal of traffic and some rehabilitation work, then it may be included within the roadless inventory.

During Forest Plan revision, the inventory of Forest roadless lands will be updated. It is not known precisely when forest plan revision will begin for the Custer National Forest. Those forests or grasslands within the Northern Region already in revision will need to complete the process before the Custer National Forest will begin plan revision. The National Forest Management Act (NFMA) requires that roadless lands be re-evaluated during revision to determine their suitability for designation as Wilderness.

3.3.5.2 Environment Consequences– Inventoried Roadless Areas

Direct and Indirect Effects

Analysis Methodology

A spatial analysis using GIS tools was used to compare the five alternatives within inventoried roadless lands. If the selected alternative would require physically changing the facility (road or trail) to accommodate the new use, and would require surface disturbing activities to make that change, site specific National Environmental Policy Act (NEPA) analysis appropriate for the activity proposed would take place prior to implementation of the physical change. Direct effects to roadless characteristics for a specific project would be disclosed during that subsequent analysis.

The following seven Wilderness attributes are the basis for evaluating the effects of the alternatives, using proximity and qualitative descriptions. In accordance with the NFMA, these are the characteristics used to define wilderness attributes, and are the basis for evaluating actions in roadless, which could affect future Wilderness designation. These attributes are also referenced and defined in Forest Service Handbook (FSH) 1920. They are:

1) *Natural Integrity:* The extent to which long-term ecological processes are intact and operating.
2) *Apparent Naturalness:* The environment looks natural to most people.
3) *Remoteness/primitive and unconfined recreation:* A perceived condition of being secluded, inaccessible, and out of the way.
4) *Solitude:* A personal, subjective value defined as the isolation from the sights, sounds, presence of others, and the development of man.
5) *Special Features:* Unique geological, biological, ecological, and cultural or scenic features.
6) *Manageability and Boundaries:* The ability to manage a roadless area to meet the minimum size criteria for Wilderness (5,000 acres).
7) *Special Places or Values:* Less-tangible attributes of the area that are special or valuable to stakeholders.

In addition to the characteristics typically used for roadless effects analysis mandated by NFMA, roadless characteristics were identified in the 2001 Roadless Final Rule, which may be independent of Wilderness characteristics. The attributes defined in the 2001 Roadless Final Rule[72] include:

[72] See the Federal Register Vol. 66, No.9, Jan. 12, 2001 for expanded definitions of the roadless characteristics.

1) High quality or undisturbed soil.
2) Sources of public drinking water.
3) Diversity of plant and animal communities.
4) Habitat for threatened and endangered species.
5) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation.
6) Reference landscapes.
7) Natural-appearing landscapes with high scenic quality.
8) Traditional cultural properties and sacred sites.

The following table provides a crosswalk between the Wilderness attributes described for Forest planning in FSH 1920 and roadless characteristics defined in 36 CFR 294. Many of the characteristics defined in the RAC Final Rule pertain to specific resource issues that are analyzed elsewhere in this document (see the Water Quality, Fisheries and Aquatics section; see the Wildlife and Soils sections) and will not be reiterated in this section.

Table 3-80. Roadless characteristics and Wilderness attributes

Wilderness Attributes	Roadless Characteristics
Natural Integrity: The extent to which long-term ecological processes are intact and operating.	▪ High quality or undisturbed soil, water and air. ▪ Sources of public drinking water. ▪ Diversity of plant and animal communities. ▪ Habitat for threatened, endangered, candidate, proposed and sensitive species dependent on large areas. ▪ Reference landscapes.
Apparent Naturalness: The environment looks natural to most people.	▪ Natural-appearing landscapes with high scenic quality.
Remoteness: A perceived condition of being secluded, inaccessible, and out of the way.	▪ Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation.
Solitude: A personal, subjective value defined as the isolation from the sights, sounds, and presence of others and the development of man.	
Special Features: Unique geological, biological, ecological, and cultural or scenic features.	▪ Other locally identified unique characteristics, traditional cultural properties and sacred sites.
Special Places or Values: Less-tangible attributes of the area that are special or valuable to stakeholders.	
Manageability and Boundaries: Ability to manage a roadless area to meet the minimum size criteria for Wilderness (5,000 acres).	▪ No criteria.

The Travel Management proposals do not include building new roads; therefore, it was not deemed necessary to revisit the accuracy of mapping and the roadless inventory for this analysis. The roadless inventory will be reviewed and updated through the Forest Plan revision process

Effects Common to Alternatives A, B, C, No Action, and B-Modified

Table 3-81 displays the miles of non-system roads proposed to be converted to system roads. Table 3-81 also shows the miles of existing system roads in each alternative that are within inventoried roadless areas. In general, road configuration does not change substantially between alternatives. Travel Management alternatives do not include building a network of new roads, but they change the management strategy on some existing roads.

There are no proposals to actually construct additional miles of road in inventoried roadless areas in any alternative. Maintenance of routes is expected to continue to the same maintenance level standard that has been identified for a route.

Potential physical effects to roadless character from travel planning decisions are primarily associated with road and trail management decisions. Although there are no proposals to alter the function of a route in this analysis, alternatives that would change the function of single-track trails to double-track (i.e., hiking/stock/motorcycle trails to ATV trails) would have the potential to alter apparent naturalness or natural integrity, or even opportunity for solitude, in some cases. Opportunities for solitude and opportunities for a primitive recreation experience may be affected by the sound of motorized vehicles, and by the number of people encountered in an area. As an example, remoteness and apparent naturalness may be affected by the development of new trailhead, or the incursion of new routes or access pointes into previously un-accessed areas.

