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 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
Crooked Creek Outfitters Special Use Permit	Special Use Management
Grand Electric Co-Op Special Use Permit	Special Use Management
Wickham Gulch Campground Toilet Replacement	Recreation Management
Long Pines Grazing Allotment Planning	Grazing Management
Geothermal Leasing Analysis	Minerals Management

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

Project Name	Type of Project
Riley CERCLA	Mineral Management
Recreational Use – hunting, camping, viewing, etc.	Recreation Management
Weed Treatment – District-wide	Weed Management
Fuels Treatments	Fuels Management
Permitted Grazing (~125,500 suitable acres)	Grazing Management
Bureau of Land Management – Knowlton Travel Planning	Travel Management
Black Hills Travel Planning	Travel Management

Use of travel routes will continue on privately-owned and public lands within and adjacent to the Custer National Forest. Government agencies and local municipalities of Montana and South Dakota all use travel routes, and to varying degrees, manage them to different standards and restrictions.

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 the Three Affiliated and the Great Sioux Nation, Northern Cheyenne, Crow, Assiniboine, Shoshone, Arapahoe, and Shoshone-Bannock. The Sioux, Crow, and Gros Ventre have treaty rights under the Fort Laramie

[3] Source: July 2008 Quarterly Schedule of Proposed Actions (SOPA), Custer National Forest.

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 Sioux 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 Sioux 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 Sioux District Travel Management would not result in any irreversible commitment of resources. The decision for Sioux 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

District 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 and potential for travel planning to impact these activities.

3.2.1.1 Affected Environment – Recreation

Introduction
Comments related to recreation on the Sioux Travel Management proposed action could generally be categorized as issues associated with the loss of recreation opportunities or activities. Losses of opportunities were typically portrayed as loss of opportunities for motorized recreation, hunting, OHV use opportunities, non-motorized recreation, and dispersed vehicle camping.

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, as well as the miles of motorized routes available by alternative.

The ROS under this analysis includes the following settings: rural, roaded natural, semi-primitive motorized, and semi-primitive non-motorized. (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 (USDA, 2003). 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. Areas that are more than ½ mile from roads or motorized trails are suitable for a semi-primitive non-motorized ROS setting as long as an individual area is equal to or greater than 2,500 acres in size. Areas less than 2,500 acres in size are added in with adjacent semi-primitive motorized or roaded natural settings, as appropriate.

This ROS information was used to determine differences between the alternatives in terms of opportunities for motorized and non-motorized recreation.

The miles of designated motorized routes available by alternative were also used to evaluate relative differences in the motorized and non-motorized recreation opportunities provided by each alternative.

The Recreation Setting

The majority of recreation activities occur in conjunction with the motorized travel corridors on the District. The majority of the activity occurs during fall and spring hunting seasons. District staff field observations indicate that OHV use, and in particular ATV use, is relatively low outside of hunting seasons.

Public feedback and staff input during the Forest's Recreation Facilities Analysis, finalized in May 2008, indicated that local communities have a relatively strong connection to recreation opportunities provided by the District. This connection appears to include a general connection with the District as well as site-specific connections with locations such as Ekalaka Park Campground, Macnab Pond, and Reva Gap.

There are no areas identified in the Forest Plan that are dedicated to non-motorized use and there are no non-motorized or motorized trails on the District.

District staff experience and public input did not indicate any significant conflicts exist between types of recreational activities on the District. Those seeking non-motorized hunting experiences did indicate some difficulty in finding these opportunities. They indicated that escaping from motorized disturbances could be challenging on the District.

Motorized Recreation

Existing system road mileages by type of restriction are shown in Chapter 2, Tables 2-3 and 2-4. The table shows there are 399 miles of system road open at least part or all of the year in the analysis area.

National Forest system roads are only open to highway legal vehicles. Currently, some unlicensed off-highway vehicles travel on forest system roads for recreation and administrative purposes. While riding on forest system roads with unlicensed vehicles is not uncommon, it is not consistent with state and federal regulations. However, under specific circumstances, system roads can be designated as motorized mixed use for both licensed and unlicensed vehicles. There are currently no motorized mixed use routes on the District. The motorized mixed 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. The required risk analysis would be completed if any mixed motorized use roads are selected in the final decision.

There are currently no motorized system trails on the District. Motorized system trails allow operation of all off-highway vehicles, licensed or unlicensed.

Implementation of the 2001 Tri-State OHV decision restricted motor vehicles to existing routes (USDA Forest Service 2001), whether system or non-system routes. Some OHV opportunities on the District are located on existing non-system routes. Non-system routes are those that were not designed, constructed, identified, or managed as a part of the forest transportation system. State motor vehicle laws do not address vehicle licensing requirements for non-system routes.

Off-Route Motorized Travel

There are no designated cross-country vehicle areas on the District.

Dispersed Vehicle Camping

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. Dispersed vehicle camping occurs throughout the District. Heaviest use occurs during the fall hunting seasons.

Hunting

Big-game hunting is the primary recreation activity on the District. Turkey hunting is also an important activity on the District, but because the use numbers are highest during big-game hunting, this season will be used as the indicator for determining if there are potentially significant effects.

The primary hunting seasons for the Montana portion of the District are archery deer/elk (early Sept. to mid-October) and general deer/elk (late October to November 30); and archery deer/antelope (mid-August to October 31), general antelope (early to mid-October), and West River deer (November) in South Dakota portion. The State of South Dakota Game, Fish, and Parks (GFP) administer hunting within South Dakota, while the State of Montana Fish, Wildlife, and Parks (FWP) administer hunting within Montana. Motorized routes provide hunters with access, with some hunters using this access to seek areas more removed from motorized influences, while other hunters may choose to hunt along or near motorized routes.

The South Dakota portion of the District falls within the 35A, 35B, and 35C West River deer hunting units and antelope hunting units, which coincides with the Harding County administrative boundaries. This area also includes private, state, and other Federal lands. The District is a relatively small percent of the hunting units.

The Montana portion of the District is within FWP's hunting district 705. This hunting district is generally bounded by the Powder River on the west, Montana/Wyoming state line on the south, Montana/South Dakota state line on the east, and Highway 12 on the north. This area also includes private, state, and other Federal lands. The District is a relatively small percent of the hunting units.

Recreation Opportunity Spectrum

Forest Service recreation management is guided by the Recreation Opportunity Spectrum (ROS), which models 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 (Rural and 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). 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 within this setting. Quiet areas and opportunities for solitude would be hard to find during the summer and fall. 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 motor vehicles 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 areas and the opportunity for solitude would not occur in this setting during the time of year the routes are open to motorized travel.

"Semi-Primitive Non-Motorized" settings denote areas where stock, hiking, and/or bicycling are the predominant modes of travel (motor vehicles would not be legal to operate in this setting and motorized travel corridors would be at least one half mile in distance). 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 areas and an appropriate setting to provide opportunities for solitude.

District ROS Settings

Added together, the data in the following table shows that 100% of the analysis area is influenced by motorized use based on ROS settings under the No Action Alternative during the current season of use. Outside of the season of use (SOU), the analysis area has 76% motorized settings and 24% non-motorized settings.

Table 3-3. No Action ROS Settings by Acres and Percent[4]

ROS Setting	Acres (Percent)	
	Season of Use 12/1 to 10/15	Outside Season of Use 10/16-11/30
Rural	2,986 (2%)	2,986 (2%)
Roaded Natural	55,222 (31%)	55,222 (31%)
Semi-Primitive Motorized	119,488 (67%)	76,668 (43%)
Semi-Primitive Non-Motorized	0 (0%)	42,820 (24%)

Recreational Use

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 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

[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.

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 relatively high recreational use on the Beartooth Ranger District resulted in selection of only a handful of NVUM surveys on the Sioux and Ashland Districts. The result is that the data generated from this effort is relatively representative for the Beartooth District, but does not appear to be representative of recreational activities on either the Sioux or Ashland Ranger Districts. Consequently, NVUM data is not helpful in conducting site-specific analysis for the District, but can be useful in identifying national and regional trends.

Hunting

It is difficult to determine exactly how many hunters use the District during big-game hunting season, or how many may be on the District at any one time. FWP issues unlimited permits for general and archery deer in the area. In the past three years, hunter surveys estimate that there were 4,500-5,200 deer hunters in hunting unit 705 (FWP 2008). They issue 300 general permits for elk for the 705 hunting district. The actual number of hunters on the District is presumably some fraction of the total permits issued, because District lands are only a portion of the hunting unit.

South Dakota Game, Fish, and Parks staff believes that the current number of hunting license in 35A, B, and C are the maximum number of licenses that can be issued without degrading hunter experience (SDGFP 2008a). The current number of licenses (2008) for deer is 1,188 in 35A, 756 in 35B, and 1,728 in 35C. For antelope, the number of licenses is 1,512 in 35A/E and 1,566 in 35B/F. They also estimate that approximately 60-70% of the licensed deer hunters use the South Dakota portion of the District, or 2,203 to 2,570 hunters (SDGFP 2008b). Similarly, they estimate that only a small fraction of the antelope hunters use the District, preferring to use adjacent grassland prairie settings on private land.

The opening weekend of big-game hunting seasons typically have the highest number of hunters on the District.

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 based on District staff field observations.

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 came 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 to National Forest have 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 (includes the Custer National Forest) and 10 (Alaska). 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 indicated that OHV use was their primary recreational activity.

Trends in Other 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 et al 1999).

A U.S. Fish and Wildlife Service (2004) report indicates that overall hunting participation decreased nationally between 1991-2001, although big-game hunting participation generally remained level and turkey hunting increased. Big-game hunting in Montana reflected this trend, but in South Dakota the report indicates that big-game hunting increased.

Studies sponsored by FWP and the Forest Service concur with these trends (FWP, 2005). However, they also indicate that demand for big-game hunting opportunities is expected to exceed supply for opportunities beginning in 2010. This suggests that current hunting levels in Montana are expected to level off in the near future (since supply will be at maximum). As indicated previously, South Dakota hunting on the District is expected to be level (permits are at the maximum) for the foreseeable future.

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 or District personnel as a particular problem in the past. Throughout the District, the highest use occurs on weekend days during fall hunting seasons. 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.

3.2.1.2 Environmental Consequences - Recreation

The following 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.

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[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 3-4. ROS Setting by Alternative (Percent/Acres)

ROS Setting	Alternative A	Alternative B		No Action	
	Yearlong	Season of Use 12/1-10/15	Outside Season of Use 10/16-11/30	Season of Use 12/1-10/15	Outside Season of Use 10/16-11/30
Rural	2% (2,986)	2% (2,986)	2% (2,986)	2% (2,986)	2% (2,986)
Roaded Natural	31% (54,512)	30% (53,213)	30% (53,253)	31% (55,222)	31% (55,222)
Semi-Primitive Motorized	67% (120,198)	68% (121,497)	40% (70,716)	67% (119,488)	43% (76,668)
Semi-Primitive Non-Motorized	0% (0)	0% (0)	28% (50,742)	0% (0)	24% (42,820)

Table 3-5. Summary of Miles[6] of System Roads and Motorized Trails Designated for Public Motorized Use by Alternative

Route Designation	Alternative A	Alternative B		No Action	
	Yearlong	Season of Use 12/1-10/15	Outside Season of Use 10/16-11/30	Season of Use 12/1-10/15	Outside Season of Use 10/16-11/30
Road – Highway legal vehicles only	70	162	110	399	251
Road – All types allowed (motorized mixed use)	116	57	45	0	0
Motorized Trail – All motor vehicles allowed	280	84	27	0	0
Total	466	303	182	399	251

Direct and Indirect Effects - Recreation

Alternative A

Recreation Opportunity Spectrum
The above table indicates the District would be entirely in motorized settings, yearround, under this alternative. This would be similar to the No Action Alternative for the majority of the year, however during the big game hunting season (October 16 – November 30), Alternative A would have 42,820 more acres in motorized settings than the No Action Alternative.

There is no season of use associated with this alternative, so there would not be an annual change in ROS settings under this alternative.

Motorized Recreation Miles
There would be 466 miles of roads and trails available for motorized recreation opportunities.

Motorized Opportunities
Implementation of this alternative would maximize the opportunities for motorized recreation on the District. It provides the greatest number of miles of routes designated for public motorized use, and includes the greatest number of miles of motorized trail. This would be expected to increase the

[6] Comparison between tables may not be exact due to rounding error.

opportunities for motorized recreationists compared the other alternatives. In addition, this alternative would be attractive to users that are seeking semi-primitive motorized types of experiences given the number of motorized trails.

Motorized users have the greatest opportunity to be able to find the type of motorized experience they are seeking under this alternative than either Alternative B or No Action Alternative, based on the miles of routes available, variety of vehicle use designations available, and absence of any season of use.

This alternative would provide a considerable amount of opportunities to operate licensed and unlicensed motor vehicles on the District. Families and those desiring to operate unlicensed motor vehicles would find opportunities for extended day trips and motorized loop experiences.

Based on miles of routes, this alternative would be expected to provide more opportunities for persons with disabilities or limited mobility to access the District than the other alternatives.

Non-Motorized Opportunities
The quality of the outdoor experience for those seeking non-motorized recreational activities would have the greatest potential to be diminished under this alternative. However, District staff field observations indicate that recreational use is low during the majority of year, so finding non-motorized experiences may not be a cause for concern other than during big-game hunting seasons – the season of heaviest visitor use.

Dispersed Vehicle Camping
This alternative would provide more dispersed vehicle camping opportunities than the other alternatives being analyzed. Compared to no action, there would be an additional 67 (12/1-10/15) to 215 (10/16-11/30) more miles of motorized routes that would provide potential dispersed vehicle camping locations.

Hunting
This alternative provides the maximum opportunity to hunters who desire to scout and retrieve their game by motorized means. Big-game hunters would be likely to find experiences similar to the No Action Alternative based on ROS settings, and would not be expected to be displaced under this alternative.

Hunters seeking opportunities to hunt without disturbance by motorized vehicles could expect to have more difficulty doing so under this alternative when compared to the No Action Alternative or Alternative B. This alternative would have the most potential to displace hunters interested in non-motorized hunting opportunities. If displaced, the ROS settings suggest that there is a low probability of hunters finding non-motorized hunting opportunities anywhere else on the District under this alternative.

Since this alternative represents the existing condition, the overall number of hunters is not expected to be affected by this alternative and is unlikely to be substantively different than total hunter numbers under the No Action Alternative given the limited difference in ROS settings.

Alternative B

Recreation Opportunity Spectrum
The above table indicates the District would be entirely in motorized settings during the season of use for this alternative. The motorized settings would be in essentially the same amounts as the No Action Alternative.

From October 16 to November 30, the main big-game hunting season, ROS settings on the District would shift more towards non-motorized settings. The District would consist of 50,742 acres in semi-primitive non-motorized settings, 7,922 more acres in semi-primitive non-motorized settings than the No Action Alternative during this same time period. These acres are distributed across the Long Pines, North Cave Hills, and Ekalaka Hills land units.

Motorized Recreation Miles
There would be 303 miles of roads and trails available for motorized recreation opportunities. During the big game hunting season, motorized season of use designations would reduce the number of miles of roads and trails available to 182 miles.

Motorized Opportunities
Implementation of this alternative would provide the least amount of miles for motorized recreation of all the alternatives.

Because of the lack of specific user information and numbers, it is difficult to say if the reduced number of miles would result in displacement of motorized users. District staff field observations indicate that visitor use is low outside of big-game hunting seasons. Consequently, it is likely that the only real potential to displace motorized users is during the big-game hunting season.

The fact that the variation in ROS settings during the season of use for both the No Action Alternative and this alternative is within one percent indicates that there were numerous “parallel” routes on the District. This suggests that there were multiple routes going to or near to the same locations. This could indicate that loss of a parallel route may not displace users since they will still be able to access the same areas and are likely to be able to achieve the same or nearly the same motorized experience as found on the parallel route.

Based strictly on miles of routes, this alternative would be expected to provide fewer opportunities for persons with disabilities or limited mobility to access the District than the other alternatives. It is difficult to assess the degree of this impact given the absence of user data for the District. Again, the degree of affect may be lessened by the fact that the reduction in miles is largely associated with parallel routes.

Non-motorized Opportunities
The quality of the outdoor experience has the greatest potential to be improved under this alternative, especially for those interested in non-motorized recreation opportunities during big-game hunting seasons. The areas created by the season of use designation will give visitors several new areas to seek out non-motorized opportunities.

District staff field observations of low visitor use outside of the big-game hunting seasons suggests that opportunities for non-motorized experiences for the majority of the year are readily available.

Thus the change in miles and ROS setting proposed under this alternative may end up enhancing non-motorized experiences during a portion of the year when those opportunities are already relatively abundant.

Dispersed Vehicle Camping
This alternative would provide fewer dispersed vehicle camping opportunities than the other alternatives being analyzed. Compared to no action, there would be 96 fewer miles of motorized routes that would provide potential dispersed vehicle camping locations during the season of use, and 68 fewer miles outside of the season of use.

There is uncertainty about how this may actually impact recreational use, since there is limited visitor use information for the District. Those individuals accustomed to using a dispersed vehicle camping site adjacent to a route that is proposed to not be designated may feel a sense of loss. It is difficult to

ascertain whether visitors may or may not find, or perceive to find, it harder to locate a dispersed vehicle camping location.

Hunting
Hunters seeking opportunities to hunt without disturbance by motorized vehicles would have the best chance of doing so under this alternative, when compared to Alternative A and the No Action Alternative.

This alternative provides the fewest opportunities for hunters who desire to scout and retrieve their game by motorized means. This alternative would have the highest potential to displace hunters interested in these hunting opportunities. If hunters are displaced, they may be able to find similar opportunities elsewhere on the District since 72 percent of the District would remain in motorized settings under this alternative.

South Dakota Game, Fish, and Parks staff generally believes that changes proposed in this alternative may not result in a net loss of hunters. Their impression is that if some hunters are displaced by the proposed actions in this alternative, they are likely to be replaced by other hunters looking for the opportunities created by the proposed actions (SDGFP 2008). Recreation trend information for Montana and South Dakota, cited in the *Trends in Other Recreation Activities* section above, supports the assumption that the types of changes proposed would not be likely to affect the overall total hunter numbers given the strong demand for big-game hunting opportunities.

No Action Alternative

Recreation Opportunity Spectrum
The above table indicates the District would be entirely in motorized settings during the season of use on the District.

From October 16 to November 30, the main big-game hunting season, ROS settings on the District are 76% motorized (134,876 acres) and 24% non-motorized (42,820 acres). The non-motorized setting acres are all found within the Long Pines land unit in Montana.

Motorized Recreation Miles
There would be 399 miles of roads and trails available for motorized recreation opportunities. During the big game hunting season, motorized season of use designations would reduce the number of miles of roads and trails available to 251 miles.

Motorized Opportunities
The miles designated for public motorized use include routes for which the Forest Service has no legal right-of-way for public access. This could have a couple of implications. First, the actual miles of roads available to the public may in effect be less, since some of these system roads may not be accessible. There are 21 miles of routes with no legal right-of-way for public access included in this alternative. The public may or may not be able to access them with motor vehicles, and would need to have permission from landowners to be able to use them. This could lead to confusion and may encourage inadvertent motorized trespassing on private lands.

Under this alternative, motorized users may not find opportunities for the types of motorized experiences they are accustomed to on the District. This is primarily because there would be no opportunities to operate unlicensed motor vehicles on the District; all motor vehicles would need to be licensed to operate on District roads.

Individuals may find that routes they had grown accustomed to using over the last few years are no longer available for motorized use since only existing system roads would be designated for public motorized use and no non-system routes would be designated. However, it is likely, based on the total miles to be designated, that visitors could find similar motorized experiences and opportunities on the District. The situation would be expected to be similar for District visitors with disabilities or limited mobility seeking motorized opportunities.