Under all alternatives, apparent naturalness can be affected by the visual appearance of ruts and mud holes along roads, trails, rutted stream banks, and indiscriminate wheel tracks off existing routes. The scope of decisions made through this analysis deals only with the determinations of appropriate types of uses on a given route; subsequent site-specific analysis would be required to actually physically change a route on the ground to accommodate a new use or to relocate a particular route.

No recent bills have been introduced into Congress to designate additional Wilderness in Montana. There were several bills that had fairly wide support in the early 1990s, though none became law.

None of the alternatives would affect roadless boundaries, nor the future consideration of these areas as potential Wilderness based on boundary or minimum size criteria.

Alternative A

In Alternative A, 1.8 miles of non-system routes would be converted to system routes. Table 3-81 shows these miles as fourteen road segments dispersed across five IRAs. Currently, there are 13.6 miles of system routes.

Of the 1.8 miles proposed to be converted to system routes, 1.02 miles are proposed to be converted within the Fishtail Saddleback IRA, of which two routes, 241420 and 241421, are proposed to be converted from non-system routes to motorized system trail and designated for use by all motorized vehicles. These routes would be converted to system routes to provide the public with motorized recreation and dispersed vehicle camping opportunities. A number of these routes would create motorized loop opportunities. See Appendix C, Table C-1.

There would be little expected change to the Wilderness attributes characteristics or roadless characteristics by converting the 1.02 miles of non-system routes to system routes and system

motorized trail within the Fishtail Saddleback Inventoried Roadless Area. One of the routes, route 20144B, 0.5 miles in length, provides access to the Stillwater Plateau Trailhead, and thus would not see a change in the use of the route. The routes are near the Benbow Mine area which has seen substantial mineral development and which already has a number of system routes as a result of that development. The routes lie within a Forest Plan Management Area E, an area underlain by the highly mineralized Stillwater Complex. The Stillwater Complex contains the some of the richest deposits of platinum, palladium, and chromites in the United States. Outstanding and reserved mineral rights (private minerals under Federal ownership) are another overriding consideration which could affect the wilderness and roadless resources of the area, regardless of the management emphasis (Forest Plan FEIS, Appendix C). The area has several private in-holdings as a result of patented mining claims. The decision to enter and develop the area by subsurface owners is a right not controlled by the Forest Service.

Of the remaining 0.7 miles proposed to be converted to system routes, one route segment totaling 0.1 miles is in the Red Lodge Creek Hellroaring IRA (route 24763); four route segments totaling 0.25 miles are in the Burnt Mountain IRA (routes 207111, 20718, 20718A, and 21415B); one route segment totaling 0.21 in the Line Creek Plateau IRA (route 20084A); and one route segment totaling 0.1 miles in the Stateline IRA (route 2123), which accesses a gravel pit for the Beartooth Highway.

There is no new road construction proposed under this alternative. There would be no change to the function of any of the routes, the type of vehicle used or road standard. Maintenance of these routes would continue into the foreseeable future. Apparent naturalness and natural integrity do not change because these routes are currently on the landscape and would remain on the landscape. In addition, other management activities that are allowed would occur. These other activities could result in prescribed fire, stumps from thinning, mineral exploration and development, grazing, weed management, etc. These would all affect the apparent naturalness and natural integrity. Solitude is subjective and transient. As noted above, most of the routes lie within areas allocated to management other than roadless or wilderness. Hence, solitude should not be expected. Only the 0.1 mile segment of route 2123 that access the gravel pit for the Beartooth Highway lies within a recommend for wilderness management area (MA-H). That is not consistent with that management area direction. Most of the routes are relatively short segments (some one-way), others create/complete loops, that provide for dispersal of recreation and motorized loop opportunities.

Alternative B

In Alternative B, 0.6 miles of non-system routes are proposed to be converted to system roads. Table 3-81 shows these miles as two road segments within two IRAs, route 24763 (0.1 miles, South Ingles Creek) and route 20144B (0.5 miles, Stillwater Plateau Trailhead), in the Red Lodge Hellroaring and Fishtail Saddleback IRAs, respectively. Under this alternative, there are 9.4 miles of existing system routes. No routes are proposed to be converted from non-system routes to motorized system trail. In Alternative B, route 27 (Meyers) and route 2092 (Commissary Ridge) are not retained as system routes. The routes proposed to be converted from non-system to system routes lie within areas allocated to management other than roadless or wilderness. Route 24763 is within Management Area R (maintain high quality water for domestic public use) and route 27 is within Management Area E (high mineral potential and existing mineral development). As noted above under Alternative A, route 27 is within Management Area E which in this instance is underlain by the highly mineralized Stillwater Complex.

There is no new road construction proposed under this alternative. There would be no change to the function of any of the routes, the type of vehicle used or road standard. Maintenance of these routes would continue into the foreseeable future. Apparent naturalness and natural integrity are improved because there are 4.2 fewer miles of system routes under this alternative when compared to the No Action Alternative. Routes not designated for motorized use are not maintained and begin to blend into the landscape. In addition, other management activities that are allowed would occur. These other activities could result in prescribed fire, stumps from thinning, mineral exploration and development, grazing, weed management, etc. These would all affect the apparent naturalness and natural integrity. Solitude is subjective and transient. Opportunity for solitude varies by site and season of use. If a person avoids peak periods of use and routes, there would be some opportunity to attain solitude. All of the routes lie within areas allocated to management other than roadless or wilderness. Hence, solitude should not be expected. The two routes are short segments, one accesses an existing trailhead.

Alternative C

In this alternative 0.5 miles of non-system routes are proposed to be converted to system road. The route is 20144B, the Stillwater Plateau Trailhead, located in Fishtail Saddleback IRA. This route accesses the trailhead at the end of the road. No routes are proposed to be converted from non-system routes to motorized system trail.

There is no new road construction proposed under this alternative. There would be no change to the function of any of the routes, the type of vehicle used or road standard. Maintenance of these routes would continue into the foreseeable future. Apparent naturalness and natural integrity are improved because there are 4.2 fewer miles of system routes under this alternative. Routes not designated for motorized use are not maintained and begin to blend into the landscape. In addition, other management activities that are allowed would occur. These other activities could result in prescribed fire, stumps from thinning, mineral exploration and development, grazing, weed management, etc. These would all affect the apparent naturalness and natural integrity. Solitude is subjective and transient. Opportunity for solitude varies by site and season of use. If a person avoids peak periods of use and routes, there would be some opportunity to attain solitude. All of the routes lie within areas allocated to management other than roadless or wilderness. Hence, solitude should not be expected. The two routes are short segments, one accesses an existing trailhead.

No Action Alternative

In the No Action Alternative, no new routes are proposed to be converted to system routes. No routes are proposed to be converted from non-system routes to motorized system trail. Under this alternative, the Stillwater Plateau Trailhead route, 20144B, is not proposed to be converted to a system route. There are 13.6 miles of existing system routes under this alternative.

The 13.6 miles of existing system routes would continue to have motorized use and be maintained to the same maintenance level for the foreseeable future. There is no new road construction proposed under this alternative. Apparent naturalness and natural integrity do not change because these routes are currently on the landscape and would remain on the landscape. In addition, other management activities that are allowed would occur. These other activities could result in prescribed fire, stumps from thinning, mineral exploration and development, grazing, weed management, etc. These would all affect the apparent naturalness and natural integrity. Solitude is subjective and transient. Opportunity for solitude varies by site and season of use. If a person avoids peak periods of use and routes, there

would be some opportunity to attain solitude. All of the existing routes lie within areas allocated to management other than roadless or wilderness. Hence, solitude should not be expected. Hence, solitude should not be expected.

Alternative B Modified

In this alternative, there are 0.6 miles of non-system routes proposed to be converted to system roads. The two road segments proposed to be converted are the same as those under Alternative B, route 24763 (0.1 miles, South Ingles Creek) and route 20144B (0.5 miles, Stillwater Plateau Trailhead), in the Red Lodge Hellroaring and Fishtail Saddleback IRAs, respectively (Table 3-82). No routes are proposed to be converted from non-system routes to motorized system trail. There are 12.6 miles of existing system routes under this alternative, including route 27 (Meyers), and route 2092 (Commissary Ridge).

There is no new road construction proposed under this alternative. There would be no change to the function of any of the routes, the type of vehicle used or road standard. Maintenance of these routes would continue into the foreseeable future. Apparent naturalness and natural integrity are improved because there is one mile less of system routes under this alternative compared to No Action Alternative. Routes not designated for motorized use are not maintained and begin to blend into the landscape. In addition, other management activities that are allowed would occur. These other activities could result in prescribed fire, stumps from thinning, mineral exploration and development, grazing, weed management, etc. These would all affect the apparent naturalness and natural integrity. Solitude is subjective and transient. Opportunity for solitude varies by site and season of use. If a person avoids peak periods of use and routes, there would be some opportunity to attain solitude. The routes lie within areas allocated to management other than roadless or wilderness. Hence, solitude should not be expected. The two routes are short segments, one accesses an existing trailhead.

Table 3-81. Miles of Route Type within Inventoried Roadless Areas.

Route Type	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified (Preferred Alternative)
Miles of non-system routes within inventoried roadless areas proposed to be converted to system routes.	1.8	0.6	0.5	0	0.6
Miles of system routes within inventoried roadless areas.	13.6	9.4	9.4	13.6	12.6

Table 3-82. Miles Of Non-System Routes Proposed To Be System Roads By Inventoried Roadless Area.

Inventoried Roadless Area Name	Alternative A	Alternative B	Alternative C	No Action	Alternative B Modified (Preferred Alternative)
01363 Red Lodge Crk Hellroaring	0.10	0.10	-	-	0.10
01364 Burnt Mountain	0.25	-	-	-	-
01368 Black Butte	-	-	-	-	-
01369 West of Woodbine	-	-	-	-	-
01371 North Absaroka	-	-	-	-	-
01911 Line Crk Plateau	0.30	-	-	-	-

01912 Beartooth	-	-	-	-	-
01913 Rock Crk	-	-	-	-	-
Fishtail Saddleback	1.12	0.5	0.5	-	0.5
01362 Lost Water Canyon	-	-	-	-	-
Stateline	-	-	-	-	-

Cumulative Effects of Past, Present and Reasonably Foreseeable Programs and Activities with the Travel Management Alternatives

Effects common to all alternatives

Cumulative effects of proposed travel plan activities to roadless character are largely the same as the direct and indirect effects discussed earlier in this chapter. Minor additive effects to roadless character (both negative and positive) can be anticipated from the activities described in the previous section: projected combined effects of reasonably foreseeable programs and activities. None of the proposed alternatives and associated cumulative effects would cause irreversible or irretrievable effects to roadless characteristics that would negate future consideration for wilderness designation.

A number of reasonably foreseeable projects could affect roadless characteristics within the next five years. Weed treatment, fuels treatment projects, livestock grazing and range allotment improvements, ongoing trail maintenance and reconstruction, and fire suppression activities all have the potential to have minor cumulative effects to roadless characteristics. Mineral exploration and development, both through hardrock or oil and gas development, could substantially alter roadless characteristics. The exercise of reserved or outstanding rights or continuation, extension or renewal of a mineral lease subject to specified time frames is acknowledged in the Roadless Area Conservation Final Rule as circumstances where the Responsible Official may determine that a road be constructed or reconstructed in an inventoried roadless area. This would be analyzed through site specific NEPA analysis at the time a proposal or plan of operations was received by the Forest Service.