Non-motorized Opportunities
The District has no non-motorized ROS settings during the majority of the year, but the low used observed by District staff suggests that visitors may still be able to find non-motorized opportunities. Visitors to the South Dakota portion of the District may especially find it difficult to find non-motorized experiences during big game hunting seasons since all of the land units would be in motorized ROS settings during this season. The season of use designation on the Montana portion of the District provides additional non-motorized recreation opportunities during the big game season.

Dispersed Vehicle Camping
There would be 67 to 215 fewer miles of roads available under no action, than under Alternative A, but 69 to 96 more miles than under Alternative B, depending on the time of year. Visitors are generally believed to be able to find adequate dispersed vehicle camping locations to meet their needs under the existing condition, and most likely would still be able to find ample opportunities under no action. However, individuals that have a connection to a particular dispersed camping location may feel a sense of loss.

Hunting
This alternative provides numerous opportunities to hunters who desire to scout and retrieve their game by motorized means. Hunters in South Dakota seeking opportunities to hunt without disturbance from motorized vehicles may have difficulty doing so under this alternative. This alternative would have potential to displace hunters in South Dakota interested in non-motorized hunting opportunities.

If hunters in South Dakota are displaced, the may not be able to find a suitable alternative location on the South Dakota portion of the District based on the ROS settings.

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 Sioux Ranger District. Field observations by District staff indicate that the predominant users of the South Dakota portion of the District are from South Dakota. Similarly, the majority of users of the Montana portion are from Montana. Discussions with attendees at the public meetings and field contacts during hunting season indicate that users primarily come from western South Dakota and eastern Montana. Based on this information, it is reasonable to assume that travel management changes on other public lands in the vicinity of the District, i.e. western South Dakota and eastern Montana, (Bureau of Land Management and National Forest System lands) have 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 National Forest and Dakota Prairie Grasslands was reduced by 64% and 100%, respectively.

Blackhills National Forest
The Blackhills National Forest is currently conducting forest-wide travel management planning. They have distributed a proposed action, but have not distributed a draft environmental document. Since the Blackhills has not yet identified a preferred alternative for their proposal, it would be speculative to attempt to identify what their final decision regarding travel management may be. Therefore, information for the Blackhills National Forest will not be included in this cumulative effects analysis.

Dakota Prairie Grasslands
The Dakota Prairie Grasslands (DPG) completed travel management planning for the Grand River and Cedar River National Grasslands in September, 2007. This portion of the DPG contains those lands in South Dakota. The decision resulted in a net reduction of 6 miles of system roads or approximately a 1.5% reduction in motorized routes compared to their existing system miles before the decision.

Net Cumulative Effects
The alternatives in this analysis represent the following changes in miles of motorized routes compared to the No Action Alternative, and based on the existing and proposed seasons of use:

- Alternative A would increase motorized route miles by 67 to 215 miles (17 to 86% increase)
- Alternative B would decrease motorized route miles by 96 to 69 miles (24 to 28% decrease)

The above information suggests that the 2001 Tri-State OHV Decision substantially changed motor vehicle use with respect to cross country vehicle travel in the area evaluated for cumulative effects. The alternatives do not include any actions to changes cross-country vehicle use, therefore no cumulative effects from the proposed alternatives are anticipated related to cross-country vehicle use.

The above information also indicates that there has not been a substantial change, only a slight decrease, in the number of miles of roads in the area evaluated for cumulative effects. Alternative A is the only action alternative that would not contribute to further decreases in motorized recreation opportunities in the project vicinity described above. Alternative B would contribute to a cumulative decrease in miles of routes available for motorized recreation.

The above travel management decisions have resulted in a slight increase in non-motorized recreation opportunities. Alternative A would reverse this increase and result in a decrease in cumulative non-motorized opportunities. Alternative B would build upon the slight increase by adding multiple semi-primitive non-motorized areas and acres.

The above information suggests that there is little cumulative impact beyond the direct and indirect impacts of the action alternatives on hunters and other forest visitors.

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 and motorized hunting access, including providing the most miles of system road and motorized trails (466 miles) and the entire District would be in motorized settings, yearround.

The remaining alternatives respond to this issue to lesser and varying degrees than Alternative A. The No Action Alternative, while providing roughly the same amount of motorized ROS settings as Alternative B, provides more miles of motorized routes, ranking it second most responsive. Alternative B would provide both the fewest miles of motorized routes and fewest acres in motorized ROS settings.

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

Alternative B best responds to concerns related to opportunities for non-motorized recreation, especially non-motorized hunting experiences in South Dakota. During the big-game hunting seasons, there would be 50,742 acres in non-motorized ROS setting acres and 182 miles of roads and trails.

The remaining alternatives respond to this issue to a lesser degree than Alternative B. The No Action provides similar ROS settings to Alternative B, but has several more miles of roads. Alternative A would not provide any non-motorized ROS settings.

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 396 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 descending order of responsiveness, they are:

Alternative B	(72 to 141 miles, depending on the time of year)
No Action	(0 miles)

Consistency with Laws, Regulations, and Policy

The recreation goal in the Custer National Forest Management Plan is to "provide a broad spectrum of recreation experience opportunities". All alternatives are consistent with the Custer National Forest Management Plan direction.

3.2.2 CULTURAL RESOURCES

Regulatory Framework

This section contains information on the Archaeological Resources and Traditional Cultural Properties. 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 Forest Service has been directed to satisfactorily address the National Environmental Policy Act (NEPA) and other related statutes involving cultural resource management and historic preservation which apply for such projects. As stated in the Custer National Forest (CNF) Management Plan "The goal of cultural resource management is to maintain and enhance historic and prehistoric cultural resource values." (USDA Forest Service 1986: 4). In 1995, the CNF became 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. Goals of the MTPA are to extend beyond the narrow-scoped management perspective of the 1970s and 1980s that focused upon “site identification/recordation and avoidance or mitigation” to a more informative approach of “cultural resources stewardship”. The South Dakota Programmatic Agreement (SDPA) was updated to reflect the new National Historic Preservation Act Section 106 regulations and was signed by all parties on May 7, 2001.

Compliance with the National Historic Preservation Act (NHPA) of 1966, as amended through 2000, is being conducted as directed 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). Under this policy, three specific travel management proposals are considered undertakings: 1) construction of a new road or trail; 2) 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 motorized 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 this policy. Categories two and three applies to the Sioux Travel Management undertaking. The terms of the MTPA and the SDPA will be followed when authorizing motor vehicle use on new or unclassified roads and trails.

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 Sioux District. 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 territories used and still used by a number of tribes, including the Crow, the Assiniboine, the Hidatsa, Mandan, Arikara, the Northern Cheyenne, and the Great Sioux Nation. The Standing Rock Sioux Tribe, Lower Brule Sioux, the Cheyenne River Sioux Tribe, and the Rosebud Sioux Tribe have issued tribal resolutions identifying sacred lands under Executive Order 13007 for the Slim Buttes, North Cave Hills, and South Cave Hills.

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 traditional cultural properties. This coordination effort was intended to insure that any tribal concerns or comments were addressed throughout the NEPA process in regards to ARPA, AIRFA, NAGPRA and/or Bulletin 38 issues.

3.2.2.1 Affected Environment – Archaeological Resources and Tradition Cultural Properties

The CNF is developing a management plan for motorized and non-motorized public access on the Sioux District (District) in Carter County, Montana and Harding County, South Dakota. The District consists of approximately 163,107 federally administered acres composed of eight isolated "island" land units—the Chalk Buttes, Ekalaka Hills and Long Pine Hills in Montana and the East and West Short Pine Hills, the North and South Cave Hills, the Slim Buttes and a small portion of the Long Pine Hills in South Dakota.

The District is located on the eastern periphery of the Ponderosa Pine Parkland which is part of the Northwestern Plains Region. The Montana units are part of the Little Missouri River and the Powder River watersheds while the South Dakota units are part of the Grand River and the Moreau River watersheds. The District has been described in general as "…land parcels that rise above the surrounding prairies like islands in the ocean." (USDA Forest Service 1976: 1). The units themselves are characterized as a "…severe landscape of deep, narrow canyons, massive shale, limestone, and sandstone cliffs, and isolated flat-topped mesas capped with ponderosa pine forests" (Beckes and Keyser 1983: 211). Grassland parks, woody draws and numerous springs are scattered throughout the units.

Human occupation within and around the District spans over 10,000 years and the eight District units may be considered "oases" in their attractive character that offered food, habitat, shelter and water to humans and animals alike. Three cultural periods—including Paleo-Indian, Plains Archaic and Late Prehistoric—are represented within the prehistoric time period.

The earliest time period, the Paleo-Indian, is characterized by a human population heavily dependent on hunting of now extinct fauna such as giant bison and mammoth. Large lanceolate projectile points are common diagnostic indicators of this period. Evidence of Paleo-Indian occupation on the District is limited.

The Archaic Period, saw a warming trend referred to as the Altithermal Climatic Episode which was related to modern flora and fauna and saw a shift to a more diversified economy. Big game hunting was supplemented with the processing of plant resources. A variety of large projectile points, including both lanceolate and notched, are diagnostic indicators of this period. The Archaic Period is well represented on the District by surface collected and excavated site recovered artifacts.

The Late Prehistoric Period is marked by the appearance of the bow and arrow on the Northwestern Plains. An increased specialization toward upland living and the utilization of open prairie resources, most importantly bison, characterizes this period. A variety of smaller projectile points, along with the presence of pottery, are diagnostic indicators of this period. The Late Prehsitoric Period is well represented on the District, both as surface collected and excavated site recovered artifacts.

The Historic Period is usually associated with Euro-American activities such as exploration, military excursions, mining, ranching, trapping and homesteading but occupation by Native American tribes predates the Euro-Americans influx into the area. Arapaho, Arikara, Crow, Cheyenne, Hidatsa, Kiowa, Kiowa-Apache, Mandan, Eastern Shoshone and Sioux lived or traveled through the area long before contact with Euro-Americans and considered the area encompassing the District as their territory.

Not only did the area offer a variety of sustenance resources—such as food, water and shelter—to Native Americans but specific units on the District held special traditional significance for certain tribes. All five units in South Dakota are considered connected as "…traditional landmarks for hunting and gathering, a focal point for eagle trapping ceremonies that are central to the traditional practices of the Mandan, Hidatsa and Arikara: a part of a seasonal traditional round as one of the buffalo home buttes; connected to the Wind Cave in the sacred Black Hills, and a wintering ground and safe haven for the Sioux." (USDA Forest Service 2004: 3.3-8). The rock art of the North Cave Hills Unit is attributed to spiritual power, oracles to predict the future, depictions of traditional ceremonies or vision quest activities (USDA Forest Service 2004: 3.3-9).

The Slim Buttes have been culturally important to the Sioux, Hidatsa and other tribes as sources for plant and mineral pigments and are considered especially sacred due to the proximity of the 1876 Slim Buttes Battle site. Sioux tribal members still visit the area, to honor those who lost their lives, and believe many of their people may have been buried in the nearby Slim Buttes following the battle.

A possible burial and eagle-trapping pit, cairns, stone circles and rock art in the East and West Short Pine Hills Units and the South Cave Hills Unit are considered TCP.

The Chalk Buttes/Blue Earth Hills, are called "where the white stone stands" (Tallbull et al. 1996) and have long been considered "…a gathering place for spirits and a place for prayer, fasting and vision quests." to the Northern Cheyenne and Sioux (Deaver 1996: 1, 42). These opportunities for eagle trapping, fasting, blue clay and red paint procurement and the solitude for a variety of ceremonial events were only a few unique qualities the area offered and are only a few of the reasons they are considered TCP.

Concurrent with early 1900s homesteading era within and around the District the Cave Hills, Ekalaka, Long Pines, Short Pines and Slim Buttes Forest Reserves were created in between 1904-06. In 1908 these forest reserves were consolidated and became the Sioux National Forest of Region 2. Shortly afterward this forest was reassigned to Region 1. In 1920 the Sioux National Forest became the Sioux District of the Custer National Forest. The Forest Service brought a whole new realm of government sponsored activities including logging, livestock grazing, building/road development, fire suppression and recreation.

The Civilian Conservation Corps (CCC) played a significant role on the District during the 1930s, especially in the construction or improvement of the road infrastructure. Capitol Rock, Foster, Old Exie, Plum Creek, Riley Pass, Rimrock-Carter, Snow Creek, Speelmon Creek, Stagville Draw and Wickham Gulch are only a few of the roads constructed or reconstructed by the CCC on the District. In addition to the establishment of two CCC camps—one in the Ekalaka Hills Unit and one in the Long Pine Hills Unit—the CCC constructed Ekalaka Park Campground in the Ekalaka Hills Unit, Wickham Gulch Campground in the Long Pine Hills Unit, Picnic Spring Campground in the North Cave Hills and Deer Draw Campground in the Slim Buttes. Tri Point Lookout Tower, the only steel-frame fire lookout on the District, was assembled and erected by the CCC on a ridge in the Long Pine Hills Unit. The CCC were responsible for reconstructing the Camp Crook Ranger Station and were involved with fenceline, range improvement (dams, springbox headworks/cedar tanks and reservoirs) and telephone line construction.

Previous Investigations

One of the first archaeological investigations conducted on the District occurred in 1908, the same year as the creation of the Sioux National Forest. Ethnographer George F. Will, from the Harvard University Peabody Museum, visited and described cairns and conical timber lodges in the Slim Buttes Unit and described in detail the character of Ludlow Cave in the North Cave Hills Unit (Will 1909: 257-265). In 1920 William H. Over, director of the South Dakota State Museum, conducted excavations in Ludlow Cave and, although his methods were primitive, the artifact collection represents one of the most unique assemblages of personal Native American offerings left at a sacred place that has since been determined a TCP.

Ludlow Cave has been well known by the local, and distant, public and has been a visitor destination point for over one hundred years. Vandalism to the cave interior—consisting of date, figure, initial and name inscriptions—is a common problem that has been ongoing since the late 1800s and continues up through the present. On occasion, screens have been observed in the cave—evidence of illegal digging into the cave floor.

A long-term investigation of a cairn complex site located near a main road in the Long Pine Hills was conducted by an amateur archaeologist and members of the Carter County Geological Society from 1934-1940. This research documented nearly eighty cairns, long considered to be Indian graves. Their final conclusions stated that the cairns were definitely man-made and of considerable age but were not human graves, caches, fireplaces or tipi circles. The possibility of a ceremonial significance was offered but not proven (Nielsen 1941: 87). Unfortunately, even during this early history of the District these researchers observed vandalism that had occurred to this site and remarked that "…we were some fifty odd years too late to get authentic information for quite a number of the mounds or graves showed evidence of having been tampered with." (CCGS 1940: 2). Monitoring at this site within the past ten years has observed continued vandalism of the cairns in the form of dismantling.

Formal cultural resource investigation on the District began in 1977 and has continue to the present in support of Facility/Road, Fuels, Heritage, Land, Mineral, Range and Range Recission, Special Use Permit, Timber and Vegetation Projects.

Rock art investigations on the District began in the late 1970s with an intensive reconnaissance of the North Cave Hills Unit. Forty-two petroglyph sites were recorded (Keyser and Sundstrom 1984: 3) which set the stage for additional investigations involving CNF archaeologists, rock art experts and Passport-In-Time (PIT) volunteers during the past thirty years. Over seventy rock art sites, containing several hundred figures, have been recorded in the North Cave Hills Unit. Many of these rock art panels have been interpreted as to their possible age, ethnicity and meaning. A draft district nomination—identifying 212 archaeological sites—is currently in preparation for the North Cave Hills Archaeological and Traditional Use District. At least 75 sites listed on the NRHP or considered contributing resources within this nomination are rock art sites. Investigations have extended beyond the North Cave Hills Unit to reveal the presence of Native American rock art in the Ekalaka Hills Unit and in the Long Pine Hills Unit.

A comprehensive prehistoric overview of the District was completed in 1983 (Beckes and Keyser 1983) followed by a broader prehistoric cultural resource overview of southeastern Montana completed in 1988 (Deaver and Deaver 1988) that included the three units in Carter County.

Documentation of CCC structures on the District began in the early 1980s but their historic significance was not acknowledged until almost fifteen years later. Camp Needmore, presently a public recreational facility in the Ekalaka Hills Unit, was constructed by the CCC and served as one of two main camps on the District during the 1930s. Within the past ten years the other CCC camp, a fire lookout tower, several roads, reservoirs, campgrounds and stocktanks have been located and recorded. In addition to these structure types, several CCC inscriptions have been located on the District. Most of these inscriptions were carved into sandstone cliffs, but one consists of pencil or dark marker written on the surface inside a galvanized steel culvert along one of the main roads in the Long Pine Hills Unit. The contribution made to the District by the workforce members of the CCC is evident in the number of structures still present and functioning.

Lightning Spring—a stratified, multi-component site located in the North Cave Hills Unit and dating to the McKean Phase of the Archaic Period—was tested in 1980 and again in 1991. This site has provided one of the most complete prehistoric records of the Middle Archaic through Late Prehistoric Period on the District.

In 1984 a Tongue River Silicified Sediment (TRSS) quarry, known as the East Short Pines Quarry, was investigated. Results of this study provided insight into this Late Prehistoric Period TRSS procurement site and its role in a broader utilization overview on the Northwestern Plains.

In 1995 an ethnographic overview of the District was completed. This overview identified culturally sensitive sites defined as "Cultural resources associated with traditional Indian ceremonies, cultural practices and important events in tribal history…" and include "…burials, rock art, stone circles of greater than 7m in diameter, monumental rock features, fasting structures, eagle catching pits, sweat lodges, wooden structures, Sun Dance lodges and grounds, offering and prayer locales and historic battle sites." Ninety-seven culturally sensitive sites were identified on the District by this 1995 overview (Deaver and Kooistra-Manning 1995: 4.80-4.88). Additional culturally sensitive sites have been recorded on the district since this overview was completed.

A cultural assessment of the Chalk Buttes Unit and surrounding area was conducted in 1996 involving traditional Elders from the Assiniboine, Northern Cheyenne and Sioux Tribes in order to "…document the cultural and continuing significance of the Chalk Buttes area for the tribes and for the Custer National Forest that has stewardship responsibilities for the area." (Deaver 1996: 1). This week-long encampment allowed the Elders to visit, reconnect with and share stories about the area through traditional activities such as fasting, blue clay and plant collecting, offerings, sweats and blessing ceremonies. The isolated character of the Chalk Buttes, with few access roads, has been a factor in retaining its original integrity and promotes a ceremonial and spiritual tie with the Elders. As a Traditional Cultural Property, the Chalk Buttes should be "…preserved, taken care of and respected…" and public access should be limited (Deaver 1996: 43).

At least two large-scale wildfires have occurred in the Long Pine Hills Unit within in the past twenty years. The 1988 Brewer Fire consumed over 51,000 acres and at least 44 new historic or prehistoric sites were recorded during inventory of over 5300 acres. The 2002 Kraft Spring Fire consumed over 40,000 acres and at least 74 new historic or prehistoric sites were recorded during inventory of over 4200 acres. Both of these wildfires resulted in improved ground surface visibility and exposure of many cultural sites.

During the late 1990s Dr. Linea Sundstrom began compiling an "ethnogeographic gazetteer" that lists places across the landscape that were recognized as sacred or otherwise of special significance. This gazetteer, which includes the entire District, provides basic information about places that may need special consideration during land use decisions.

As mentioned above, several PIT projects have been conducted on the District for over ten years. While most of these volunteer investigations have focused on rock art inventories and monitoring, several other archaeological site types have been recorded and tested. In addition, interviews with local ranchers have provided insight into the history of the area. A site stewardship program was initiated several years ago that brought in the assistance of local interested individuals to monitor conditions of rock art site in the North Cave Hills Unit and to document changes, due to natural or human causes, as well as to document the locations of new sites.