The final Custer National Forest Weed Management Final Environmental Impact Statement (USDA 2006) selected alternative, Alternative 1, did not identify any known weed infestations in recommended wilderness (MA-H), or inventoried roadless areas, and noted that weed monitoring had been infrequent in these areas. However, if discovered, weeds would be treated in these areas consistent with the Weed Management FEIS decision. The selected alternative improves natural integrity in roadless by aggressively treating noxious weeds promoting the restoration of native species. Short term effects to opportunities for solitude are likely if recreationists encounter weed control crews while working in roadless. Apparent naturalness may also be affected in the short term where chemical odors from herbicide treatments persist, or grubbing/pulling/mechanical treatments are obvious.

Fuels treatments are proposed across the Beartooth Ranger District. No projects are proposed in roadless at this time. However, should fuels treatments be proposed in roadless, pre-treatment of fuels prior to burning could result in impacts to apparent naturalness where stumps and slash piles are obvious. During pre-treatment and burning operations, short term impacts to opportunities for solitude could be expected where recreationists encountered crews working with chainsaws, helicopters, etc. Treating fuels could result in short term exposure to weed infestations in burned areas - impacting natural integrity. In the long term, fuel treatment will benefit natural integrity by trending treated areas towards a more natural fire regime.

Ongoing management of range allotments within roadless areas could affect apparent naturalness and natural integrity in some areas. Observers are likely to notice that vegetation has been grazed in some areas and species composition affected. The presence of manure and stock trails would not appear natural to many. Range improvements like fences and watering facilities are an obvious sign of man's work on an otherwise natural appearing landscape. Natural integrity of sites where over grazing occurs could be impacted by erosion, weed infestation, species composition changes, soil compaction, and damage to vegetation.

Administrative activities like trail maintenance, fire suppression and weed control all have the potential to have short term effects on opportunities for solitude, and apparent naturalness, while those projects are underway. Visitors may encounter work crews, camps, motorized and mechanized equipment associated with these projects that may affect opportunities for solitude. Fresh trail construction would not appear natural to some.

In the next five years, growing recreation use from all user types will likely reduce opportunities for solitude in some roadless areas.

3.3.5.3 Conclusion - Inventoried Roadless Areas

As indicated in Table 3-81, Alternative A is the only alternative that would increase the overall miles of motorized routes in Inventoried Roadless Areas compared to the No Action Alternative. Alternatives B, C, and B Modified would reduce the overall miles in Inventoried Roadless Areas by 3.6, 3.7, and 0.4 miles, respectively, when compared to the No Action Alternative.

None of the alternatives would cause irreversible or irretrievable effects to roadless characteristics that would negate future consideration for inclusion in the Wilderness Preservation System. Conversion of non-system routes to system routes is a reversible decision. If areas were established by Congress as wilderness, motorized uses would be prohibited. Those routes could be considered for conversion to foot and/or pack and saddle standards

None of the effects described above would appreciably reduce roadless quality or appreciably compromise the potential to designate roadless lands as wilderness in the future.

All of the alternatives would comply with existing law, regulation, and policy.

3.3.6 ECONOMICS

3.3.6.1 Affected Environment – Economics

Overview of Changes from the Draft to the Final EIS

- There were no changes in this section between Draft and Final EIS.

Economic Area

The functional economic area that surrounds the District consists of the following eight counties – Big Horn, Carbon, Park, Stillwater, Sweet Grass, and Yellowstone counties in Montana, plus Big Horn and Park counties in Wyoming. These counties, which are all in the Billings, MT economic area

(according to the US Department of Commerce Bureau of Economic Analysis), are included because they share a labor market, commuters, and are collectively affected by Custer National Forest management activities and outputs. While Billings is the regional trade center for this economic area, many other communities that surround the District provide both visitors and benefits from tourism and the natural amenities offered by the Beartooth and Pryor Mountain units. The estimated economic impacts to be discussed in the environmental consequences section will be based on this eight-county area, and is referred to as the economic impact area.

Population

From 1970 to 2004, population growth of the eight-county area increased by roughly 71,260 people to 223,330. This 47% growth in population outpaced that of the United States, which grew 44% over the same time period. The average growth rate of the eight-county area was slightly more than 1%, with negative growth occurring for only a few years in the late 1980s. The city of Billings dominates the population and economy near the District.

Economy

There were approximately 148,315 part and full-time jobs in the economic impact area during 2004 with 263 industries (of 580 possible) represented. There were 82,072 new jobs added between 1970 and 2004 with an average annual growth rate outpacing that of the nation. Three out of four of these new jobs were wage and salary positions and one out of four were proprietors, who by 2004 comprised nearly 24% of all employment. The employment share of the services sector grew most rapidly across the impact area during the 35 year period, while the retail trade sector share decreased the most. Part of the explanation for rapid job growth can be found in the government sector, and in particular the state and local government portion of this sector. State and local government explain 85% of the government sector job growth. However, even with the new jobs that were added to the government sector, its share of total employment in the area actually decreased from 16% to 13%, as it was outpaced by growth in other sectors. Unemployment rates generally fell throughout the period from 1970 (5.4%) to 2005 (3.6%) indicating that competition for jobs has increased.

Total personal income for the 89,339 households was $6.6 billion for an average of $73,751 per household in 2004. The average annual growth in income was 2.6%, which was more than double the population growth rate. This is reflected by the marked increase in the inflation adjusted per capita personal income change from $17,975 during 1970 to $29,503 during 2004. However, the shifting workforce and age demographics hide the fact that the inflation adjusted earnings per job increased only slightly from $32,213 to $32,683 during this period. Non-labor income sources showed stronger growth at an average annual rate of 3.5% compared to labor earnings, which only grew at 2.2% annually during the 35 year period. The percent of total income represented by non-labor sources grew from 25% during 1970 to 34% during 2004.