In 2004 the Sioux Ranger District Oil & Gas Leasing EIS was released. This document, representing a multi-year endeavor of research gathering in Harding County, focused on the identification of "…federal lands with federal mineral rights and determining whether or not they should be made available for oil and gas exploration, development, and production…" (USDA Forest Service 2004: 1-1). Through research and consultation meetings, the project area was found to contain historic properties, traditional cultural properties, a proposed National Historic District for the North Cave Hills Archeological and Traditional Use Area, culturally sensitive sites and three sacred sites/cultural landscapes—the North Cave Hills, South Cave Hills and Slim Buttes Units.

Methodology

At present there are over 1000 recorded prehistoric or historic sites on the District represented by bison kills, cairns, recreational campgrounds, prehistoric campsites (containing bone, ceramic, fire-cracked rock and/or stone artifacts), drive lines, fasting beds, fire lookouts, historic and prehistoric petroglyphs, homesteads, lithic artifact scatters, a medicine wheel, quarries, ranger stations, range improvements (livestock tanks, reservoirs), roads, rock shelters, stone circles, and many sites associated with the CCC.

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 133 sites on this list that are monitored on a five-year cycle for condition assessment. Forty-one sites have been formally nominated and are listed on the NRHP (see the following table).

Table 3-6. Priority Asset Sites on the Sioux District

Site ID	Site Type
24CT0010	cairn
24CT0309	stone feature
24CT0317	stone circle
24CT0364	ceremonial
24CT0366	ceremonial
24CT0372	ceremonial
24CT0411	Tri Point Fire LookoutTower
24CT0420	lithic scatter
24CT0423	lithic scatter
24CT0426	lithic scatter
24CT0429	cemetary
24CT0471	petrolgyph
24CT0499	lithic scatter
24CT0559	CCC Camp
24CT0562	historic homestead
24CT0792	CCC Campground
24CT1321	petroglyph
39HN0001	petroglyph, rock shelter
39HN0004	rock shelter
39HN0005	rock shelter
39HN0007	rock shelter
39HN0018	petroglyph
39HN0021	petroglyph
39HN0022	petroglyph
39HN0024	rock shelter
39HN0026	petroglyph
39HN0030	petroglyph, rock shelter, trail
39HN0049	petroglyph
39HN0050	petroglyph
39HN0054	petroglyph
39HN0120	petroglyph, rock shelter
39HN0121	petroglyph, rock shelter
39HN0150	petroglyph, rock shelter

Table 3-6. Priority Asset Sites on the Sioux District

Site ID	Site Type
39HN0152	rock alignments
39HN0154	lithic scatter
39HN0155	petroglyph
39HN0157	lithic scatter
39HN0158	stone circle
39HN0159	petroglyph, rock shelter
39HN0160	petroglyph
39HN0162	petroglyph, rock shelter
39HN0163	stone circle and lithic scatter
39HN0165	petroglyph, rock shelter
39HN0167	petroglyph
39HN0168	petroglyph
39HN0171	petroglyph, rock shelter
39HN0174	petroglyph
39HN0176	lithic scatter
39HN0177	petroglyph
39HN0178	stone circle
39HN0186	stone circle
39HN0198	petroglyph
39HN0199	petroglyph
39HN0201	conical wood structure
39HN0204	lithic scatter
39HN0205	petroglyph
39HN0206	petroglyph
39HN0207	petroglyph
39HN0209	petroglyph, rock shelter
39HN0210	petroglyph
39HN0213	petroglyph
39HN0214	lithic scatter w/FCR and bone
39HN0217	petroglyph
39HN0218	petroglyph
39HN0219	petroglyph
39HN0221	lithic scatter and stone circle
39HN0227	petroglyph
39HN0228	petroglyph
39HN0232	petroglyph in rock shelter
39HN0233	petroglyph
39HN0234	petroglyph
39HN0298	quarry
39HN0436	ranger station
39HN0447	historic homestead
39HN0448	historic grave
39HN0484	petroglyph, rock shelter
39HN0485	petroglyph
39HN0486	petroglyph
39HN0487	petroglyph, rock shelter
39HN0515	petroglyph
39HN0516	petroglyph, rock shelter
39HN0529	cairn, possible burial, rock art, alignment, lithics and bone
39HN0569	occupation with FCR, Bones, tools and 6 buried components
39HN0663	petroglyph
39HN0664	petroglyph

Table 3-6. Priority Asset Sites on the Sioux District

Site ID	Site Type
39HN0680	petroglyph
39HN0682	petroglyph, rockshelter
39HN0684	cairns, stone circles, upright sandstone slabs, sheepherder cairn
39HN0685	lithic scatter, petroglyph, rock shelter
39HN0687	cairn
39HN0689	petroglyph
39HN0690	petroglyph
39HN0691	petroglyph
39HN0692	petroglyph
39HN0693	petroglyph
39HN0694	petroglyph
39HN0695	petroglyph
39HN0696	petroglyph
39HN0698	petroglyph
39HN0705	petroglyph
39HN0710	petroglyph
39HN0744	petroglyph, rock shelter
39HN0745	petroglyph, rock shelter
39HN0746	petroglyph
39HN0747	petroglyph
39HN0748	petroglyph
39HN0755	petroglyph
39HN0756	petroglyph
39HN0776	petroglyph
39HN0777	petroglyph
39HN0778	petroglyph
39HN0779	petroglyph
39HN0781	petroglyph
39HN0790	petroglyph
39HN0791	petroglyph
39HN0792	petroglyph
39HN0793	petroglyph
39HN0794	petroglyph
39HN0796	petroglyph
39HN0797	petroglyph
39HN0798	petroglyph
39HN0799	petroglyph
39HN0800	petroglyph
39HN0802	petroglyph
39HN0815	petroglyph
39HN0816	petroglyph
39HN0826	petroglyph
39HN0827	petroglyph
39HN0828	petroglyph
39HN0829	petroglyph
39HN0832	petroglyph
39HN0842	petroglyph
39HN0846	lithic scatter, petroglyph

To determine the effect on historic properties by alternatives proposed under travel management, the analysis for this "undertaking" focused on two specific categories: 1). the addition and/or designation of new user-created routes to the road and trail system; and 2). the convertion of system roads to designated trail system. To determine the potential effects to historic properties within the Area of Potential Effect (APE), existing system and non-system roads and trails were intersected with the GIS site database of recorded and known cultural resource sites lying within a 600 foot wide corridor. This 600 foot wide corridor is in accordance with the 2001 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 when analyzing both direct and indirect effects under all alternatives. In addition, a historic map of the District dating to 1957 was compared with the APE maps in an effort to define roads and trails that may be historic and deserving of further analysis as potential historic properties. Historic reference material, on file at the CNF, was used to identify roads that had been constructed or reconstructed by the CCC during the 1930s.

The GIS analysis and map resources identified 212 recorded cultural resource sites located within the 600 foot wide road and trail corridor on the District. This represents 21 % of the recorded sites on the District. Thirty-three sites are considered priority assest sites consisting of artifacts scatters, a medicine wheel, cairns, stone circles, a cemetery and grave, a ranger station, a CCC camp, roads, rock art and a homestead. Thirty-three sites are eligible for nomination to the NRHP (as shown in the following table).

Table 3-7. Priority Asset Sites Within the APE

Site ID	Site Type
24CT0275	lithic scatter
24CT0309	stone feature
24CT0429	cemetary
24CT0556	cairn, lithic scatter
24CT0559	Camp Needmore CCC Camp
24CT0562	historic homestead
24CT0713	CCC road (Capitol Rock)
24CT0714	CCC road (Plum Creek)
24CT0715	CCC road (Snow Creek)
24CT0716	CCC road (Speelmon Creek)
24CT0792	Wickham CCC Campground, road, petroglyphs
24CT1342	CCC road (J P Smith)
24CT1344	CCC road (Stagville-Ekalaka Park)
24CT1348	lithic scatter, pottery
39HN0027	stone circle
39HN0055	lithics, bone FCR
39HN0056	stone circle
39HN0153	stone circle
39HN0157	lithic scatter
39HN0182	stone circle
39HN0192	lithic scatter, stone circle
39HN0225	stone circle
39HN0314	lithic scatter
39HN0315	lithic scatter
39HN0320	quarry
39HN0436	ranger station
39HN0448	historic grave
39HN0461	lithic scatter
39HN0516	petroglyph, rock shelter
39HN0595	lithic scatter
39HN0598	lithic scatter
39HN0776	petroglyph
39HN0778	petroglyph

There are at least 24 CCC constructed or reconstructed roads within the APE. Over half of these roads have been recorded and are tentatively recommended eligible for nomination to the NRHP. At least 42 unrecorded historic roads are located within the APE and their NRHP eligibility is undetermined at this time. The CCC roads are summarized in the following table.

Table 3-8. CCC Constructed Roads Located Within The APE

Land Unit	ID	Road Name (site number)
Ekalaka Hills	31012	31012 (24CT1347)
	*3104	Rimrock – Carter (24CT634)
	31045A	31045A (24CT1336)
	31046C	31046C
	*3813	Stagville (24CT1344)
	31012	31012 (24CT1347)
	3108A	3108A (24CT1346)
	3108B	3108B (24CT1346)
	3108D	3108C (24CT1346)
Long Pines	3045	Foster
	30451	Old Exie (24CT98)
	3049	Wickham Gulch
	3057A	Grasshopper Spring
	3057W	Burditt (24CT289)
	3061	Mowbry
	*3116	Capitol Rock (24CT713)
	*3117	Snow Creek (24CT715)
	*3118	Plum Creek (24CT714)
	31181	31181 (39HN882)
	3118A	3118A (39HN882)
	*3818	Speelmon Creek (24CT716)
North Cave Hills	*3120	Riley Pass
South Cave Hills	*31131A	31131A
	*31131A1	31131A1
	*31131A2	31131A2

* CCC roads unaffected by proposed action

At least 72 recorded cultural resource sites within the APE could be identified as cultural resources of traditional religious and cultural importance, referred to here as culturally sensitive sites. Few sites have been formally evaluated for site eligibility for nomination to the NRHP. 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 within the APE have not been identified by the tribes as culturally sensitive or TCPs for this analysis all recorded culturally sensitive sites are treated as if they are potentially TCPs.

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 or water source 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. 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. Cairns on the CNF are considered culturally sensitive sites and are avoided and protected. Along with the recorded culturally sensitive sites described sites above are four traditional cultural property/ethnographic "landscapes" described earlier which include the Chalk Buttes, the North Cave hills, the South Cave Hills, and the Slim Buttes.

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.

In compliance with a 2005 Washington Office directive (USDA Forest Service 2005) for travel management, all non-system routes (roads and trails) that are proposed to be added to the system under selected alternative will be inventoried for cultural resources. The proposed non system roads and trails will be inventoried utilizing pedestrian transects within a 150 foot wide corridor centered on these routes, and actual or potential effects to the sites, due to motor vehicle use, will be documented. The results will be incorporated into all the alternatives, analyzed and disclosed in the Final EIS.

With the final selection of one of the alternatives any potential negative effects to sites may require 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 MT Programmatic Agreement, all sites will be monitored and the results of these monitors will be reported to the MT SHPO on an annual basis.

3.2.2.2 Environmental Consequences – Archaeological Resources and Tradition Cultural Properties

Direct and Indirect Effects

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.

An effect, according to 36 CFR 800.9(a) of the NRHP, may include an alteration to the historic 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. The number of historic properties that may potentially be adversely affected by each alternative is the measure used to compare the alternatives.

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). 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 District from 1957 there are only a few recognized road additions during a span of nearly thirty years. But in the following years since then the number of roads have at least tripled on some of the units. According to the studies, 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-18 1992).

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. 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, in the 1930's the CCC workforce built and/or improved at least 24 roads on the District. Most of these roads are considered historic properties because most of the original alignments and stone work is still intact and in use. In many cases continued use and maintenance of these and other historic roads have a favorable effect to the property, preserving the qualities that make the road eligible for the NRHP. Discontinued use of the road, or change in use to lower standard such as a conversion to a motorized trail could result in less maintenance and could threaten the preservation of the road as a road. Any proposed changes by the Forest Service to the property would require evaluation and consultation with the MT and SD SHPO.

All routes proposed to be added to the system will require inventory and determination as to whether or not they are historic properties. This additional inventory will add to the historical record on the District and provide new information on the recent past.

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 dispersed 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. 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. 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). The ability to access distant areas, relatively quickly and with relative ease, via motorized vehicles can result in subsequent 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, stone circles or historic buildings, may become damaged by actually driving over them or simply through acts of theft or vandalism. Motorized vehicles can easily transport equipment (i.e. shovels, screens, hammers, crowbars, high-powered rifles) 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.

Vandalism at two sites—Ludlow Cave in the North Cave Hills Unit and at a cairn complex site in the Long Pine Hills Unit—has been mentioned above but there are other indirect effect examples of site vandalism near roads on the District. At a rock shelter near Ludlow Cave an inscribed shield figure was hacked out of the sandstone wall with an axe during the 1980s, destroying at least three adjacent shield figures in the process. In 2000 an individual with a Colorado mule team organization inscribed a logo next to a Native American rock art panel and nearby, artifact collectors have dug and screened at two lithic and bone artifact scatters. A site discovered in 2002 near a road in the Long Pine Hills Unit contained a large, low-profile cairn that had been recently vandalized. Several sandstone nodules had been removed and a large hole had been dug in the center of the cairn.

Dispersed camping may result in indirect effects to cultural resources possibly due to inadvertent activity by recreationists. Campers may not recognize cultural features such as low-profile cairns, alignment features or stone circles and may displace feature stones without knowing the difference. This may be the case in the South Cave Hills Unit where a stone circle located near a road was recently dismantled to construct a nearby campfire ring. A low-profile cairn near a road in the Slim

Buttes Unit is threatened with the same type of vandalism due to the fact that it is located in an area commonly used for dispersed camping activity.

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, and especially culturally sensitive sites, 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.

Alternative A

Direct Effects

Under this alternative at least 212 recorded cultural resource sites are located within the APE corridor and could be adversely affected by new trail additions to the road or trail system or by conversions of roads to the trail system. Most of these sites consist of lithic artifact scatters with intact subsurface cultural material and the direct effects consist of vehicle-caused rutting or down-cutting of the routes that pass through the sites. Allowing additional motorized use, either due to designation of previously undesignated routes or the addition of unlicensed vehicle use to licensed vehicle use on existing system routes, may further expose these deposits resulting in loss of valuable information. Thirty-three NRHP eligible archaeological sites and 33 priority asset sites are located within the APE corridor and could be physically damaged by motorized vehicle use as well. Seventy-two sites are considered culturally sensitive sites and, while the direct effects include the same for lithic scatters, the possibility of dislodging stone from cairn, stone circles, and stone features would damage their physical character as well as their traditional qualities.

Four CCC roads would be added to the road system and one CCC road would be added to the motorized trail system. These five roads have already been recorded. For the CCC road added to the trail system, the potential change in maintenance and standard, and allowing motorized vehicle use may alter its integrity and historic function. Nine historic roads would also be added to the motorized trail system and 3 historic roads would be added to the road system. These roads would be formally recorded and evaluated, adding to our knowledge of the historic road system on the District. However, allowing motorized vehicle use may alter their integrity and historic function.

For eight CCC roads proposed for conversion to motorized system trails, the maintenance standard may change, thus potentially altering the original integrity and historic function of the roads. At least 37 identified historic roads, proposed for conversion, may be affected in the same manner.

The locations of at least 134 archaeological sites along the APE corridor may be adversely affected and would require monitoring and evaluation to determine the effects of a potential change in maintenance and standards, and additional motor vehicle use (i.e. allowing unlicensed vehicles in addition to licensed vehicles).

Designating dispersed camping within 300 feet of designated roads and trails would likely affect some of the sites identified within the APE under Alternative A. These effects include vehicle rutting on sites or damage to artifacts or features due to being driven over.

Under this alternative there are several examples of areas that are considered threatened by the proposed addition of motorized roads and trails. The Molstad Complex consists of several culturally sensitive sites, a historic homestead and a cemetery that could be affected by additional public access and by authorizing motor vehicle use (i.e. adding and designating routes for public motorized use). In the Long Pine Hills Unit a unique concentration of cairns, at least one fasting bed, and several stone circles in the Devils Canyon area could be affected by additional public access and by authorizing motor vehicle use (i.e. adding and designating routes for public motorized use). The Burditt Spring and North Slick Creek areas contain lithic artifact scatter sites that are near, or are bisected by, roads. A large cairn adjacent to Road 3049 and northwest of the Wickham Campground was vandalized six years age and a nearby spur road courses directly through a stone circle site. Proposed motorized vehicle access into an area near the Plum Creek Road would threaten to disturb a unique complex of 21 stone circle sites, consisting of over 70 features. In the North Cave Hills Unit, proposed motorized use of road 38500 into Davis Draw would promote increased public access and threaten a variety of sites, several of which have already suffered irreparable vandalism.

Indirect Effects
By adding numerous user created roads to the road system, and by converting a number of historic roads to the motorized trail system, access to the more remote areas of the district would increase. As studies have shown, increased access often leads to increased vandalism and theft. The 134 sites located along the added routes could be exposed to vandalism and illegal artifact collection. Increased access may also affect the 72 culturally sensitive sites by infringing on the isolated character surrounding these sites. This could affect any traditional use that may be associated with these site types.

Designating dispersed camping within 300 feet of designated roads and trails would likely affect some of the 134 sites identified along the APE corridor under Alternative A. These effects include discovery of sites and illegal collection of artifacts or possibly the dismantling of sensitive site features—such as cairns or stone circles—as intentional acts of vandalism or for the construction of campfire rings.

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, and especially culturally sensitive sites, 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.

In certain instances, adding routes to the road system would provide interpretation opportunities to the public for certain types of cultural resources such as CCC camps and roads, ranger stations and historic cemeteries.

Alternative B

Direct Effects
At least 138 recorded cultural resource sites are located within the APE corridor and could be adversely affected by new trail additions to the road or trail system or by conversions of roads to the trail system. Most of these sites consist of lithic artifact scatters with intact subsurface cultural material and the direct effects consist of vehicle-caused rutting or down-cutting from use of the routes that pass through the sites. Allowing additional motorized use, either due to designation of previously undesignated routes or the addition of unlicensed vehicle use to licensed vehicle use on existing system routes, may further expose these deposits resulting in loss of valuable information. Twenty NRHP eligible archaeological sites and 22 priority asset sites are located within the APE corridor and could be physically damaged by motorized vehicle use as well. Fifty sites are considered culturally

sensitive sites and, while the direct effects include the same for lithic scatters, the possibility of dislodging stone from cairn, stone circles, and stone features would damage their physical character as well as their traditional qualities.
Two CCC roads are proposed for conversion to the motorized trail system. One historic road is proposed for addition to the motorized trail system and will require inventory and evaluation. This may help contribute to the history of the local area and the District. Eleven historic roads are proposed for conversion to motorized trails. The maintenance and standard may change as a result of this action and may alter their original integrity and historic function.

The locations of at least 46 archaeological sites along the APE corridor may be adversely affected and would require monitoring and evaluation to determine the effects of a potential change in maintenance and standard, and additional motor vehicle use (i.e. allowing unlicensed vehicles in addition to licensed vehicles).

Designating dispersed camping within 300 feet of designated roads and trails would likely affect some of the sites identified within the APE under Alternative B. These effects include vehicle rutting on sites or damage to artifacts or features due to being driven over.

Under this alternative the following areas would not be threatened since there would be no proposed addition of motorized roads and trails. The Molstad Complex, consisting of a several culturally sensitive sites, a historic homestead and a cemetery in the Chalk Buttes Unit; a unique concentration of cairns, at least one fasting bed and several stone circles in the Devils Canyon area, the Burditt Spring and North Slick Creek areas containing lithic artifact scatter sites that are near, or are bisected by, roads; a large cairn adjacent to Road 3049 and northwest of the Wickham Campground and a nearby spur road courses directly through a stone circle site; a unique complex of 21 stone circle sites, consisting of over 70 features located near the Plum Creek Road road 38500 into Davis Draw would promote increased public access and threaten a variety of sites, several of which have already suffered irreparable vandalism.

Indirect Effects
The addition of user created motorized trails to the road system opens up new access to areas previously considered somewhat remote and, as studies have found, could increase the occurrence of vandalism and site theft. This can have detrimental effects to culturally sensitive sites where site integrity and setting are important values to protect.

Designating dispersed camping within 300 feet of the added user created could affect 46 sites identified within the APE under Alternative B. These effects include discovery of sites and illegal collection of artifacts or possibly the dismantling of culturally sensitive site features—such as cairns or stone circles—as intentional acts of vandalism or for the construction of campfire rings.

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, and especially culturally sensitive sites, 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.

In certain instances, adding routes to the road system may provide interpretation opportunities to the public for certain types of cultural resources such as CCC camps and roads, ranger stations and historic cemeteries.

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. The CCC built at least 24 system roads on the District that are still in use. Maintenance of these historic properties as roads has added years to their preservation and protection.

Direct Effects
Under this alternative, no new historic information would be gained through the addition of new routes to the road system. The CCC built system roads would continue to be maintained and protected through their identification as system roads. No new potential CCC routes or historic roads would be recorded, however, and added to the system.

Indirect Effects
The remote location for three of the NRHP prehistoric locations and limited access under this alternative minimizes the potential disturbance of the sites. The culturally sensitive sites would not be subjected to increased access since no new routes would be added to the system.

Cumulative Effects

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 SHPOs.

Additional inventory in response to this and future undertakings will add to the understanding of the area prehistory and history.

3.2.2.1 Conclusion – Archaeological Resources and Traditional Cultural Properties

In overall comparisons, Alternative A consists of the highest count of sites and potential historic roads that may be affected due to the addition to the road system or due to the conversion to the trail system. The No Action has the lowest count of sites that may be affected. Alternative B strikes a balance between adding to our knowledge of the area through additional inventory, while protecting and preserving the highest number of known recorded sites, culturally sensitive sites, priority asset sites, historic roads and CCC roads. The following table compares the action alternatives.

Table 3-9. Comparisons of Alternatives

Effects To:	Alternative A	Alternative B
Total Sites	212	138
Culturally Sensitive Sites	72	50
CCC Roads	18	4
Historic Roads	47	17
NRHP Eligible Sites	33	20
Priority Asset Sites	33	22

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 MT and SD SHPO.

3.2.3 WILDLIFE

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 3-10. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in EIS	Rationale and Other Information	Effects Determination for Alternative B[7]
Threatened, Endangered, and Proposed Species				
Black-footed Ferret (*Mustela nigripes*) (Endangered)	Live within large complexes (6,000 to 7,500 acres) of occupied prairie dog colonies (>100 acres) and complexes. Ferrets depend on prairie dog colonies for food, shelter and denning. The Montana side of the Sioux Ranger District does not support any Prairie dog colonies and the South Dakota side has about 1 acre of black-tailed prairie dog colonies. Black-footed ferrets are not known to be present.	Analysis in EIS.	Species does not occur in project area and an adequate preybase of black-tailed prairie dogs is not located in or near the project area.	NE
Forest Service Sensitive Species				
American peregrine falcon *(Falco peregrinus anatum)*	Cliff habitat over 200' high with suitable ledges for nest construction. Not known to occur in the project area.	No further analysis will be conducted.	Not in project area	NI
Baird's sparrow *(Ammodramus bairdii)*	Prefers native prairie but structure is more important so may nest in tame grasses. Species present in project	Analysis in EIS.	Included in Migratory Birds discussion	NI

[7] 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.

Table 3-10. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in EIS	Rationale and Other Information	Effects Determination for Alternative B[7]
	area.			
Bald Eagle *(Haliaeetus leucocephalus)*[8]	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. The 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.	NI
Black-backed woodpecker *(Picoides arcticus)*	Primary habitat is recently burned forested areas, secondary habitat is spruce/fir forests. Habitat present in project area and species is known to be present.	Analysis in EIS.	Included in Migratory Birds discussion	NI
Blue-gray gnatcatcher *(Polioptila)*	Open stands of juniper and limber pine with intermixed sagebrush. Habitat is not present in the project area.	No further analysis will be conducted	Not in project area.	NI
Burrowing owl *(Athene cunicularia)*	Open grasslands, nesting and roosting in burrows dug by mammals or owls. Species is associated with prairie dogs burrows in the project area. Habitat present in project area and species is known to be present.	No further analysis will be conducted.	No increased access to occupied black-tailed prairie dog habitat is proposed in any alternative. The District supports less than 1 acre of prairie dogs.	NI
Greater sage grouse *(Centrocercus urophasianus)*	Sagebrush with intermixed grasslands. No leks are located in project area. Brood-rearing and winter habitat maybe present but the species is not known to occur in the project area.	No further analysis will be conducted.	No increased access to habitat is proposed in any alternative.	NI
Grizzly Bear (*Ursus arctos*)[9]	Remote, well connected forested generalist. Species is not present in the project area.	No further analysis will be conducted	Not in project area.	NI
Harlequin duck *(Histrionicus histrionicus)*	Inhabit fast moving, low gradient clear mountain streams. Species is not present in the project area.	No further analysis will be conducted	Not in project area.	NI
Loggerhead Shrike *(Lanius ludovicianus)*	Grassy pastures that are well grazed, nest in shrubs or small trees, preferably thorny such as hawthorn. Species and habitat are present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	NI
Long-billed curlew	Open grasslands or prairie usually near water. No habitat in project area.	No further analysis	Not in project area.	NI

[8] Bald eagle delisted effective August 8, 2007 and subsequently managed as a Forest Service Sensitive Species.
[9] 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 3-10. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in EIS	Rationale and Other Information	Effects Determination for Alternative B[7]
(Numenius americanus)		will be conducted.		
Long-eared myotis *(Myotis evotis)*	Use a variety of habitats but are strongly associated with coniferous forests. Species present in project area.	Analysis in EIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.	MIIH
Long-legged myotis *(myotis volans)*	Primarily a coniferous-juniper forest bat found at moderate elevations (≥6000ft) but may also inhabit riparian cottonwood bottoms and desert areas. Species present in project area.	Analysis in EIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.	MIIH
Pallid bat *(Antrozous pallidus)*	Arid deserts and grasslands with rock outcrops. Species may be present in project area.	Analysis in EIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.	MIIH
Spotted bat *(Euderma maculatum)*	Desert to montane coniferous forests. Species present in project area.	Analysis in EIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.	MIIH
Townsend's big-eared bat *(Corynorhinus townsendii)*	Cave and cave-like structures along with forested foraging habitat. Species present in project area.	Analysis in EIS.	Included in Bats discussion. Primary concern is disturbance at roosting sites and hibernacula.	MIIH
Black-tailed prairie dog *(Cynomys ludovicianus)*	Relatively flat grasslands with diggable soils, throughout the central plains. Species present in project area.	See black-footed ferret analysis, no further analysis for prairie dogs will be conducted.	No increased access to habitat is proposed in any alternative.	NI
White-tailed prairie dog *(Cynomys leucurus)*	Xeric sites with mixed stands of shrubs and grasses from the Bighorn Basin in Montana to Utah. Species is not present in project area.	No further analysis will be conducted.	Not in project area.	NI
Wolverine *(Gulo gulo)*	Remote subalpine and spruce/fir forested areas. Species is not present in project area.	No further analysis will be conducted.	Not in project area.	NI
Greater short-horned lizard *(Phrynosoma hernandesi)*	Areas with short, sparse grass or sagebrush; flats with pebbly or stony soil; and rock outcrops. Species may be present in project area.	Analysis in EIS.	Included in General Wildlife Species discussion. Primary concern is direct mortality while crossing roads.	MIIH
Milk Snake *(Lampropeltis triangulum)*	Open sagebrush/grasslands, usually in or near rocky areas. Species may be present in project area.	Analysis in EIS.	Included in General Wildlife Species discussion. Primary concern is direct mortality while crossing roads.	MIIH

Table 3-10. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in EIS	Rationale and Other Information	Effects Determination for Alternative B[7]
Western hog-nosed snake *(Heterodon nasicus)*	Sagebrush/grassland; arid areas with gravelly or sandy soil. Species present in project area.	Analysis in EIS.	Included in General Wildlife Species discussion. Primary concern is direct mortality while crossing roads.	MIIH
Management Indicator Species[10]				
Northern Goshawk *(Accipiter gentilis)* (H)	Mature forest generalist. Species present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	0
White-tailed deer *(odocoileus virginianus)* (H, K)	Grassland to montane conifer forest. Species present in project area.	Analysis in EIS under elk section.	Analysis for elk serves as surrogate for white-tailed deer because they occupy the same habitats in the project area and elk have more restrictive habitat requirements. Impacts of travel are expected to be similar for the two species.	0
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 is not present in project area.	No further analysis will be conducted.	Not in project area.	0
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.	0
Bullock's (Northern) oriole *(Icterus bullockii)* (H)	Open deciduous woodland and riparian areas. Habitat present in project area. Species presence unknown.	Analysis in EIS.	Included in Migratory Birds discussion	0
Yellow warbler *(Dendroica petechia)* (H)	Brushy riparian especially with willows. Species present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	0
Ovenbird *(Seiurus aurocapillus)* (H)	Mid-late successional, closed-canopied deciduous or deciduous/conifer forests with limited understory. Species present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	0
Spotted (Rufous-sided) towhee *(Pipilo maculatus)* (H)	Shrubby riparian areas, woody draws, and woodland undergrowth. Species present in Pryors Unit.	Analysis in EIS.	Included in Migratory Birds discussion	0
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 EIS.	Included in Migratory Birds discussion	0

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

Table 3-10. Wildlife Analysis Table

Species Name	Basic Habitat Description and Occurrence in Project Area	Included in EIS	Rationale and Other Information	Effects Determination for Alternative B[7]
Sharp-tailed grouse *(Tympanuchus phasianellus)* (H, K)	Mosaic of dense grass and shrubs with forbs for nesting, woody riparian areas in winter. Species present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	0
Yellowstone Cutthroat trout (*Oncorhynchus clarkii bouvieri)* (H, K)	Upper Yellowstone and Upper Snake River drainages. Species is not present in project area.	No further analysis will be conducted.	Not in project area.	0
Elk *(Cervus canadensis)* (K)	Grassland to forested alpine areas. Species present in project area.	Analysis in EIS.	Main concerns are potential for displacement due to recreational travel, and vulnerability during hunting season.	0
Golden eagle *(Aquila chrysaetos)* (K)	Open hilly to mountainous areas. Habitat and species present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	0
Merlin *(Falco columbarius)* (K)	Patchy shrub/grassland habitats with large trees to support nesting (secondary nester). Habitat and species present in project area.	Analysis in EIS.	Included in Migratory Birds discussion	0
Mule deer *(Odocoileus hemionus)* (K)	Rugged grassland to forested alpine areas. Species present in project area.	Analysis in EIS under elk section.	Analysis for elk serves as surrogate for mule deer because they occupy the same habitats in the project area and elk have more restrictive habitat requirements. . Impacts of travel are expected to be similar for the two species.	0
Bighorn sheep *(Ovis Canadensis)* (K)	Remote, steep, rugged terrain, such as mountains, canyons, and escarpments where precipitation is low and evaporation is high. Species is not present in project area.	No further analysis will be conducted.	Not in project area.	0
Pronghorn antelope *(Antilocapra Americana)* (K)	Rolling grasslands to mixed sagebrush shrublands. Species present in project area.	No further analysis will be conducted.	No increased access to habitat is proposed in any alternative.	0

Potential effects of the alternatives on the following species and/or their habitats are analyzed in detail: Black-footed ferret; bats (includes Long-eared myotis, long-legged myotis, Pallid bat, Spotted bat, and Townsend's big-eared bat); big game (includes Elk, White-tailed deer and Mule deer); migratory birds (includes Baird's sparrow, Black-backed woodpecker, Loggerhead shrike, Golden eagle, Merlin, Northern goshawk, Bullock's oriole, Yellow warbler, Ovenbird, Spotted Towhee, Brewer's sparrow and sharp-tailed grouse); and general wildlife species (includes Greater short-horned lizard, Milk Snake, Western hog-nosed snake and other Focal Species).

The list of federally Threatened and Endangered species for the Custer National Forest and counties encompassed by the Sioux Ranger District was verified through the U.S. Fish and Wildlife Service in July 2008 (US Fish and Wildlife Service 2008). The bald eagle was delisted effective August 8, 2007. The only listed species for the Sioux Ranger District is the black-footed ferret.

Applicable background information regarding specific species biological requirements, and general effects including effects of roads and recreation on wildlife, were taken from the Beartooth Travel Management FEIS, Gallatin National Forest Travel Plan FEIS, the Helena National Forest North Belts Travel Plan Wildlife Report, Effects of Recreation on Rocky Mountain Wildlife – A Review for Montana, and other literature as cited.

3.2.3.1 Affected Environment – Threatened And Endangered Species Black-footed Ferret

Regulatory Framework – Black-footed Ferret

The black-footed ferret was listed as a federally endangered species under the Endangered Species Act (ESA) in March 1967. The recovery plan for the black-footed ferret (USFWS 1988) established the national recovery objectives where are to: increase the captive population of ferrets to 200 breeding adults by 1991; establish a prebreeding census population of 1,500 free-ranging breeding adults in 10 or more different populations with no fewer than 30 breeding adults in each population by the year 2010; and encourage the widest possible distribution of reintroduced animals throughout their historic range (FR Vol. 61, No. 55, March 1996). So far, reintroduction attempts have occurred in Wyoming, Montana, South Dakota, Colorado, and Utah. In January 2002, the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana was approved and implemented in Montana (MTFWP 2002). The overall goal of the plan is to "provide for management of prairie dogs populations and habitats to ensure long-term viability of prairie dogs and associated species" which included black-footed ferrets (MTFWP 2002). In 2003 an annual rule regulating prairie dog shooting on public lands was implemented by the State where prairie dogs could not be shot on public lands from March 1 thru May 31 (MTFWP 2003). The no shooting rule was permanently remanded in 2007 so prairie dog shooting on most public land remains open. On January 24, 2008, the U.S. Fish and Wildlife Service reintroduced 8 black-footed ferrets on the Northern Cheyenne Indian Reservation. The nearest release site was about 80 miles from the Sioux Ranger District in Montana and over 100 miles from the closest release site in South Dakota (Cheyenne River Indian Reservation).

Affected Environment – Black-footed ferret

Black-footed ferrets are intimately tied to prairie dog colonies throughout their range. Research from ferret-occupied prairie dog colonies indicates that the most important attribute of ferret habitat is the distribution and abundance of prairie dogs. Ferrets are therefore limited to the same open habitat used by prairie dogs: grasslands, steppe, and shrub steppe (MTNHP 2008). To support a viable population of ferrets, a prairie dog colony complex of 2500-3000 ha (6,200-7,400 acres) composed of individual colonies at least 12 ha (30 acres) in size, with the majority 50 ha (125 acres) or larger, is needed (Forrest et al., 1988, p. 28). Miller et. al. (1996) found that females with young have never been found on prairie dog colonies less than 49 ha (121 acres). No black-footed ferrets have been documented on the Ranger District since the 1930s.

Currently there is one known active black-tailed prairie dog (*Cynomys ludovicianus*) colony (< 1 acre) on the Sioux Ranger District. The distribution of prairie dog colonies and acreages on adjacent lands is unknown but is thought to be limited based on the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (2002).

The colony acreage on NFS lands is grossly inadequate to support black-footed ferrets. As of August 12, 2004 the USFWS removed the black-tailed prairie dog as a candidate for listing under the Endangered Species Act. The black-tailed prairie dog is considered as a USFS Northern Region Sensitive species.

3.2.3.2 Environmental Consequences – Threatened And Endangered Species: Black-footed Ferret

Direct and Indirect Effects – Black-footed Ferret

The presence of roads and trails represents a direct loss of habitat that has already occurred, and their use can pose a direct threat of black-footed ferret mortality from vehicles. However, black-footed ferrets are not know to occur in the area and the project area does not support an adequate preybase of prairie dogs to support ferrets. Indirectly, the impacts of roads include increased access for prairie dog shooters that could have a negative impact on prey density.

Effects Common to All Alternatives.
Direct habitat loss would not increase under any alternative because construction of new routes is not proposed. None of the alternatives analyzed in detail propose increased access to potential black-footed ferret or black-tailed prairie dog habitat. All of the alternatives provide the same amount of access to the one active prairie dog town

Vehicle-related black-footed ferret mortality is unlikely given the relatively low speeds and traffic volumes on National Forest system roads and the lack of ferrets and adequate habitat.

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

Alternative A, Alternative B and No Action Alternative.
The availability of black-footed ferret habitat would be effectively the same under Alternatives A, B, and the No Action.

Cumulative Effects – Black-footed Ferret
Based on the past and current vegetation management on the District, including timber harvest, livestock grazing, prescribed fire, the invasive species program, and other vegetation projects, grassland/shrub steppe vegetation conditions provide some habitat for black-footed ferret and their preferred prey species, black-tailed prairie dogs. The impacts of different types of dispersed recreation including the outfitter/guide program; hunting; recreational shooting; fire suppression; and the lands, minerals, and non-recreation special use programs on the District have been minor. Given that anticipated direct and indirect effects to black-footed ferrets and their 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, the Custer National Forest Land and Resource Management Plan, Federal, Regional, and state direction in Montana and South Dakota, and the conservation Plan for Black-tailed and White-tailed Prairie dogs in Montana (2002).

Determination of Effects – Black-footed Ferret

Implementation of the proposed Federal Action would have *No Effect On The Black-Footed Ferret Or Their Habitat.* This determination is based on the following rationale: 1) black-footed ferrets are not known to occur in the area; 2) the project area does not support an adequate preybase to support ferrets; 3) the amount of occupied black-tailed prairie dog habitat will not grow to an adequate level in the near future; 4) direct habitat loss would not increase under any alternative because construction of new routes is not proposed; and 5) none of the alternatives propose increased access to potential black-footed ferret or black-tailed prairie dog habitat. Implementation of the proposed Federal Action *May Impact Individuals Or Habitat But Is Not Likely To Cause A Trend To Federal Listing Or Loss Of Viability For Black-Tailed Prairie Dogs.* This determination is based on the above rationale for ferrets along with the fact that prairie dogs will continue to be killed by recreational shooting until the States of Montana and South Dakota impose anti-shooting rules. Recommendations for removing, avoiding, or compensating adverse effects are not necessary.

3.2.3.3 Affected Environment – Sensitive Species: Bat Species

Five Forest Service sensitive bat species (Long-eared myotis, long-legged myotis, Pallid bat, Spotted bat, and Townsend's big-eared bat), occur or are thought to 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, 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 project area 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 3-11. Public Motorized Use Route Miles by Alternative – Sioux RD

Alternative	Motorized Route Miles
Alternative A	466
Alternative B	303
No Action Alternative	399

Hibernacula are not expected to be present on the District due to lack of caves. For the same reason, colonial roosts and maternity colonies are also not expected to occur. Non-colonial roosting and maternity sites are more likely to occur in rock crevices in sandstone, siltstone, and mudstone outcrops scattered throughout the District, as well as in tree snags and other habitats. Effects to bats in these settings are more likely to be caused by loss of habitat than by human disturbance at any particular site.