Motorized and Non-motorized Use

One of the issues of travel management planning is the economic effects (i.e., economic impacts) of motorized and non-motorized uses. Various sources of information are used to display use and trends in motorized and non-motorized use in Montana and on the Custer National Forest. Vehicle registration from the Montana Department of Justice, Motor Vehicle Registration Bureau was used to understand the state-wide trend in snowmobiles, ATVs and Motorcycles (MT Dept. of Justice, 2005). Results from a statistically rigorous sampling regime used by the Forest Service National Visitor Use Monitoring survey (NVUM) describe total forest-level use (visits) and use by various motorized and

non-motorized activities.

National Visitor Use Monitoring (NVUM)

The NVUM survey process was implemented as a response to the need to better understand recreation use occurring on National Forest System lands (Kocis et al. 2003). From October 2001 through September 2002, the Custer National Forest participated in the NVUM survey process. A final report of the survey findings was published in August 2002 (Kocis et al. 2003). Examples of information provided in the Custer National Forest report include: 1) total number of visits; 2) participation rates; and 3) user satisfaction. The survey also collected information regarding user spending within 50 miles of the National Forest boundary. Users reported expenditures for various spending categories, such as groceries, restaurants, gas/oil, and lodging. The specific spending profiles and expenditures are found in Stynes (2005) and White (2006).

The final report indicates that 758,344 national forest visits (the 90% confidence interval ranges from 666,357 to 850,331) occurred on the Custer National Forest during the survey period (October 2001 through September 2002). A forest-level review of the NVUM numbers indicated that approximately 75 percent of these visits occur on the District.

The following Table presents participation rates by activity for the Custer National Forest during the NVUM survey period. The % Participation column of the table presents the participation rates by activity and will exceed 100% since visitors may participate in multiple activities. The % as Primary Activity column presents the participation rates in terms of visitors' self-selected primary activity. Hunting was the highest ranked primary activity with 15.3% of study participants. Fishing was also popular as a main activity with 11.1% of participants listing this as their primary activity. The Table indicates that the six most popular non-wildlife related primary activities were: 1) hiking / walking (14.5%); 2) downhill skiing (13.5%); 3) viewing natural features (11.3%); 4) relaxing (6.6%); 5) driving for pleasure (5.0%), and (6) developed camping (5.0%).

The primary activity participation rates (% as Primary Activity) were used to estimate use by activity. For this analysis, motorized use was defined as OHV use, snowmobiling, driving for pleasure, motorized water activities and other motorized activities. Non-motorized was defined as backpacking, hiking / walking, horseback riding, bicycling, cross-country skiing, and other non-motorized. Aggregated, visitors listing motorized use as the primary activity represented 7.2% of visiting population, while visitors listing non-motorized use as the main activity represented 19.1% of visiting population. The estimated number of visits by activity is based on the primary purpose (% as Primary Activity) and the total number of visits (758,344) reported in the Custer National Forest NVUM report.

Table 3-83. Custer NF Activity Participation and Primary Activity [73]

Activity	% Participation	% as Primary Activity	Estimated Number of Primary Visits
Developed Camping	14.9	5.0	37, 917
Primitive Camping	3.9	0.7	5,308
Backpacking	7.2	1.9	14,409
Resort Use	1.8	0.0	0
Picnicking	15.0	2.1	15,925
Viewing Natural Features	49.4	11.3	85,693
Visiting Historic Sites	8.3	0.5	3,792
Nature Center Activities	6.1	0.0	0
Nature Study	8.8	0.0	0
Relaxing	26.8	6.6	50,051
Fishing	19.6	11.1	84,176
Hunting	16.2	15.3	116,027
OHV Use	2.9	1.6	12,134
Driving for Pleasure	26.7	5.0	37,917
Snowmobiling	0.0	0.0	0
Motorized Water Activities	1.3	0.0	0
Other Motorized Activities	1.0	0.6	4,550
Hiking / Walking	40.2	14.5	109,960
Horseback Riding	0.5	0.3	2,275
Bicycling	3.9	2.1	15,925
Non-motorized Water	0.8	0.0	0
Downhill Skiing	14.0	13.5	102,376
Cross-country Skiing	1.3	0.0	0
Other Non-motorized	1.3	0.3	2,275
Gathering Forest Products	7.8	0.0	0
Viewing Wildlife	42.9	1.0	7,583
TOTAL	**207.2**	**93.4**	**708,293**

Users are determined to be either local or non-local based on the miles from the user's residence to the forest boundary. If the user reported living within 50 miles of the forest boundary, they are considered local; if over 50 miles, they are considered non-local. The majority of Custer National Forest visitors were non-local (66%) with fewer local visitors (34%). This pattern of use is unusual when compared to other forests, where the majority of visitors are local. However, many of the visitors to the Custer National Forest come from the Billings, Montana area, which is more than 50 miles away; therefore, these visits are considered to be non-local. Based on economic surveys conducted as part of NVUM, visitors to the Custer National Forest are considered low spending visitors compared to peers at all forests across the country.

[73] Source: Custer National Forest, National Visitor Use Monitoring Results, August 2003 (Kocis et. al 2003)
Note: The primary activity and estimated number of primary visits columns total less than 100% and 758,344 because some visitors did not report a primary activity.

The following table indicates the number of visits and the expenditures ($ per visit) for the different motorized and non-motorized activities occurring on the Custer National Forest. Of the non-motorized activities, cross-country skiers spend the most per visit ($16 for local users and $44 for non-local users). However, the use data indicates that very little cross country skiing occurs on the Custer. The majority of non-motorized use is for hiking/walking by local users, with nearly seven times the visits of the next most numerous non-motorized activity, biking by local users. From the standpoint of motorized activities, snowmobilers spend the most per visit ($28 for locals and $61 for non-locals), though the use data also indicates very little snowmobiling on this forest. Driving for pleasure is the motorized activity associated with the greatest number of visits.

Table 3-84. Number of Visits and Expenditures by Activity Type

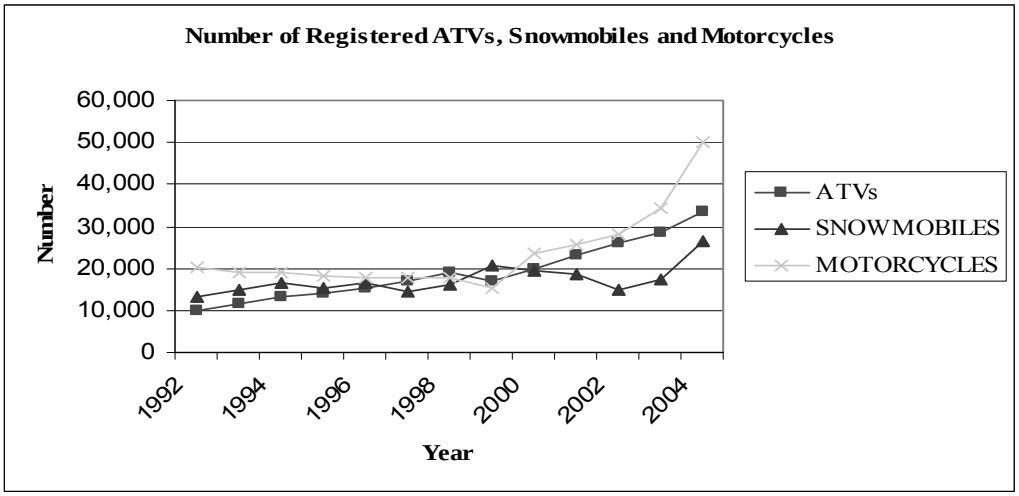
Activity	Use (Visits)[74]		Expenditures ($ per Visit)[75]	
	Local	Non-local	Local	Non-local
Non-motorized				
Horseback Riding[76]	756	1,489	$12	$35
Backpacking[76]	4,766	9,378	$12	$35
Hiking / Walking[76]	36,512	71,846	$12	$35
Bicycling[76]	5,169	10,171	$12	$35
Cross-country Skiing	0	0	$16	$44
Other non-motorized[76]	782	1,538	$12	$35
Motorized				
OHV	3,908	7,691	$22	$35
Driving for Pleasure[77]	12,608	24,809	$13	$28
Snowmobiling	0	0	$28	$61
Other Motorized[77]	1,513	2,977	$10	$28

Trends in Motorized Use

The following Figure shows the trend in the number of registered ATVs, snowmobiles, and motorcycles (street and dirt bikes) in Montana (MT Dept. of Justice 2005). This information is useful in gauging the popularity of outdoor activities that use this equipment since trend information is difficult to obtain for these types of dispersed activities. In general, the data indicates an upward trend in recreational vehicle ownership in Montana. The average annual growth rates for ATVs, snowmobiles, and motorcycles are 9.7%, 5.4%, and 7.3%, respectively. This compares to an average annual population growth rate in Montana of approximately 1% during this time period. The growth rate in registration far exceeds the population growth rate, indicating either those activities that use this equipment are gaining popularity and/or compliance with registration requirements has increased.

[74] Custer National Forest, National Visitor Use Monitoring Results, August 2003
[75] Stynes Daniel J.; White Eric M. 2006. Spending Profiles for National Forest Recreation Visitors by Activity
[76] Horseback Riding, Backpacking, Hiking/Walking, Bicycling, and Other non-motorized activities share the same spending profile.
[77] Driving for Pleasure and Other Motorized activities share the same spending profile.

Figure 3-3. Number of Registered ATVs, Snowmobiles, and Motorcycles in Montana, 1992-2004



3.3.6.2 Environmental Consequences - Economics

Direct, Indirect and Cumulative Effects

Effects Common To All Alternatives

The assessment of economic impacts attempts to identify potential effects that Forest Service travel management planning may have on local, county, and regional economic systems. In particular, this analysis is used to address the questions: (1) would changes in the management of the National Forest for recreation and the amount of change in the motorized/non-motorized designation of Forest roads and trails be large enough or significant enough to cause measurable economic changes? (2) Is the economy of the local area diverse enough and robust enough that the proposed changes will be insignificant or will they be felt in very specific segments of the local economy?

Economic Effects Analysis Methodology

Economic effects can be categorized as direct, indirect and induced. Direct effects are changes associated with the initial spending by a recreation visitor. Indirect and induced effects are the multiplier effects resulting from subsequent rounds of spending in the local economy.

Employment and labor income effects were estimated for: 1) all current recreation use (i.e., wildlife and non-wildlife recreation activities) on the Forest, and 2) current motorized and non-motorized activities occurring on the Forest. Economic effects tied to all recreation visitations were estimated to establish total economic effects tied to recreation activities on the Forest. Economic effects tied to motorized and non-motorized activities were estimated to address the economic impact issues tied directly to travel management planning. Also, the marginal economic effects (employment and labor income effects per 10,000 visits) of motorized and non-motorized use are provided. The marginal effects (i.e., response coefficients) are useful for performing sensitivity analyses of various management alternatives.