3.2.3.4 Environmental Consequences – Sensitive Species: Bat Species

Direct and Indirect Effects – Bat Species

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 roosting or maternity sites, thus leading to adverse indirect effects by disturbance of bats at these sites.

Alternative A

Alternative A would have the highest number of open motorized route miles (466) in the project area. This alternative would provide the least protection to bat roosting and maternity sites because these sites may be more easily accessible than under the other alternatives. Hibernacula are not likely to occur on the District so no direct or indirect effects are expected on bats during this period of their life cycle when they are most vulnerable.

Alternative B

Alternative B would have the lowest open motorized route miles (303) and thus would provide the most protection to bat roosting and maternity sites overall because these sites would be less easily accessible than under the other alternatives. This alternative also has 121 route miles with seasonal restrictions from December 1 thru October 13. Hibernacula are not likely to occur on the District so no direct or indirect effects are expected on bats during this period of their life cycle when they are most vulnerable.

No Action

This alternative would have 399 miles of open motorized routes and thus would protect bat roosting and maternity sites overall more than Alternative A and less than Alternative B. This alternative also has 148 route miles with seasonal restrictions from December 1 thru October 13. Hibernacula are not likely to occur on the District so no direct or indirect effects are expected on bats during this period of their life cycle when they are most vulnerable.

Cumulative Effects - Bat Species

Several factors have likely contributed to cumulative effects to bats in the project area which include past wildlfires and timber harvest. Effects of past timber harvest and fires 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). Vegetation across the District is comprised of about 50% ponderosa pine forest and 50% grassland/shrub so forest edge ecotones dominant the landscape. Since 1988 over 75% of the Long Pines land unit has burned in high intensities wildlfires where the majority of the fire killed trees were salvage logged. Little of the remaining seven land units that make up the Sioux District have been burned in wildfires since 1988. Timber harvest has occurred on the District over the last couple of decades in the Ekalaka Hills, Long Pines and Slim Buttes land units. The extent that cutting units have regenerated is variable, with some naturally regenerated to dense shrub cover, others to seedling and sapling ponderosa pine of varying degrees of canopy cover. The combination of vegetative structure and forest edge likely provides suitable foraging conditions for bats.

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 most 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.

Determination of Effects - Bat Species

Implementation of the proposed Federal Action *May Impact Individuals Or Habitat But Is Not Likely To Cause A Trend To Federal Listing Or Loss Of Viability For Bat Species.* This determination is based on the following rationale: 1) hibernacula for the five bat species does not occur in the project area; 2) public access to potential roosting and maternity sites is most likely low across the project area; 3) the preferred alternative reduces open motorized routes by 202 miles (40% reduction); 4) direct habitat loss would not increase under any alternative because construction of new routes is not proposed; and 5) none of the alternatives propose increased access to sensitive bat species habitat. Recommendations for removing, avoiding, or compensating adverse effects are not necessary.

3.2.3.5 Affected Environment – Management Indicator Species: Big Game Species

The elk analysis serves as a surrogate for mule deer and white-tailed deer. The rationale for this is based on the large amount of overlap in habitat use and needs between deer and elk on the District; the amount of scientific literature available for elk and the effects of roads; and impacts of travel management on the District are expected to be very similar for these three species.

Big Game 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 in 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). 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 will only address disturbance and displacement of elk (big game) from suitable habitat and not population responses.

Big Game 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 are displayed in the following table.

Table 3-12. Percent Elk Security Habitat and Vulnerability by Alternative.

Land Unit	Alternative A		Alternative B		No Action	
	Elk Security (Security during Seasonal Route Closures) in Percent	Open Motorized Route Density (Open Route Density during Seasonal Route Closures) in Mi. / Sq. Mi.	Elk Security (Security during Seasonal Route Closures) in Percent	Open Motorized Route Density (Open Route Density during Seasonal Route Closures) in Mi. / Sq. Mi.	Elk Security (Security during Seasonal Route Closures) in Percent	Open Motorized Route Density (Open Route Density during Seasonal Route Closures) in Mi. / Sq. Mi.
Chalk Buttes	50 (NA)	1.16 (NA)	57 (57)	0.78 (0.78)	36 (36)	0.99 (0.99)
Ekalaka Hills	11 (NA)	2.21 (NA)	25 (37)	1.27 (0.90)	8 (8)	1.83 (1.83)
Long Pines	6 (NA)	1.93 (NA)	27 (64)	1.12 (0.44)	8 (64)	1.74 (0.40)
East Short Pines	34 (NA)	1.19 (NA)	44 (44)	0.69 (0.69)	13 (13)	1.22 (1.22)
West Short Pines	0 (NA)	1.76 (NA)	0 (0)	1.76 (1.76)	0 (0)	1.76 (1.76)
North Cave Hills	7 (NA)	1.60 (NA)	15 (31)	1.25 (0.85)	11 (11)	1.42 (1.42)
South Cave Hills	7 (NA)	1.95 (NA)	17 (17)	1.25 (1.07)	7 (7)	1.55 (1.55)
Slim Buttes	30 (NA)	1.12 (NA)	34 (48)	0.94 (0.66)	32 (32)	0.82 (0.82)

NA=Not Applicable

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 Custer Forest EMU (the EMU encompassing all of the District in Montana) are to work cooperatively with private and public land managers to maintain and improve existing elk habitat. The Custer Forest EMU encompasses 14,378 square miles of land where about 45% (6,400 square miles) provides elk habitat. About 25% of the EMU falls on public land with the rest falling on private property. Approximately 2.4% of the suitable elk habitat in the EMU falls within the Sioux Ranger District. About 63% of the current elk distribution is on private lands. State big game managers estimate that approximately 800 to 1000 elk are present in the EMU. Elk numbers are currently managed based on the level of landowner tolerance to elk depredation on private lands. The State is currently trying to maintain 500 post-hunting season elk in the EMU.

3.2.3.6 Environmental Consequences – Management Indicator Species: Elk

Direct and Indirect Effects – Big Game Species

Effects Common to All Alternatives

All alternatives meet the access management recommendations (see Big Game Habitat Use and Travel section above) for elk in the project area, except for the Ekalaka Hills, Long Pines and South Cave Hills land units under Alternative A. Open motorized route densities, in all of the other land units would range from 0.40 to 1.83 mi/sq mi which are below Christensen et al's.(1993) recommendation to manage roads at <1.9 mi/sq mi for areas where elk are one of the primary resource considerations. Secure elk habitat in the project area (see Big Game Vulnerability and Travel section above) would range from 0% to 64%, where most of the land units would be below the 30% minimum recommended by Hillis et al. (1991). Elk habitat within the project area for all alternatives would be categorized as year-round habitat with no distinct areas for seasonal use (e.g. winter range).

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

Alternative A would have the highest open motorized route density and would provide the lowest elk security cover by land unit. Overall, recommendations for access management and for elk vulnerability would not be met by this alternative.

Alternative B

Alternative B would have the lowest open motorized route density and would provide the highest elk security cover by land unit. Five of the eight land units that provide the majority of the big game habitat on the District would have road closures during the hunting season. These season of use closures would lower big game vulnerability (See Table 3-12). Overall, recommendations for access management and for elk vulnerability would be met by this alternative.

No Action

This alternative would have open motorized route densities and security cover in between Alternative A and B. Overall, recommendations for access management would be met for elk under this alternative. Management recommendations for elk vulnerability would not be met by this alternative except in the Chalk Buttes and Slim Buttes land units; and also in the Long Pines during the hunting season.

Cumulative Effects – Big Game Species

Several past and ongoing habitat enhancement activities on the District have improved habitat for elk. These activities include thinning and prescribed burning on elk range to improve forage quality and availability, and to increase the acreage of available habitat by reducing conifer species that have gradually encroached onto year-round 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 most 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 adjacent to the Forest are not an issue, at least for the near future, because most private lands are large blocks with few owners.

Density of motorized non-Forest Service roads within the Forest boundary is 0.50 mi/sq mi. for all of the alternatives. Contributions of these roads to adverse cumulative effects within the Forest boundary are expected to be minimal.

Consistency with Laws, Regulations, and Policy

The Custer National Forest Management Plan contains relevant direction for management of big game populations. The mitigation 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." In addition, the 2005 Montana Final Elk Management Plan provides relevant management direction for elk habitat. This analysis considered guidance from the above documents as well as from pertinent literature.

Determination of Effects – Big Game Species

Implementation of the proposed Federal Action will have a *Neutral Impact On Big Game Species***.** This determination is based on the following rationale: 1) the preferred alternative meets recommendations for access management and elk vulnerability; 2) the preferred alternative would have the lowest open public motorized use route densities and would provide the highest level of elk security cover by land unit; 3) the preferred alternative reduces open motorized routes by 202 miles (40% reduction); 4) direct habitat loss would not increase under any alternative because construction of new routes is not proposed; 5) season of use road closures during the hunting season will benefit big game species; and 6) the alternatives are consistent with the Montana Statewide Elk Management Plan (2005). Recommendations for removing, avoiding, or compensating adverse effects are not necessary.

3.2.3.7 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: Baird's sparrow, Black-backed woodpecker, and Loggerhead shrike. The following birds are Management Indicator Species on the District: Golden eagle, Merlin, Northern goshawk, Bullock's oriole, Yellow warbler, Ovenbird, Spotted Towhee, and Brewer's sparrow. 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.

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.

3.2.3.8 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 three Alternatives considered, Alternative A represents a maximum for both habitat alteration effects and disturbance impacts to migratory bird species. At an average route density across the land units of 1.62 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 and No Action

Average motorized route densities across the land units under these alternatives would range from1.13 to 1.42 mi/mi sq. The total number of motorized route miles would be 303 for Alternative A and 399 for the No Action alternative. Adverse affects to susceptible bird species would therefore be essentially the same, but slightly less than under Alternative B.

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.

Determination of Effects – Migratory Birds

Implementation of the proposed Federal Action will have a *Neutral Impact On Migratory Bird Species***.** This determination is based on the following rationale: 1) the preferred alternative would have the lowest open motorized route densities by land unit; 2) the preferred alternative reduces open motorized routes by 202 miles (40% reduction); and 3) direct habitat loss would not increase under any alternative because construction of new routes is not proposed. Recommendations for removing, avoiding, or compensating adverse effects are not necessary.

3.2.4 AFFECTED ENVIRONMENT – GENERAL WILDLIFE

Focal species are species used as surrogates in assessing ecological integrity (FR 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) that are relevant to this analysis are shown in the following table.

Table 3-13. Focal Wildlife Species

Wildlife Group	Focal Species
Wide-ranging carnivore	Mountain lion
Ungulates	Mule deer, elk
Late-successional-forest associated species	Northern goshawk, brown creeper, white-breasted nuthatch
Riparian-associated species	Bald eagle, black-capped chickadee
Primary cavity nesters	Three-toed woodpecker
Grassland/Shrub-Steppe-associated species	Greater short-horned lizard, Milk Snake, Western hog-nosed snake

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 3-14. 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
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

Table 3-14. Documented Effects Associated with Roads and Trails

Road- and trail-associated factors	Effects of factors	Wildlife group affected
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 3-15. Public Motorized Use Route Miles by Alternative – Sioux RD

Alternative	Motorized Route Miles
Alternative A	466
Alternative B	303
No Action Alternative	399

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

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). 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 Sioux 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).

Some species do respond positively to the presence of roads and trails. Routes may increase habitat for some species that prefer edges. New microhabits 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 routes on wildlife, a one kilometer 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 motorized routes on the District were analyzed. The percent of the District untouched by the two kilometer buffer on motorized routes is referred to as "core". 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 routes. Refer to other analyses for species such as black-footed ferrets and elk. 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 motorized 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 3-16. Percent of Sioux Ranger District That is Core Habitat for Wildlife

Land Unit	Alternative A	Alternative B	No Action
Chalk Buttes	45	52	31
Ekalaka Hills	10	21	7
Long Pines	5	21	6
East Short Pines	28	37	8
West Short Pines	2	2	2
North Cave Hills	8	14	9
South Cave Hills	6	14	7
Slim Buttes	27	30	26

3.2.4.1 Environmental Consequences – General Wildlife

Direct and Indirect Effects

Effects Common to All Alternatives

Mortality: Approximately 57 miles of higher speed unpaved roads (maintenance level 3) are on the District. These roads are rated for passenger vehicles with speeds up to 35 miles per hour. No changes are proposed for higher speed unpaved roads. The potential for animal mortality caused by collision with vehicles on maintenance level three 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 project area available as core habitat would be essentially the same under all alternatives (see table above).

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 such as reptiles.

Habitat Modification /Changes to Behavior: The potential for mortality would be the same for all alternatives.

Alternative B

Mortality: With the lowest open motorized route miles (303), this alternative has the lowest potential for leading to wildlife mortality and supports the highest percentage of core habitat.

Habitat Modification /Changes to Behavior: The potential for mortality would be the same for all alternatives.

No Action

Mortality: The open motorized route miles, and thus the potential for mortality, would be less than under Alternative A, but higher than Alternative B.

Habitat Modification/Changes to Behavior: The potential for mortality would be the same for all alternatives.

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 routes on the Sioux Ranger District 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. 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 the use of roads and trails. There are also effects of the activities that humans do when they use roads and trails, including hunting, fishing, trapping, firewood cutting, viewing wildlife, 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.

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 are regulated, and probably is less impactive to wildlife than non-outfitted activities (USDA Forest Service 2006). Conservation easements on private lands outside the Forest protect habitat and are beneficial to wildlife.

The presence of hiking and riding areas has led to the availability 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.

Determination of Effects – General Wildlife

Implementation of the proposed Federal Action will have a *Neutral Impact On General Wildlife Species And May Impact Individuals Or Habitat But Is Not Likely To Cause A Trend To Federal Listing Or Loss Of Viability For Reptile Species.* This determination is based on the following rationale: 1) the preferred alternative would have the lowest number of open motorized routes (303); 2) the preferred alternative reduces open motorized routes by 202 miles (40% reduction); 3) direct habitat loss would not increase under any alternative because construction of new routes is not proposed; 4) the preferred alternative supports the highest percentage of core habitat; and 5) even with the proposed travel plan modifications some wildlife mortality will continue to occur across the District's road system. Recommendations for removing, avoiding, or compensating adverse effects are not necessary.

3.2.4.2 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 black-footed ferret was based on motorized route density and potential effects on black-tailed prairie dog colonies. 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 3-17. Wildlife Effects Determinations[11]

Species Name	Alternative A	Alternative B	No Action
Threatened, Endangered, and Proposed Species			
Black-footed Ferret (*Mustela nigripes*) (Endangered)	NLAA	NLAA	NLAA
Forest Service Sensitive Species			
American peregrine falcon *(Falco peregrinus anatum)*	NI	NI	NI
Baird's sparrow *(Ammodramus bairdii)*	NI	NI	NI
Bald Eagle *(Haliaeetus leucocephalus)*[12]	NI	NI	NI
Black-backed woodpecker *(Picoides arcticus)*	NI	NI	NI

[11] 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.

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

Table 3-17. Wildlife Effects Determinations [11]

Species Name	Alternative A	Alternative B	No Action
Blue-gray gnatcatcher *(Polioptila)*	NI	NI	NI
Burrowing owl *(Athene cunicularia)*	NI	NI	NI
Greater sage grouse *(Centrocercus urophasianus)*	NI	NI	NI
Grizzly Bear (*Ursus arctos*) [13]	NI	NI	NI
Harlequin duck *(Histrionicus histrionicus)*	NI	NI	NI
Loggerhead Shrike *(Lanius ludovicianus)*	NI	NI	NI
Long-billed curlew *(Numenius americanus)*	NI	NI	NI
Long-eared myotis *(Myotis evotis)*	MIIH	MIIH	MIIH
Long-legged myotis *(myotis volans)*	MIIH	MIIH	MIIH
Pallid bat *(Antrozous pallidus)*	MIIH	MIIH	MIIH
Spotted bat *(Euderma maculatum)*	MIIH	MIIH	MIIH
Townsend's big-eared bat *(Corynorhinus townsendii)*	MIIH	MIIH	MIIH
Black-tailed prairie dog *(Cynomys ludovicianus)*	MIIH	MIIH	MIIH
White-tailed prairie dog *(Cynomys leucurus)*	NI	NI	NI
Wolverine *(Gulo gulo)*	NI	NI	NI
Greater short-horned lizard *(Phrynosoma hernandesi)*	MIIH	MIIH	MIIH
Milk Snake *(Lampropeltis triangulum)*	MIIH	MIIH	MIIH
Western hog-nosed snake *(Heterodon nasicus)*	MIIH	MIIH	MIIH
Management Indicator Species [14]			
Northern Goshawk *(Accipiter gentilis)* (H)	0	0	0
White-tailed deer *(Odocoileus virginianus)* (H, K)	0	0	0
Ruffed grouse *(Bonasa umbellus)* (H)	0	0	0
Western kingbird *(Tyrannus verticalis)* (H)	0	0	0
Bullock's (Northern) oriole *(Icterus bullockii)* (H)	0	0	0
Yellow warbler *(Dendroica petechia)* (H)	0	0	0
Oven bird *(Seiurus aurocapillus)* (H)	0	0	0
Spotted (Rufous-sided) towhee *(Pipilo maculatus)* (H)	0	0	0
Brewer's sparrow *(Spizella Breweri)* (H)	0	0	0
Sharp-tailed grouse *(Tympanuchus phasianellus)* (H, K)	0	0	0
Elk *(Cervus canadensis)* (K)	0	0	0
Golden eagle *(Aquila chrysaetos)* (K)	0	0	0
Merlin *(Falco columbarius)* (K)	0	0	0
Mule deer *(Odocoileus hemionus)* (K)	0	0	0
Bighorn sheep *(Ovis Canadensis)* (K)	0	0	0
Pronghorn antelope *(Antilocapra Americana)* (K)	0	0	0

[13] 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."

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

3.3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES – OTHER ISSUES

3.3.1 WATER QUALITY, FISHERIES, AND AQUATICS

3.3.1.1 Introduction

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

3.3.1.2 Affected Environment – Water Quality

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).

The Montana Department of Environmental Quality (MTDEQ) has classified all waters within the Montana portion of the analysis area as C-3 waters. The beneficial uses associated with this classification include; bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agricultural and industrial water supply. Degradation which will impact established beneficial uses will not be allowed. (Administrative Rules of Montana (ARM) 17.30.611 2008).

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.

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 three streams within the analysis area where one or more uses are impaired and a TMDL is required (Category 5). Refer to Table 3-20 for more detail on these streams.

The State of Montana has the authority to develop TMDLs. On streams with multiple ownerships, 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 MCA 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 (MCA 2007).