Input-output analysis was used to estimate the direct, indirect and induced employment and labor income effects stemming from motorized and non-motorized use. Input-output analysis (Hewings

1985) is a means of examining relationships within an economy both between businesses as well as between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows one to examine the effect of a change in one or several economic activities on an entire economy. This examination is called impact analysis. Input-output analysis requires the identification of an economic impact area. The economic area that surrounds the Custer National Forest was previously defined, and consists of six counties in south central Montana and two counties in Northern Wyoming, stretching from Cody to Big Timber to Billings.

The IMPLAN Pro input-output modeling system and 2004 IMPLAN data (the most recent data available) were used to develop the input-output model for this analysis (IMPLAN Professional 2004). IMPLAN translates changes in final demand for goods and services into resulting changes in economic effects, such as labor income and employment of the affected area's economy. For the economic impact area, employment and labor income estimates that were attributable to all current recreation use (wildlife and non-wildlife activities) and only motorized and non-motorized activities for the Forest were generated.
The expenditure and use information collected by the NVUM survey are crucial elements in the economic analysis. As reported earlier, the NVUM survey collects use and expenditure information for various activity types. The expenditure information is collected by eight spending categories (Stynes and White 2005 and 2006). The reported spending for each of the spending categories is allocated to the appropriate industry within the IMPLAN model (the allocation process, also referred to as "bridging," was conducted by the USDA Forest Service, Planning Analysis Group in Fort Collins, CO). The bridged IMPLAN files were used to estimate economic effects (e.g., employment and labor income) related to changes in spending (i.e., changes in spending, technically referred to as changes in final demand, are caused by changes in use).

Estimated Economic Effects
Estimated economic effects (full and part-time jobs and labor income) are presented. Estimated economic effects are displayed in the following ways: 1) Estimated employment and labor income based on all local and non-local recreation visitation occurring on the Forest; 2) Estimated employment and labor income by motorized and non motorized activity types; and 3) Direct, indirect, and induced employment and labor income response coefficients by activity type (jobs and labor income per 10,000 visits).

The following Table displays the estimated employment and labor income effects for all recreation visitation (i.e., wildlife and non-wildlife visitation) to the Forest. There were a total of 697,676 primary visits to the Forest during the sampling period (Note: The number of primary visits is slightly less than the total visits reported in the NVUM report. Non-primary visitation to the Forest was eliminated from the economic effects analysis since these users were not coming primarily to recreate on the Forest). Approximately 66% of the visits to the Forest were attributable to non-local users. The results indicate that there were 518 total jobs (direct plus multiplier effect) and $10.9 million of total labor income (direct plus multiplier effect) attributable to the total non-wildlife and wildlife recreation. Of this there were 62 total jobs (direct plus multiplier effect) and $1.3 million of total labor income (direct plus multiplier effect) attributable to the local visitation. There were approximately 456 total jobs (direct plus multiplier effect) and $9.5 million of total labor income (direct plus multiplier effect) attributable to non-local recreation users.

Table 3-85. Estimated Employment and Labor Income Effects for All Current Recreation Use Reported by NVUM

Economic Effects Based on Local Use (235,087 visits)			
	Direct Effects	**Indirect & Induced Effects**	**Total Effects**
Jobs	46	16	62
Labor Income (M $)	$879.6	$455.3	$1,334.0
Economic Effects Based on Non-local Use (240,820 visits)			
	Direct Effects	**Indirect & Induced Effects**	**Total Effects**
Jobs	338	118	456
Labor Income (M $) [78]	$6,258.9	$3,290.5	$9,549.5

In the eight-county economic area, the total employment in the economy in 2004 was 148,315 jobs with $4.9 billion dollars in labor income (IMPLAN 2004). All employment and labor income activities attributable to recreation activities on the Forest accounted for less than one-quarter of one percent of the total employment and total labor income in the economic area.

Motorized and Non-motorized Use

The following Table displays the estimated employment and labor income effects for current use levels reported by NVUM for local and non-local motorized and non-motorized activities. In general, the estimated economic effects are a function of the number of visits and the dollars spent by the visitors. For example, non-local users typically spend more money per visit than local users. Also, activities that draw more users will be responsible for more economic activity in comparison to activities that draw fewer users, holding constant spending per visit. Given the analysis is dependent on visitation and expenditure estimates, any changes to these estimates affect the estimated jobs and labor income.

The Table indicates that approximately 72 total jobs (direct, indirect and induced) and $1.463 million in total labor income was attributable to non-motorized activities on the Forest, with about 12% due to local users and 88% to non-local users. The vast majority (76%) of these jobs and income were associated with hiking/walking.

Motorized activities were responsible for approximately 22 total jobs (direct, indirect and induced) and $447,773 in total labor income (direct, indirect and induced), with 83% of these jobs and income associated with non-local uses. Driving for pleasure on the Forest accounted for approximately 15 total jobs (69% of the motorized total) and $302,302 in total labor income (67% of the motorized total). OHV use on the Forest accounted for approximately 5 total jobs (23% of the motorized total) and $110,110 in total labor income (25% of the motorized total). Together, motorized and non-motorized activities accounted for approximately 18% of the jobs and income associated with recreational activity on the Forest, with motorized activities accounting for around 4% and non-motorized activities accounting for 14%.

[78] Labor Income is reported in 2004$.

Table 3-86. Employment and Labor Income Effects by Activity Type

Activity	Employment Effects (full & part-time jobs)		Labor Income Effects ($) [79]	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Non-motorized Use				
Local Horseback Riding	0.1	0.0	$1,933.2	$1,000.9
Non-local Horseback Riding	0.7	0.3	$13,319.9	$6,811.7
Local Backpacking	0.6	0.2	$12,179.2	$6,305.9
Non-local Backpacking	4.7	1.6	$83,915.7	$42,913.9
Local Hiking / Walking	4.7	1.8	$93,309.2	$48,312.2
Non-local Hiking / Walking	35.9	12.2	$642,909.6	$328,779.4
Local Bicycling	0.7	0.3	$13,210.2	$6,839.8
Non-local Bicycling	5.1	1.7	$91,019.7	$46,546.8
Local Cross-county Skiing	0.0	0.0	$0.0	$0.0
Non-local Cross-county Skiing	0.0	0.0	$0.0	$0.0
Local Other Non-motorized	0.1	0.0	$1,997.6	$1,034.3
Non-local Other Non-motorized	0.8	0.3	13,763.9	$7,038.8
Total	**53.4**	**18.5**	**$967,558.2**	**$495,583.9**
Motorized Use				
Local OHV	0.9	0.3	$17,226.5	$9,027.9
Non-local OHV	2.8	1.1	$54,709.7	$29,146.0
Local Driving for Pleasure	1.8	0.6	$32,907.1	$17,099.7
Non-local Driving for Pleasure	9.4	3.2	164,847.7	$87,447.6
Local Snowmobiling	0.0	0.0	$0.0	$0.0
Non-local Snowmobiling	0.0	0.0	$0.0	$0.0
Local Other Motorized	0.2	0.1	$3,092.2	$1,606.9
Non-local Other Motorized	1.2	0.4	20,034.2	$10,627.7
Total	**16.1**	**5.7**	**$292,817.5**	**$154,955.8**

Response Coefficients by Activity Type

The following Table displays the estimated employment and labor income response coefficients (employment and labor income per 10,000 visits) for local and non-local motorized and non-motorized activities. The response coefficients indicate the number of full and part-time jobs and dollars of labor income per ten thousand visits by activity type. The response coefficients are useful in: 1) understanding the economic effects tied to a given use level; 2) understanding projected employment effects for various use scenarios described in other sections of this DEIS (sensitivity analysis); and 3) understanding the differences in employment effects by activity type. The response coefficients displayed in following Table along with the visits presented in previous Tables were used to estimate the economic effects for local and non-local use by activity type.

As shown in the following Table, the economic effects tied to local visitation are generally lower than for non-local visitation. This is a result of local visitors spending less per visit in comparison to non-local visitors (see previous Table, titled Number of Visits and Expenditures by Activity Type). Additionally, economic effects vary widely by activity type. Based on employment impacts, the

[79] Dollars are for 2004 $.

strongest employment effect modeled is tied to non-local snowmobiling, followed closely by non-local cross-country skiing. However, the data for the Forest shows very little of these types of activities occurring on the forest. The smallest economic effects are associated with local horseback riding, backpacking, hiking/walking, and bicycling (Note: the economic effects are identical for these categories since they share the same spending profile). In general, economic effects vary by the amount of spending and by the type of activity, but it cannot be generalized that motorized or non motorized activities contribute more or less to the local economy on a per visit basis.

Table 3-87. Employment and Labor Income Response Coefficients by Activity Type

Activity	Employment (Jobs / 10,000 Visits)		Labor Income ($ / 10,000 Visits) [80]	
	Direct Effects	Indirect & Induced Effects	Direct Effects	Indirect & Induced Effects
Non-motorized Use				
Local Horseback Riding	1.3	0.5	$25,556	$13,232
Non-local Horseback Riding	5.0	1.7	$89,485	$45,762
Local Backpacking	1.3	0.5	$25,556	$13,232
Non-local Backpacking	5.0	1.7	$89,485	$45,762
Local Hiking / Walking	1.3	0.5	$25,556	$13,232
Non-local Hiking / Walking	5.0	1.7	$89,485	$45,762
Local Bicycling	1.3	0.5	$25,556	$13,232
Non-local Bicycling	5.0	1.7	$89,485	$45,762
Local Cross-country Skiing	2.1	0.7	$37,942	$19,644
Non-local Cross-country Skiing	6.7	2.2	$115,987	$61,643
Local Other Non-motorized	1.3	0.5	$25,556	$13,232
Non-local Other Non-motorized	5.0	1.7	$89,485	$45,762
Motorized Use				
Local OHV	2.2	0.8	$44,076	$23,099
Non-local OHV	3.6	1.4	$71,138	$37,898
Local Driving for Pleasure	1.4	0.5	$26,101	$13,563
Non-local Driving for Pleasure	3.8	1.3	$66,448	$35,249
Local Snowmobiling	2.8	1.1	$56,198	$28,953
Non-local Snowmobiling	8.3	2.7	$144,473	$76,403
Local Other Motorized	1.1	0.4	$20,439	$10,621
Non-local Other Motorized	3.9	1.3	$67,296	$35,699

Cumulative Effects-Economics

The economy can be affected by a variety of factors including population growth, changes in interest rates, location of new magnet industries, recession, growth of new sectors, tax policy, State economic policy, etc. When compared to these kinds of variables, the management of travel and recreation on the National Forest has a relatively small effect. Most of the area of south central Montana and the Greater Yellowstone area outside Carbon, Stillwater, Park, and Sweet Grass counties are also in an economic growth pattern and activities in the larger area will likely affect the functional economic area positively. Because the decisions of Travel Management will have little direct and indirect effects on the economic area, there should be no cumulative effects.

[80] Dollars are for 2004 $

3.3.6.3 Conclusion - Economics

For the eight-county functional economic area used in this analysis, the total economic effects of recreation overall, and specifically recreation tied to motorized and non-motorized activities, are very small compared to the total economic activity in the area. Though changes in use attributable to the alternatives outlined in this report are difficult to estimate, even large changes in use would have little effect on the overall economy of the eight-county area.

- End of Chapter 3 -