Beneficial use classification for all streams in the South Dakota portion of the analysis area is fish and wildlife propagation, recreation, and stock watering waters (category 9, South Dakota Administrative Rules (SDAR), Surface Water Quality Standards, 74:51:03:01 (SDAR 2008)). The criteria of parameters for fish and wildlife propagation, recreation, and stock watering waters and their allowable variations that are provided in the following table:

Table 3-18. Criteria for Fish and Wildlife Propagation, Recreation, and Stock Watering Waters (74:51:01:52)

Parameter	Criteria	Unit of Measure	Special Conditions
Total alkalinity as calcium carbonate	≤ 750	mg/L	30-day average
	≤ 1313	mg/L	daily maximum
Total dissolved solids	≤ 2,500	mg/L	30-day average
	≤ 4,375	mg/L	daily maximum
Conductivity at 25°C	≤ 4,000	micromhos/cm	30-day average
	≤ 7,000	micromhos/cm	daily maximum
Nitrates as N	≤ 50	mg/L	30-day average
	≤ 88	mg/L	daily maximum
pH	≥ 6.0 - ≤ 9.5	units	see § 74:51:01:07
Total petroleum hydrocarbon	≤ 10	mg/L	see § 74:51:01:10
Oil and grease	≤ 10	mg/L	see § 74:51:01:10

The most applicable surface water quality standards for streams in South Dakota include: “*Compliance with criteria for beneficial use.* A person may not discharge or cause to be discharged into surface waters of the state pollutants which cause the receiving water to fail to meet the criteria for its existing or designated beneficial use or uses” (SDAR 74:51:01:02). “*Biological integrity of waters.* All waters of the state must be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, in concentrations or combinations which will adversely impact the structure and function of indigenous or intentionally introduced aquatic communities” (SDAR 74:51:01:12). “*Antidegradation of waters of the state.* The antidegradation policy for this state is as follows (SDAR 74:51:01:34): (1) The existing beneficial uses of surface waters of the state and the level of water quality that is assigned by designated beneficial uses shall be maintained and protected; (2) Surface waters of the state in which the existing water quality is better than the minimum levels prescribed by the designated beneficial use shall be maintained and protected at that higher quality level; (3) The board, or secretary, may allow a lowering of the water quality to levels established under the designated beneficial use if it is necessary in order to accommodate important economic or social development in the area in which the waters are located; (4) Surface waters of the state which do not meet the levels of water quality assigned to the designated beneficial use shall be improved as feasible to meet those levels; (5) No further reduction of water quality may be allowed for surface waters of the state that do not meet the water quality levels assigned to their designated beneficial uses as a result of natural causes or conditions, and all new discharges must meet applicable water quality standards; and (6) The secretary shall assure that regulatory requirements are achieved for all new and existing point sources and that non-point sources are controlled through cost effective and reasonable best management practices."

Larger stream systems are assessed by the South Dakota Department of Environment and Natural Resources to determine the level of beneficial use support. Streams that do not fully support their uses do not fully meet water quality standards. These streams are identified in a report by the Department of Environment and Natural Resources as impaired waterbodies in need of TMDL development. The 2008 South Dakota Integrated Report - Surface Water Quality Assessment (SD-DENR, 2008) does not identify any streams within or immediately adjacent to the Forest as impaired. However, two segments located well below the Forest boundary are listed. These include portions of the South Fork Grand River and South Fork Moreau River.

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, Landform, Erosion and Sediment

The underlying geology within the project area is intermixed sedimentary beds of clay, silt and sand. These structures have weathered to form steep cliff features along portions of the perimeter of most land units, while landforms along the remaining perimeter are less steep and more convex in nature.

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 analysis area 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 downslope. However, at the broad scale, instream erosion is considered the dominant erosion process across the analysis area.

Precipitation and Flow Regimes

Elevations across the land units range from under 3400 to over 4300 feet. Based on a 30 year period of record, the average annual precipitation associated with these elevations range from 14 to 20 inches (MTNRIS 2008). The majority of the precipitation falls as spring snow or rain from April through June.

Precipitation levels and geologic formations result in the ephemeral flow regimes for the majority of the drainages within the land units. Short perennial streams do however, occur below many spring sites. Spring (groundwater) discharge results in relatively constant flow throughout the year, although infrequent but significant peaks can occur during heavy spring snow and rain events that produce overland flow.

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, insects or disease, and wind can drastically alter vegetative cover. Over the last three decades, timber stands have been affected by wildfire on just under 70,000 acres across the District. Wildfire events have likely resulted in substantial increases in localized surface erosion although sediment delivery to perennial streams has not been quantified. Surface erosion and sediment transport subsides to back ground levels generally within five years as ground vegetation recovers. Recent wind events in the

Ekalaka Hills caused substantial damage to timber stands, some of which is planned for salvage operations.

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 impacts to watershed characteristics and hydrologic processes.

Currently, many activities influence water quality and natural channel processes including historical mining, livestock grazing, crop production, timber harvest 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.

Historical Uranium Mining

Uranium exploration has occurred throughout all land units on the District since the mid 50’s, while extractive mining of uranium was concentrated in the Cave Hills and specifically in the area of Riley Pass. Mining occurred between 1962 and 1964, and under federal legislation at the time, no reclamation of mining activities were required. Approximately 250 acres were disturbed in the North Cave Hills either through excavation of overburden to expose ore deposits, or off-site deposition of waste material. Currently, under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), approximately 80 percent of this disturbance is under contract for reclamation (USDA-FS 2007). Depending on the concentration of hazardous substances in the mine waste (mainly arsenic and uranium), reclamation actions range from basic site stabilization and revegetation, to removal of contaminated waste to on-site repositories that are stabilized, capped and revegetated. This work is anticipated to be completed within four to five years. The remaining reclamation needs will be accomplished through contract as funding opportunities arise.

Livestock Grazing

Livestock grazing has occurred within the analysis area since the late 1800s. Livestock numbers have decreased over the years; in some allotments quite substantially. Currently there are 63 allotments providing 58,043 animal unit months (AUMs) on 126,00 acres of suitable range on the District. Recent range analyses 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 Slim Buttes Range Analysis Decision and 2008 Long Pines EA (draft) proposed changes in range management to address these issues on the District. Range management planning across the remainder of the analysis area is ongoing.

Timber Harvest and Prescribed Fire

Timber harvest over the last three decades encompasses just under 19,000 acres on the District. Prescribed fire over the last two decades encompasses approximately 5000 acres on the District. 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.

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.

Individual routes have not been evaluated on the ground for impacts or risks to water resources. Instead, route networks were evaluated for their potential to impact water quality at the 6 HUC (hydrologic unit code) watershed scale (10,000-40,000 acre) using GIS. Since impacts to water quality generally occur from concentrated road surface flows routed directly to streams at crossing locations (bridges, culverts or fords), stream crossings were a key variable in the evaluation. All routes, regardless of ownership were included in the evaluation, although routes with Forest Service jurisdiction were also summarized separately as these are the routes potentially affected by the proposed actions. Refer to the next section for the results of this evaluation.

Affected Environment Summary

A summary of selected natural characteristics and human activities are provided in Table 3-19 by 6 HUC watershed. Quantifiable Forest Service activities include past timber harvest, fire (prescribed fire and wildfire), and existing transportation system attributes. All HUCs have some level of agricultural activity (crop production and/or livestock grazing), past and present. Other than the information provided above on Forest Service range allotments, the effects of agricultural activities to water resources have not been assessed.

Watersheds were assigned a risk level to help focus cumulative effects analysis for water resources. The risk level is based on 1) perennial stream crossings by FS routes, 3) total perennial stream miles, 3) intermittent stream crossings by FS routes, and 4) TMDL listed streams. High risk watersheds have Forest Service roads with perennial stream crossings, exceptionally high number of intermittent crossings on Forest Service Roads, or are TMDL category 5 streams with intermittent crossings on Forest Service roads. Moderate risk watersheds have more than one mile of Forest Service roads and more than one mile of perennial stream downslope, or are TMDL category 5 streams without any stream crossings on Forest Service roads. Of the 53 watersheds on the District, 11 are rated high risk, 16 moderate and 26 low.

As mentioned previously, riparian and stream conditions are also 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 3-20.

The 2006 Montana 305(b)/303(d) Water Quality Report lists one stream adjacent to the analysis area that require TMDLs: Little Missouri River (MTDEQ 2006). Impaired uses include aquatic life and warm water fisheries. Probable causes for impairment of the Little Missouri are metals- cadmium, copper, iron, lead and zinc. Probable sources are natural sources and unknown. Transportation systems on National Forest System land have the potential to influence aquatic life and warm water fisheries in this watershed, but do not contribute to the causes identified.

Table 3-19. Summary of Watershed Characteristics and Watershed Scale Influences on the District

Watershed #	Watershed Name	Watershed Acres	Percent Watershed Forest Service	Total Perennial Stream Miles	FS Perennial Stream Miles	Harvest Acres	Fire Acres	Total Road Miles	FS Road Miles	Total Stream Crossings	FS Intermittent Crossings	FS Perennial Crossings	Watershed (Road) Risk
101102010704	Upper Tie Creek	23220	35	9	3	2099	6854	65	24	82	18	7	HIGH
101102010705	Lower Tie Creek	22935	11	13	1	350	3369	41	7	51	8	5	HIGH
101102020505	Speelmon Creek	17718	63	6	6	2350	10355	57	36	99	44	4	HIGH
101303010104	Upper Crooked Creek	18046	16	7	<1	0	2	37	10	35	3	3	HIGH
101102010802	Plum Creek	12819	70	5	1	1943	10685	47	33	43	24	2	HIGH
101303020405	Bull Creek- Campbell Creek	13471	48	17	2	0	1464	37	15	26	7	1	HIGH
101303020406	Dry Creek	10396	42	5	2	0	60	31	14	28	7	1	HIGH
101102010803	Slick Creek	37776	31	20	1	1709	12052	104	34	109	45	1	HIGH
101102010801	Little Missouri River-K Bar Creek[1]	43315	4	27	0	12	2284	87	6	84	8	0	HIGH
101102011004	Russell Creek	16090	41	13	0	5215	2425	82	30	107	44	0	HIGH
101102010706	Little Missouri River-Waterhole Creek[1]	41162	9	16	0	9	4402	95	15	76	7	0	HIGH
101102010701	Little Missouri River-Sand Creek[1]	24861	4	10	0	0	61	52	2	37	0	0	MOD
101303050406	Gap Creek	24693	11	20	4	5	1	43	9	43	1	0	MOD
101303010105	Middle Crooked Creek	14933	15	15	0	0	0	28	7	22	5	0	MOD
101102011005	Little Beaver Creek-Terrell Creek	35999	8	15	0	698	2	87	12	125	11	0	MOD
101303020408	Bull Creek- Hay Creek	12219	8	13	0	0	2	22	3	17	1	0	MOD
101303020403	Bull Creek- Cottonwood Creek	13150	4	13	0	0	69	28	2	38	1	0	MOD
101303010106	Petes Creek	13302	12	12	0	0	0	28	5	20	1	0	MOD
101102020510	Boxelder Creek-Wood Gulch	21619	7	11	0	0	19	37	8	39	4	0	MOD
101102020506	Boxelder Creek-Little Ramme Creek	32305	12	11	0	30	4622	81	9	63	5	0	MOD
101303020504	South Fork Grand River- Prairie Dog Creek	17776	12	10	3	0	0	14	3	6	0	0	MOD
101102011006	HS Creek	14229	18	9	0	752	107	47	10	60	7	0	MOD
101102011003	Little Beaver Creek-Dugan Draw	23310	7	8	0	1602	6	59	10	82	18	0	MOD
101102020508	Boxelder Creek-Devils Canyon	15205	24	6	0	0	3387	32	9	30	7	0	MOD
101102011002	Headwaters Little Beaver Creek	22987	20	4	0	1165	51	72	10	80	16	0	MOD

Table 3-19. Summary of Watershed Characteristics and Watershed Scale Influences on the District

Watershed #	Watershed Name	Watershed Acres	Percent Watershed Forest Service	Total Perennial Stream Miles	FS Perennial Stream Miles	Harvest Acres	Fire Acres	Total Road Miles	FS Road Miles	Total Stream Crossings	FS Intermittent Crossings	FS Perennial Crossings	Watershed (Road) Risk
101303020304	Middle Jones Creek	13720	19	4	0	0	924	49	7	23	1	0	MOD
101303020505	Fisher Creek	13257	26	3	3	0	0	22	4	16	0	0	MOD
101303020501	South Fork Grand River- Sand Creek	11013	13	3	0	0	0	12	3	4	0	0	LOW
101102020504	Boxelder Creek-Belltower	30302	2	22	0	0	225	81	0	88	0	0	LOW
101303050109	Little Cowboy Creek- North Fork Moreau River	14958	2	10	0	0	0	15	0	10	0	0	LOW
101303020305	Lower Jones Creek	17148	3	9	0	0	0	21	0	25	0	0	LOW
101303050101	Chalk Butte Draw- North Fork Moreau River	17844	2	2	0	0	0	48	0	57	0	0	LOW
101303050106	Red Butte Creek	12328	13	1	0	0	0	7	1	7	0	0	LOW
101303020206	Sioux Creek	18077	35	0	0	0	2	30	12	21	2	0	LOW
101102020509	Snow Creek	12658	89	0	0	494	10227	50	38	87	56	0	LOW
101303040104	Ash Coulee	21058	11	0	0	0	402	41	9	27	1	0	LOW
101303040401	North Sand Creek- Sand Creek	20166	17	0	0	0	117	32	6	42	9	0	LOW
101102020403	Buffalo Creek	29301	5	0	0	0	0	82	6	95	5	0	LOW
101303020205	Lower Unnamed Tributary to Clarks Fork Creek	18336	12	0	0	0	0	18	1	11	0	0	LOW
101303050202	Spring Creek	19909	13	0	0	0	20	28	4	24	1	0	LOW
101102020507	Harmon Creek	14636	14	0	0	243	0	35	7	39	10	0	LOW
101303020407	Jack Creek	11479	3	0	0	0	20	16	0	15	0	0	LOW
101102020503	Big Ramme Creek	17740	6	0	0	200	17	37	4	51	8	0	LOW
101303050401	Jones Creek- Rabbit Creek	17037	65	0	0	0	464	45	27	32	8	0	LOW
101303050601	Headwaters of Antelope Creek	19957	33	0	0	0	1	34	19	23	7	0	LOW
100902090601	Upper Spring Creek	23702	19	0	0	0	342	55	12	75	11	0	LOW
101102020602	Spring Creek	23745	13	0	0	0	1557	42	6	61	2	0	LOW
101303020601	Headwaters of Big Nasty Creek	13438	7	0	0	0	170	35	4	39	1	0	LOW
101303050403	Point Creek	17553	13	0	0	0	5	29	3	25	0	0	LOW
101303020204	East Branch Unnamed Tributary to	16621	8	0	0	0	539	23	1	21	0	0	LOW

Table 3-19. Summary of Watershed Characteristics and Watershed Scale Influences on the District

Watershed #	Watershed Name	Watershed Acres	Percent Watershed Forest Service	Total Perennial Stream Miles	FS Perennial Stream Miles	Harvest Acres	Fire Acres	Total Road Miles	FS Road Miles	Total Stream Crossings	FS Intermittent Crossings	FS Perennial Crossings	Watershed (Road) Risk
	Clarks Fork Creek												
101102020401	Fresh Water Draw	14827	5	0	0	0	10	38	1	37	0	0	LOW
101303050207	Sheep Creek	16289	10	0	0	0	0	9	1	6	0	0	LOW
101303050205	Ash Creek	10150	10	0	0	0	1	10	0	10	0	0	LOW
SUM		1030788	na	352	27	18876	77322	2258	500	2373	414	24	H-11 M-16 L-26

[1] TMDL listed stream or tributary to.

Table 3-20. Summary of Streams on the 2006 Montana 303(d) List Within or Immediately Adjacent to the District

Stream/TMDL category	Probable Impaired Use*	Probable Cause of Impairment	Probable Source of Impairment	Location
TMDL Category 5 Streams (TMDLs Required)				
Little Missouri River Category 5	Aquatic Life Support (P) Warm Water Fishery (P)	Cadmium, Copper, Iron, Lead, Zinc	Natural Sources, Sources unknown,	Hwy 323 bridge to South Dakota border.
TMDL Category 1 and 3 Streams (TMDLs Not Currently Required)				
Box Elder Creek Category 3	All uses not assessed			Headwaters to South Dakota border.
Buffalo Creek Category 1	All uses fully supported			Headwaters to Box Elder Creek.

*P= partial use support

3.3.1.3 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 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 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 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 (vehicle).

The only action that would tend to increase risk on water resources is designating non-system roads for public motorized use. Designating non-system roads adds additional route miles to the landscape for the long-term, thereby maintaining the risk of indirect and cumulative effects to water resources.

Changing the mode of travel from highway legal vehicle to all motorized vehicles is not expected to change the type of vehicle that currently use these routes. Likewise, converting roads to trails is not expected to change the type or level of use, nor the level or priority for maintenance along these routes. Therefore, these actions would not substantially change risk.

All other actions would tend to decrease risk to water resources. Converting routes to administrative use reduces traffic and allows revegetation of the road surface to occur, both of which reduce erosion over the long-term. Not designating non-system routes reduces route miles on the landscape over the long-term, thereby reducing potential erosion. Applying a seasonal use period related to the fall hunting season has the potential to reduce surface erosion, rutting and maintenance needs when roads are wet before freeze-up, although not to the level that could be attained during a spring break-up closure period.

Effects by Alternative - Water Quality

Indirect effects are displayed for moderate and high risk watersheds in the following table. Low risk watersheds are not evaluated for indirect effects because they either do not contain perennial streams, or roads on National Forest System land, or both.

Alternative A - Indirect Effects

This alternative proposes actions that result in a net decrease in risks to water resources in 12 of the 27 moderate and high risk watersheds on the District, while 13 watersheds have a net increase and two have no net change. Four of the 13 watersheds with a net increase are high risk watersheds. The main reason for the net increase is due to the conversion of roads to trails, followed by the addition of non-system roads to the transportation system.

Alternative B - Indirect Effects

This alternative proposes actions that result in a net decrease in risks to water resources in 22 of the 27 moderate and high risk watersheds on the District, while only three watersheds have a net increase and two have no net change. One of the three watersheds with a net increase is a high risk watershed. The main reason for the net increase in risk in these watersheds is the conversion of system roads to trails.

Table 3-21. Summary of Route Miles by Risk for Moderate and High Risk Watersheds on the District

Watershed Name	Alternative A		Alternative B	
	Increase Risk	Decrease Risk	Increase Risk	Decrease Risk
Boxelder Creek-Devils Canyon	0.3	8.4	0.0	2.6
Boxelder Creek-Little Ramme Creek	0.0	8.5	0.0	4.8
Boxelder Creek-Wood Gulch	0.4	5.9	0.0	3.9
Bull Creek- Campbell Creek	2.3	2.2	1.1	6.1
Bull Creek- Cottonwood Creek	1.5	0.0	1.5	0.1
Bull Creek- Hay Creek	0.5	0.0	0.5	1.0
Dry Creek	3.2	0.0	2.7	1.7
Fisher Creek	1.6	1.6	1.6	1.6
Gap Creek	4.0	1.4	3.4	1.5
Headwaters Little Beaver Creek	1.8	0.0	1.8	4.1
HS Creek	2.6	0.4	2.4	4.5
Little Beaver Creek-Dugan Draw	0.7	0.0	0.0	3.1
Little Beaver Creek-Terrell Creek	1.1	2.4	1.0	7.4
Little Missouri River-K Bar Creek	0.0	6.2	0.0	1.6
Little Missouri River-Sand Creek	0.0	0.0	0.0	0.0
Little Missouri River-Waterhole Creek	1.9	5.5	0.2	1.3
Lower Tie Creek	0.0	5.9	0.0	4.3
Middle Crooked Creek	1.4	0.0	0.6	1.3
Middle Jones Creek	0.4	0.1	0.2	3.9
Petes Creek	1.1	1.0	1.1	1.9
Plum Creek	3.0	19.1	2.7	9.9
Russell Creek	11.1	0.0	3.4	9.1
Slick Creek	9.1	18.4	4.3	11.7
Snow Creek	2.8	24.4	0.6	10.3
South Fork Grand River- Prairie Dog Creek	0.5	1.6	0.5	2.1
South Fork Grand River- Sand Creek	0.0	2.4	0.0	2.4
Speelmon Creek	4.3	23.6	2.1	10.7
Upper Crooked Creek	3.6	0.7	1.9	3.5
Upper Tie Creek	3.0	15.8	0.5	8.6
TOTAL	62.2	155.5	34.2	125.0

Comparison of Indirect Effects

The following table provides a summary of route miles for all actions by risk category; increase, decrease or no change in risk. For all actions on the District, Alternative A substantially increases risk (approximately 2:1) to water resources, while Alternative B substantially decreases risk (approximately 8:1).

Table 3-22. Summary of Route Miles *with* Proposed Actions on the District

Actions that Increase Risk	Alternative	
	A	B
Add (designate non-system routes)	91.6	23.9 [15]
Total Miles that Increase Risk	**91.6**	**23.9**
Actions that Decrease Risk		
Administrative (convert system/non-system road to administrative use only)	33.3	139.1
Do Not Designate (system routes)	0.4	22.4
Season (allow use from 12/1 to 10/14)	0	24.5
Vehicle or No Camping with Season	8.3	0
Total Miles that Decrease Risk	**42**	**186**
Actions that Don't Change Risk		
Vehicle	93.1	49.7
Convert (from road to trail)	66.9	68.6[15]
Convert/Season (from road to trail with yearlong use)	141.0	3.7
No Camping	4.2	8.2
Total Miles –Actions that Do Not Change Risk	**305.2**	**130.2**
Total Miles – All Actions	**438.8**	**340.1**

No Action Alternative

See discussion of No Action Alternative in the cumulative effects section below.

Cumulative Effects - Effects of All Routes Including Those Without Proposed Actions

All alternatives include routes without proposed actions. Actions to reduce the risk of impacting water resources will not occur on designated system routes, and any existing impacts and risks are expected to continue into the foreseeable future until road or trail maintenance occurs. Not designating non-system routes would remove these routes from the landscape, either through natural recovery or active reclamation, both of which would reduce risks to water resources over time. The following table summarizes miles of routes without actions and cumulatively to include routes with actions.

Table 3-23. Summary of All Routes Across the District With and Without Proposed Actions

	Alternative		
	A	B	No Action
Designation Status/Risk Category for Routes *without* Actions			
NF System Road Miles – Designate/No Risk	62.7	126.2	397.9
NF Non-system Road Miles – Do Not Designate/Decrease Risk	4.2	39.8	108.3
Total Miles for Routes *without* Actions	**66.9**	**166.2**	**506.2**

[15] 17 miles of added routes and 4.1 miles of converted routes would have a 12/1 to 10/14 season of use.

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 +/- 0.5 miles.

Table 3-23. Summary of All Routes Across the District With and Without Proposed Actions

	Alternative		
	A	**B**	**No Action**
Indirect Effects - Risk Category for Routes *with* Actions (see previous Table)			
Miles for Actions that Increase Risk	91.6	23.9	0
Miles for Actions that Decrease Risk	42	186	0
Miles for Actions that Don't Change Risk	305.2	130.2	0
Total Miles for Routes *with* Actions	**438.8**	**340.1**	**0**
Cumulative Effects - Risk Category for All Routes			
Total Miles for All Routes with Increased Risk	91.6	23.9	0
Total Miles for All Routes with Decreased Risk	46.2	225.8	108.3
Total Miles for All Routes with No Change in Risk	367.9	256.4	397.9
Total Miles - All Routes	**505.7**	**506.1**	**506.2**

Action Alternative
These alternatives designate varying levels of system routes, without any additional actions to reduce risks to water resources, but all are substantially less than the No Action Alternative. Alternative B does not designate more non-system miles than Alternative A, thereby further reducing risks from these routes.

Cumulatively, Alternative B decreases risk on more route miles than either Alternative A or the No Action Alternative.

No Action Alternative
This alternative designates the most system routes, without any additional actions to reduce risks to water resources. However, it also does not designate the most non-system routes. Not designating these routes reduces risk over the long-term as the routes disappear from the landscape, either naturally or through active rehabilitation.

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 Affected Environment – Water Quality section.

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. Management decisions based on modeling results with this degree of error are not appropriate.

At the 6 HUC watershed scale, the proposed actions are not likely to be substantial enough to cause detectable changes in water quality, quantity or channel processes under any alternative. Although the effect of an individual action on a specific route could be detectable in the nearest watercourse immediately downslope, it is unlikely to be detectable at the mouth of watersheds ranging from 10,000 to 40,000 acres. Additionally, the effects of all actions are indirect as previously discussed. They will occur at different times in different locations at different magnitudes across these large watersheds. The effects are therefore diluted; temporally and spatially.

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. Transportation systems could compound the effects of post-fire flood events, especially where routes are not maintained to standard. It is reasonable to assume that current road conditions and maintenance needs will continue into the future.

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, and floodplain developments are likely to continue to cause chronic effects to water resources as discussed previously.

3.3.1.4 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 EIS, 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 D - 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 D - 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.

3.3.1.5 Affected Environment – Fisheries and Aquatics

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 (MTDEQ) has classified all waters within the Montana portion of the analysis area as C-3 waters. The beneficial uses associated with this classification include; bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers.

Beneficial use classification for all streams in the South Dakota portion of the analysis area includes fish and wildlife propagation, recreation, and stock watering waters (category 9, South Dakota Administrative Rules (SDAR), Surface Water Quality Standards, 74:51:03:01 (SDAR 2008)). The most applicable surface water quality standards for streams in South Dakota pertaining to aquatic species and their habitat include: "*Biological integrity of waters.* All waters of the state must be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, in concentrations or combinations which will adversely impact the structure and function of indigenous or intentionally introduced aquatic communities" (SDAR 74:51:01:12).

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. Three sensitive amphibian species are present in the project area. These include the Great Plains Toad *Bufo cognatus*, Northern Leopard Frog *Rana pipiens*, and Plains Spadefoot *Spea bombifron*. Sensitive fish species considered in this analysis include the Northern Redbelly Dace *Phoxinus eos* and Sturgeon Chub *Macrhybopsis gelida*. Although the project area is within the historic distribution of these sensitive fish species, there has been no documented occurrence of either fish species in the project area.

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.

Fish and Amphibian Distribution

The Sioux District Travel Management Plan project area spans across 53 individual watersheds (6th level hydrologic unit code). Custer National Forest system lands comprise about one-tenth (11.4 %) of the total acreage of the 53 watersheds (177,250 acres of 1,030,788 acres total). The project area encompasses headwater tributaries, springs, and impoundments that support diverse populations of endemic fish and amphibian species.

There are no sensitive fish species documented in the project area. However, waters on the Sioux Ranger District are within the historic distribution of the Northern Red Belly Dace and the Sturgeon

Chub. These species are listed as *Sensitive* by Region 1 of Forest Service, although neither species has been observed or documented on the District.

Other fish species considered in this analysis include: 1) native nonsensitive species, including the Black Bullhead *Ameiurus melas*, Brook Stickleback *Cualea inconstans*, Fathead Minnow *Pimephales promelas*, and Lake Chub *Couesius plumbeus* and, 2) exotic recreational species, including Black Crappie *Pomoxis nigromaculatus*, Green Sunfish *Lepomis cyanellus*, Large Mouth Bass *Micropterus salmoides*, Rainbow Trout *Oncorhynchus mykiss*, and Yellow Perch *Perca flavescens*..

Sensitive amphibian species present in the project area include the Great Plains Toad, Northern Leopard Frog, and Plains Spadefoot. Common nonsensitive amphibian species found throughout the project area include the Boreal Chorus Frog *Pseudacris maculata*, Tiger Salamander *Ambystoma tigrinum*, and Woodhouse's Toad *Bufo woodhousii*.

Great Plains Toad (Bufo cognatus)

The Great Plains toad is recognized as a distinct species that ranges across the Great Plains from central Mexico to southeastern Alberta (Maxell 2000). In Montana, Great Plains Toads are found across the eastern plains, especially on the plateaus between and flanking the Yellowstone and Missouri Rivers, and have been documented east of Shelby, Great Falls, Lewiston, and Billings Montana (Maxell 2000; Werner et al. 2004). The Great Plains Toad is widespread throughout South Dakota, occurring in almost every county (Fischer et al. 1999).

The Great Plains Toad is found in headwater drainages and onto prairies, where they are seen around glacial potholes, stock reservoirs, irrigation ditches, and smaller coulees (Werner et al. 2004). The Great Plains toad is a rapid burrower when active and occupies shallow burrows during the day (Fischer et al. 1999, MFWP 2008). This species enters water only to breed, and emergence and breeding periods are triggered by early summer thunderstorms after which the toads immediately move to breeding areas (Fischer et al. 1999, MFWP 2008). Breeding takes place anytime between mid-May and mid-July (Fischer et al. 1999). Females lay up to 45,000 eggs and communal egg laying is common; eggs hatch in two to three days and tadpoles metamorphose in three to six weeks (Werner et al. 2004). Sexual maturity is achieved at two to three years of age (Werner et al. 2004).

Great Plains toads have only been documented at about 30 localities across the plains east of the Rocky Mountains and their status across this region is largely unknown (Maxell 2000). Risk factors relevant to the viability of populations of this species are likely to include grazing, use of pesticides and herbicides, nonindigenous species, road and trail development, on- and off-road vehicle use, development of water impoundments, habitat loss/fragmentation, and metapopulation impacts (Maxell 2000). Although historic records document Great Plains Toads on land units of the Sioux Ranger District (Long Pines and Ekalaka Hills), there have been no recorded observations on the District since 1914 (Reichel 1995).

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 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 Sioux District of the Custer National Forest, in both Montana and South Dakota, they are considered a ***Sensitive Species*** due to population declines in the western portion of their historic range.

Plains Spadefoot (Spea bombifrons)

The Plains Spadefoot is documented only sparsely in central and eastern Montana, including sightings in the mountain valleys of the upper Missouri watershed at elevations up to 5,000 ft (Maxell 2000, Werner et al. 2004). They can be found in southeastern South Dakota and are also sporadically distributed throughout the western portion of the state (Fischer et al. 1999).

Spadefoots are a prairie species, associated with areas of sandy soil or gravel-loam (Werner et al. 2004). Their lifestyle associates them with large temporary wetlands easily flooded after heavy rains (Fischer et al. 1999). When conditions are such that adults retreat underground, the spades on the hind feet are used to dig backwards into the soil until pockets of moist soil are encountered, sometimes at depths of almost a meter (MFWP 2008). Plains Spadefoots are seldom encountered outside the breeding season since they spend most daylight hours underground (Werner 2004). The Plains Spadefoot reaches sexually maturity at one to two years of age and breeding generally takes place from May to August following heavy rainfall at temperatures above 54°F (Fischer 1999, Werner et al. 2004). Females lay close to one thousand eggs, tadpoles develop in two to six days, and metamorphosis occurs from three to six weeks (Werner at al. 2004).

In the past 125 years, this species has been documented at about 40 localities across the plains and in the mountain valleys east of the Continental Divide and their status across this region is almost completely unknown (Maxell 2000). Risk factors relevant to the viability of populations of the Plains Spadefoot are likely to include grazing, road and trail development, on- and off-road vehicle use, use of pesticides and herbicides, development of water impoundments, habitat loss/fragmentation, and metapopulation impacts (Maxell 2000). Only two current records exist for the Plains Spadefoot on the Sioux Ranger District, one in the Ekalaka Hills and on in the Long Pines land unit.

Watershed Condition and Stream Habitat Characteristics

For the purpose of this analysis generalizations of watershed condition, and potential impacts to aquatic habitat and biota relative to travel routes, were inferred from: 1) perennial stream crossings by FS routes, 3) total perennial stream miles, 3) intermittent stream crossings by FS routes, and 4) TMDL listed streams. 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 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).

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. For example, Dale and Weaver (1974) found horse 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.

Influences of Transportation Systems on Aquatic Habitat and Biota

Potential effects of travel routes and various modes of travel on aquatic habitat and species 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.

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 and amphibian habitats (Everest et al. 1987, Hicks et al. 1991, Waters 1995, McIntosh et al. 2000, Werner et al. 2004). To evaluate the effects travel routes and modes of travel have on sediment and aquatic habitats, 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).

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 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 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 fish and amphibians (Rosgen 1996, Hogan and Ward 1997, Werner 2004).

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 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 aquatic species (Furniss et al. 1991). 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. Aquatic organisms upstream of the barrier are then geographically and hence, reproductively isolated from the downstream population. Habitat fragmentation can reduce viability of fish populations by a variety of stochastic, deterministic and genetic mechanisms (e.g., Rieman et al. 1993). Based on field reviews and recent culvert replacement information, no existing, perennial stream/route crossings on the District are known to hinder aquatic organism passage.

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 lakes and reservoirs 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. 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.

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 those impacts. 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 perennial stream crossings by FS routes, total perennial stream miles, intermittent stream crossings by FS routes, and TMDL listed streams. Values obtained from the 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, aquatic systems, or species, rather a hierarchical approach to prioritizing impact potential by category: Low, Moderate, and High Risk. A summary of selected natural characteristics, human activities, and aquatic species presence are provided in Table 3-24 by 6 HUC (hydrologic unit code) watersheds. Quantifiable Forest Service activities include past timber harvest, fire (prescribed fire and wildfire), and existing transportation system attributes. Potential effects to fish and amphibians and their habitats related to proposed actions are evaluated under indirect effects by action alternative.

Table 3-24. Summary of Watershed Characteristics, Watershed Scale Influences, Fisheries Resources, and Sensitive Amphibians on the Sioux Ranger District.

Watershed #	Watershed Name	Watershed Acres	Percent Watershed Forest Service	FS Perennial Stream Miles	Harvest Acres	Fire Acres	FS Road Miles	Total Stream Crossings	FS Intermittent Crossings	FS Perennial Crossings	Watershed (Road) Risk	Fisheries Resource *	Sensitive Amphibians **
101102010704	Upper Tie Creek	23,220	35	3	2,099	6,854	24	82	18	7	HIGH	ER, NNS	NLF
101102010705	Lower Tie Creek	22,935	11	1	350	3,369	7	51	8	5	HIGH	--	--
101102020505	Speelmon Creek	17,718	63	6	2,350	10,355	36	99	44	4	HIGH	--	NLF
101303010104	Upper Crooked Creek	18,046	16	<1	0	2	10	35	3	3	HIGH	--	--
101102010802	Plum Creek	12,819	70	1	1,943	10,685	33	43	24	2	HIGH	--	NLF, PSF
101303020405	Bull Creek- Campbell Creek	13,471	48	2	0	1464	15	26	7	1	HIGH	ER, NNS	NLF
101303020406	Dry Creek	10,396	42	2	0	60	14	28	7	1	HIGH	--	NLF
101102010803	Slick Creek	37,776	31	1	1,709	12,052	34	109	45	1	HIGH	--	--
101102010801	Little Missouri River-K Bar Creek[1]	43,315	4	0	12	2,284	6	84	8	0	HIGH	--	NLF
101102011004	Russell Creek	16,090	41	0	5,215	2,425	30	107	44	0	HIGH	--	NLF, PSF
101102010706	Little Missouri River-Waterhole Creek[1]	41,162	9	0	9	4,402	15	76	7	0	HIGH	--	NLF
101102010701	Little Missouri River-Sand Creek[1]	24,861	4	0	0	61	2	37	0	0	MOD	--	--
101303050406	Gap Creek	24,693	11	4	5	1	9	43	1	0	MOD	--	--
101303010105	Middle Crooked Creek	14,933	15	0	0	0	7	22	5	0	MOD	--	NLF
101102011005	Little Beaver Creek-Terrell Creek	35,999	8	0	698	2	12	125	11	0	MOD	--	--
101303020408	Bull Creek- Hay Creek	12,219	8	0	0	2	3	17	1	0	MOD	--	--
101303020403	Bull Creek- Cottonwood Creek	13,150	4	0	0	69	2	38	1	0	MOD	--	--
101303010106	Petes Creek	13,302	12	0	0	0	5	20	1	0	MOD	--	--
101102020510	Boxelder Creek-Wood Gulch	21,619	7	0	0	19	8	39	4	0	MOD	--	--
101102020506	Boxelder Creek-Little Ramme	32,305	12	0	30	4,622	9	63	5	0	MOD	--	--

Table 3-24. Summary of Watershed Characteristics, Watershed Scale Influences, Fisheries Resources, and Sensitive Amphibians on the Sioux Ranger District.

Watershed #	Watershed Name	Watershed Acres	Percent Watershed Forest Service	FS Perennial Stream Miles	Harvest Acres	Fire Acres	FS Road Miles	Total Stream Crossings	FS Intermittent Crossings	FS Perennial Crossings	Watershed (Road) Risk	Fisheries Resource*	Sensitive Amphibians**
	Creek												
101303020504	South Fork Grand River-Prairie Dog Creek	17,776	12	3	0	0	3	6	0	0	MOD	--	--
101102011006	HS Creek	14,229	18	0	752	107	10	60	7	0	MOD	--	--
101102011003	Little Beaver Creek-Dugan Draw	23,310	7	0	1,602	6	10	82	18	0	MOD	--	NLF
101102020508	Boxelder Creek-Devils Canyon	15,205	24	0	0	3,387	9	30	7	0	MOD	--	--
101102011002	Headwaters Little Beaver Creek	22,987	20	0	1,165	51	10	80	16	0	MOD	--	NLF
101303020304	Middle Jones Creek	13,720	19	0	0	924	7	23	1	0	MOD	--	NLF
101303020505	Fisher Creek	13,257	26	3	0	0	4	16	0	0	MOD	--	--
101303020501	South Fork Grand River- Sand Creek	11,013	13	0	0	0	3	4	0	0	LOW	--	--
101102020504	Boxelder Creek-Belltower	30,302	2	0	0	225	0	88	0	0	LOW	--	--
101303050109	Little Cowboy Creek- North Fork Moreau River	14,958	2	0	0	0	0	10	0	0	LOW	--	--
101303020305	Lower Jones Creek	17,148	3	0	0	0	0	25	0	0	LOW	--	--
101303050101	Chalk Butte Draw- North Fork Moreau River	17,844	2	0	0	0	0	57	0	0	LOW	--	--
101303050106	Red Butte Creek	12,328	13	0	0	0	1	7	0	0	LOW	--	--
101303020206	Sioux Creek	18,077	35	0	0	2	12	21	2	0	LOW	--	--
101102020509	Snow Creek	12,658	89	0	494	10,227	38	87	56	0	LOW	ER	--
101303040104	Ash Coulee	21,058	11	0	0	402	9	27	1	0	LOW	--	--
101303040401	North Sand Creek- Sand Creek	20,166	17	0	0	117	6	42	9	0	LOW	--	--
101102020403	Buffalo Creek	29,301	5	0	0	0	6	95	5	0	LOW	--	--
101303020205	Lower Unnamed Tributary to Clarks Fork Creek	18,336	12	0	0	0	1	11	0	0	LOW	--	--

Table 3-24. Summary of Watershed Characteristics, Watershed Scale Influences, Fisheries Resources, and Sensitive Amphibians on the Sioux Ranger District.

Watershed #	Watershed Name	Watershed Acres	Percent Watershed Forest Service	FS Perennial Stream Miles	Harvest Acres	Fire Acres	FS Road Miles	Total Stream Crossings	FS Intermittent Crossings	FS Perennial Crossings	Watershed (Road) Risk	Fisheries Resource*	Sensitive Amphibians**
101303050202	Spring Creek	19,909	13	0	0	20	4	24	1	0	LOW	--	--
101102020507	Harmon Creek	14,636	14	0	243	0	7	39	10	0	LOW	ER	NLF
101303020407	Jack Creek	11,479	3	0	0	20	0	15	0	0	LOW	--	--
101102020503	Big Ramme Creek	17,740	6	0	200	17	4	51	8	0	LOW	--	--
101303050401	Jones Creek- Rabbit Creek	17,037	65	0	0	464	27	32	8	0	LOW	ER, NNS	NLF
101303050601	Headwaters of Antelope Creek	19,957	33	0	0	1	19	23	7	0	LOW	--	--
100902090601	Upper Spring Creek	23,702	19	0	0	342	12	75	11	0	LOW	--	--
101102020602	Spring Creek	23,745	13	0	0	1,557	6	61	2	0	LOW	--	--
101303020601	Headwaters of Big Nasty Creek	13,438	7	0	0	170	4	39	1	0	LOW	--	--
101303050403	Point Creek	17,553	13	0	0	5	3	25	0	0	LOW	--	--
101303020204	East Branch Unnamed Tributary to Clarks Fork Creek	16,621	8	0	0	539	1	21	0	0	LOW	--	--
101102020401	Fresh Water Draw	14,827	5	0	0	10	1	37	0	0	LOW	--	--
101303050207	Sheep Creek	16,289	10	0	0	0	1	6	0	0	LOW	--	--
101303050205	Ash Creek	10,150	10	0	0	1	0	10	0	0	LOW	--	--
SUM		1,030,788	NA	27	18,876	7,7322	500	2,373	414	24	H-11 M-16 L-26	NA	NA

[1] TMDL listed stream or tributary to.

*Fisheries Resources: ER - Exotic Recreational Species, NNS - Native Nonsensitive Species.

** Sensitive Amphibians Species: NLF – Northern Leopard Frog, PSF- Plains Spadefoot, GPT – Great Plains Toad.

3.3.1.6 Environmental Consequences – Fisheries and Aquatic

Effects Common to All Action Alternatives – Fisheries and Aquatics

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
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, individuals, or populations as a result of changes in the aquatic environment. Detrimental effects to aquatic species could result from increased sediment levels entering stream channels, wetlands, springs or impoundments, changes in streambank stability due to near-bank activities, and modification in water temperature regimes induced by a reduction in riparian vegetation.

Routes with proposed actions are evaluated for indirect effects to fisheries and amphibians. A summary of route related actions and the potential for these actions to reduce or not reduce the risk of impacting water quality 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 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 well maintained trails, 3) converting system roads to trails with a seasonal restriction, 4) not designating non-system routes, and 4) restricting the season of use for roads or trails.

Effects by Alternative – Fisheries and Aquatics

Indirect effects to fisheries resources and sensitive amphibians, for moderate and high risk watersheds are displayed in Table 3-25. Low risk watersheds are not evaluated for indirect effects to aquatic resources because they either do not contain perennial streams, or roads on National Forest System land, or both.

Alternative A - Indirect Effects
Alternative A proposes actions that result in a net decrease in risk to aquatic resources in 8 of the 12 moderate and high risk watersheds that harbor fisheries or sensitive amphibians on the District (Table 3-25). Four fisheries or sensitive amphibian species watersheds have a net increase and one of these is a high risk watershed, Russell Creek, with two sensitive amphibian species (Northern Leopard Frog and Plains Spadefoot; Table 3-24). The main reason for the net increase in risk is due to the addition of non-system roads to the transportation system.

Alternative B - Indirect Effects

Alternative B proposes actions that result in a net decrease in risk to aquatic resources in all 12 moderate and high risk watersheds with fish resources or sensitive amphibians on the District (Table 3-25).

Table 3-25. Summary of Route Miles by Risk for Moderate and High Risk Watersheds and for Fisheries Resource and Sensitive Amphibian Watersheds on the Sioux Ranger District

Watershed Name	Alternative A		Alternative B	
	Increase Risk	Decrease Risk	Increase Risk	Decrease Risk
Boxelder Creek-Devils Canyon	0.3	8.9	0	8.9
Boxelder Creek-Little Ramme Creek	0.0	8.5	0.0	5.3
Boxelder Creek-Wood Gulch	0.4	5.9	0	3.9
Bull Creek- Campbell Creek[A,F]	2.3	3.3	1.1	6.1
Bull Creek- Cottonwood Creek	1.5	0.1	1.5	0.1
Bull Creek- Hay Creek	0.5	1.0	0.5	1.0
Dry Creek[A]	3.2	8.0	2.7	8.0
Fisher Creek	1.6	1.6	1.6	1.6
Gap Creek	4.0	1.4	3.4	1.5
Headwaters Little Beaver Creek[A]	1.8	0	1.8	4.1
HS Creek	2.6	4.9	2.4	4.5
Little Beaver Creek-Dugan Draw[A]	0.7	0	0	3.1
Little Beaver Creek-Terrell Creek	1.1	5.9	1.0	7.4
Little Missouri River-K Bar Creek[A]	0.0	6.2	0.0	6.2
Little Missouri River-Waterhole Creek[A]	1.9	5.5	0.2	3.9
Lower Tie Creek	0	5.9	0	4.3
Middle Crooked Creek[A]	1.4	1.1	0.6	1.3
Middle Jones Creek[A]	0.4	4.0	0.2	4.0
Petes Creek	1.1	1.9	1.1	1.9
Plum Creek[A]	3.0	19.1	2.7	19.1
Russell Creek[A]	11.1	3.1	3.4	9.1
Slick Creek	9.1	18.4	4.3	14.6
Snow Creek	2.8	24.4	0.6	18.0
South Fork Grand River- Prairie Dog Creek	0.5	1.6	0.5	2.1
Speelmon Creek[A]	4.3	23.6	2.1	18.1
Upper Crooked Creek	3.6	3.5	1.9	3.5
Upper Tie Creek[A,F]	3.0	15.8	0.5	10.5
SUM	62.2	185.9	34.2	174.6
Fisheries Resource Watershed SUM	**5.3**	**19.1**	**1.6**	**16.6**
Sensitive Amphibian Watershed SUM	**33.1**	**89.7**	**15.3**	**93.5**

[A] Sensitive Amphibian Watershed
[F] Fisheries Resource Watershed

No Action Alternative

See discussion of No Action Alternative in the cumulative effects section below.

Cumulative Effects

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 53 watersheds (on and off CNF) of the project area, include: wildfire/prescribed fire, mining, grazing, timber harvest, transportation networks, and recreation (camping, fishing, hunting, etc.).

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 considered in this analysis include the Northern Redbelly Dace, Sturgeon Chub, Great Plains Toad, Northern Leopard Frog, and Plains Spadefoot. The table below summarizes the potential effects to aquatic species in the project area.

Table 3-26. Determination of potential impacts to sensitive fish and amphibian species and recreational fisheries resources

Aquatic Species Determination[16]			
Alternative	**Alternative A**	**Alternative B**	**No Action Alternative**
Northern Redbelly Dace *Phoxinus eos*	NI	NI	NI
Sturgeon Chub *Macrhybopsis gelida*	NI	NI	NI
Great Plains Toad *Bufo cognatus*	NI	NI	NI
Northern Leopard Frog *Rana pipiens*	MIIH	BI	MIIH
Plains Spadefoot *Spea bombifron*	MIIH	BI	MIIH
Recreational Fish Species	MIIH	BI	MIIH

Cumulative Effects - Effects of All Routes Including Those Without Proposed Actions

All alternatives, including the No Action Alternative, include routes without proposed actions. Therefore, actions to reduce the risk of impacting aquatic species and habitats will not occur on designated system routes, and any existing impacts and risks in the 15 aquatic resource occupied watersheds (Table 3-24) are expected to continue into the foreseeable future until road or trail

[16] **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.

maintenance occurs. Not designating non-system routes would potentially remove these routes from the landscape through time, and consequently would reduce risks to aquatic resources.

Action Alternatives

The cumulative effects of the individual action alternatives (A and B) when combined with past activities and natural processes, would result in minimal negative impacts to aquatic biota, including sensitive aquatic species, and their habitats throughout the project area. However, Alternative B decreases risk to aquatic resources on more route miles than Alternative A (net decrease of 78.2 miles versus 56.6 miles; Table 3-25), and both action alternatives decrease risk substantially more than the No Action Alternative.

No Action Alternative

Twelve of 27 moderate and high risk watersheds and 3 of the 26 low risk watersheds on the Sioux District harbor fisheries and/or sensitive amphibian resources (Table 3-24). The No Action Alternative designates the most system routes without any additional actions to reduce risk to aquatic resources (397.9 miles; Table 3-23 Water Quality Section). Sedimentation produced from routes in these watersheds would likely impact aquatic habitat and localized fish and amphibian populations across the District.

Effects Common to All Alternatives at the Watersheds Scale

The cumulative effects of the individual alternatives 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.

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 aquatic habitats and species. Alternative B includes the most route mile actions that would result in beneficial impacts (reduce risk) to aquatic systems.

3.3.1.7 Conclusion - Fisheries and Aquatics

Proposed actions with site specific effects that potentially increase risk of adverse impacts to aquatic habitat and species are negligible under Alternative B. Compliance relative to the Record of Decision for this DEIS, only pertains to those routes with proposed actions. Under Alternative B, 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 Alternative A. Therefore, the Sioux District is anticipated to move towards compliance with Forest Plan standards and state and federal water quality regulations under either action alternative. However, Alternative B initiates the most rapid rate of recovery and compliance should be achieved in the shortest timeframe under this alternative.

Appendix D 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 3-27. Fisheries and Aquatics Effects Summary

Indicator	Alt. A	Alt. B	No Action
Sensitive Fish and Amphibian Species			
Number of Species with No Impact or Beneficial Impacts	3	5	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	2	0	2
Number of Species likely to result in a trend to Federal listing or loss of viability	0	0	0
Recreational Fish Species			
Alternatives with No Impact or Beneficial Impact	No	Yes	No
Alternatives with potential to effect individuals or Habitat but will not Likely Contribute to a Loss of Viability to the Population or Species	Yes	No	Yes

3.3.2 SOILS

Adding routes to the system and designating motorized uses on roads and trails could increase soil compaction and soil erosion leading to a decrease in soil productivity, and soil quality.

3.3.2.1 Affected Environment – Soils

The project area is located in southeast Montana and northwest South Dakota on the Sioux Ranger District. The Sioux Ranger District falls in the Northwestern Great Plains Section of the Great Plains-Palouse Dry Steppe province. The area includes gently sloping to rolling, moderately dissected shale plains. There are some steep, flat topped buttes, badland like topography, and eroded escarpments. The Soil Survey of Carter County, Montana (USDA NRCS, 2003) and The Soil Survey of Harding County, South Dakota (USDA SCS, 1988) were used to determine erosion hazards ratings, suitability of the landscape for natural surfaced roads, and describe landforms. Soil survey information can be downloaded from the soil data mart on the world wide web at http://soildatamart.nrcs.usda.gov/. (Montana soil survey information is also available at (http://nris.state.mt.us/nrcs/soils/datapage.html or http://www.mt.nrcs.usda.gov/soils/mtsoils/official.html). Soil survey information reports can also be accessed directly from the web using Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

Erosion risk ratings are provided from the county soil survey data. 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. Slight hazard implies little to no potential for erosion; moderate hazard indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion control measures are needed; and a severe hazard implies that considerable erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion control measures are needed. Of the current Forest Service routes approximately 1% are classified in the slight hazard rating, 40% in moderate, 59% in severe, and a trace amount are not rated.

The ratings for the suitability for natural surface roads interpretation indicate the suitability for using the natural surface of the soil for roads. The ratings are based on slope, rock fragments on the surface, plasticity index, content of sand,, the Unified classification of the soil, depth to a water table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to this use. Well suited indicates the soil has features that are favorable for the specified kind of roads and has no limitations. Good performance can be expected, and little or no maintenance is needed. Moderately suited indicates the soil has features that are moderately favorable for the specified kind of roads. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. Poorly suited indicate the soil has one or more properties that are unfavorable for the specified kind of roads. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. Not rated is used for those map units that do not have soil components that can be rated for the particular use. For example, rock outcrop would be not rated. Of the current Forest Service routes approximately <1% are classified as well-suited for using the natural surface of the soil for roads, 44% are moderately suited, 56% are poorly suited, and a trace amount are not rated.

Soil Map units may contain one or more ratings based on soil components of the map unit. Since the locations of the different components are not mapped, the map unit ratings depict the most severe rating for the soils within the map unit. For example, if one soil component has a moderate rating while another soil component in the same map unit has a slight rating, the map unit was given a moderate rating. In some map units the most severe or limiting rating may comprise the lowest percentage of the map unit, for example in Carter County, on the Sioux District, the Busby-Blacksheep-Twilight fine sandy loams, 8 to 25 percent slopes, map unit 170D, is rated as having severe erosion hazard and is poorly suited to native surface roads, but only 15% of the map unit actually has that rating, while 70% of the unit has a more favorable rating. These ratings do not mean that management (i.e. roads and trails) should not occur or exist on soils with a specific rating but rather what types of mitigation and management are needed to minimize the impact, and are used as a comparison in the analysis of effects.

The interpretations for the suitability for natural surface roads and trails are very similar to the erosion hazard rating. Information for both are displayed in the tables but discussion will focus on the erosion hazard, as that has the most direct effect on soil productivity.

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 vegetation production or water resources. Therefore, the R1 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 project's 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

Some impacts to soils and soil productivity 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 is they are improperly located, do not have adequate drainage to prevent accelerated erosion and deposition, and are difficult to maintain for long term use. 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.

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 Surveys of the project 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 Ashland and Sioux Ranger Districts.

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 drier 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 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.

3.3.2.2 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.

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.

An indirect effect from the action alternatives would take place as roads and trails identified as system routes (including conversion from non-system routes) are reconstructed, relocated, or maintained to meet standards and incorporate BMPs, which would reduce soil effects from these roads and trails.

Comparisons of erosion hazard and natural surface road suitability ratings by alternative are found in the following.

Table 3-28. Miles[17] of Roads and Trails by Erosion Hazard Rating by Designation for the Three Alternatives for the Sioux Ranger District

Road Erosion Hazard Rating	Designation	Alternative A	Alternative B	No Action Alternative
		Miles of roads and trails		
Slight	Administrative Use	0.54	1.72	0.13
	Not Designated	0.06	0.36	1.12
	Public Motorized Use	5.92	4.43	5.27

[17] Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

Table 3-28. Miles[17] of Roads and Trails by Erosion Hazard Rating by Designation for the Three Alternatives for the Sioux Ranger District

Road Erosion Hazard Rating	Designation	Alternative A	Alternative B	No Action Alternative
		Miles of roads and trails		
Moderate	Administrative Use	14.09	55.49	0.53
	Not Designated	3.22	24.67	43.23
	Public Motorized Use	176.41	113.56	149.95
Severe	Administrative Use	20.95	83.38	1.72
	Not Designated	8.58	43.43	67.63
	Public Motorized Use	262.82	165.54	222.99
Not rated	Administrative Use		0.64	
	Not Designated		0.46	0.58
	Public Motorized Use	1.35	0.26	0.77

Table 3-29. Miles[18] of Roads and Trails by Suitability for Natural Surface Roads and Trails Rating by Designation for the Three Alternatives for the Sioux Ranger District

Native Surface Road Suitability Rating	Designation	Alternatives		
		A	B	No Action
		Miles of Roads and Trails		
Well suited	Administrative Use	0.42	1.09	
	Not Designated	0.09	0.45	0.60
	Public Motorized Use	2.08	1.05	1.99
Moderately suited	Administrative Use	16.51	62.85	0.66
	Not Designated	4.54	28.74	54.62
	Public Motorized Use	197.12	126.58	162.88
Poorly suited	Administrative Use	18.64	76.65	1.72
	Not Designated	7.23	39.28	56.76
	Public Motorized Use	245.95	155.89	213.34
Not rated	Administrative Use		0.64	
	Not Designated		0.46	0.58
	Public Motorized Use	1.35	0.26	0.77

Alternative A

Direct Effects

This alternative would have the greatest impact on soils for the action alternatives. This alternative would add approximately 19 miles of routes for administrative use and 40 miles of 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 the undetermined routes.

This alternative would prohibit motorized travel on 11 miles of routes (8.6 miles on landforms with high erosion hazard) (Table 3-28), allowing vegetation to reestablish. This would reduce erosion and concentrated runoff from these sites. These areas would eventually be returned to productive capability.

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[18] Small differences in mileage figures between this and other tables are due to GIS analysis and rounding errors.

This alternative would add 101 miles of undetermined roads and trails to the Forest transportation system. Of this, 59 miles (51 miles Public use and 8 miles Administrative use) would be on landscapes that have a severe erosion hazard rating

This alternative would provide the greatest miles of roads and trails to be available for public use, and would also provide the most miles of roads available for administrative use.

Indirect Effects
Off-site deposition of eroded material, soil erosion from roads and trails, and concentrated runoff would be reduced over time as more of the road and trail system is revegetated or is brought up to standard and BMPs are implemented.

Alternative B

Direct Effects
This alternative would add 82 miles of routes for administrative use and decrease by 58 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 the undetermined routes.

This alternative would prohibit motorized travel on 69 miles of routes (43 miles on landscapes with high erosion hazard) (Table 3-28), allowing vegetation to reestablish. This would reduce erosion and concentrated runoff from these sites.

There are approximately 65 miles of undetermined roads and trails being added to the transportation system. Of this, 40 miles (14 miles Public use and 26 miles Administrative use) would be on landscapes that have a severe erosion hazard rating.

This alternative would provide the fewest miles of roads and trails to be available for public use, and would also provide the most miles of roads available for administrative use.

Indirect Effects
Off-site deposition of eroded material, soil erosion from roads and trails, and concentrated runoff would be reduced over time as more of the road and trail system is revegetated or is brought up to standard and BMPs are implemented.

No Action Alternative

Direct Effects
This alternative only includes those routes that are currently in the transportation system. There are 379 miles of routes that would be available for public motorized use. There are approximately 113 miles of undetermined roads that would not be designated (motor vehicle use prohibited) and would be available for rehabilitation and return of natural vegetation and eventually be returned to the productive land base. Concentrated runoff and erosion would be reduced from these sites.

Existing low standard roads and trails would continue to erode and concentrate runoff and erosion at present rates. 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.

Indirect Effects
Off-site deposition of eroded material, soil erosion from roads and trails, and concentrated runoff would be reduced over time as more of the road and trail system is revegetated or is brought up to standard and BMPs are implemented.

Cumulative Effects
Cumulative effects occur when past present or foreseeable activities overlap in both time and space with the proposed activities. Thus, cumulative effects are limited to the areas where the proposed activities would occur. In other words, cumulative effects would occur only where proposed activities would occur 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 Sioux Ranger District Travel Management Project. Soil effects do not extend off of the piece of ground where they occur.

Cumulative effects consist of the impacts from all past, present, future and proposed activities that overlap in time and space with the proposed project.

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.

Effects of Ongoing and Reasonably Foreseeable Activities
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.

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.

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).

3.3.2.3 Conclusion - Soils

Adding routes to the National Forest System and designating roads and trails for public or administrative use will have an impact on soil productivity, though regional soil quality standards do not apply to this project. Roads and trails impact and disrupt the natural function of the soil resource, and are long-term commitments to that specific use. Routes not commonly used will revegetate and eventually return to productivity. Alternative A would provide the greatest number of miles of routes available for public use and the least number of miles of routes to return to productive capability over time. Alternative B would provide an intermediate number of miles compared to Alternatives A and No Action. Alternatives B 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.

3.3.3 VEGETATION

3.3.3.1 Introduction

Analysis of associated travel disturbances on vegetation, weed spread, and sensitive plants are addressed under the general heading of Vegetation.

3.3.3.2 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.

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 Sioux Ranger District is floristically rich and diverse. The diversity is composed of many community types including ponderosa pine (5), aspen (1), paper birch (1), green ash woodland (3), cottonwood (6), Rocky Mountain juniper (1), silver sage shrubland (1), big sage shrubland (4), skunkbush sumac shrubland (2), buffaloberry (1), western snowberry (1), horizontal juniper (1), grasslands (22), and herbaceous riparian (19).

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. Within the scope of this analysis, travel related impacts to vegetation include disturbances from camping and vehicle use. 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, 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 are 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 and grassland areas. Recovery in forested systems is typically moderate to high. In contrast, trampling impacts in less resilient environments, such as arid environments, require a long time to recover (Leung & Marion, 1996).

Effects Analysis Methodology-Vegetation

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 and duration of trampling, and vegetation resistance and resilience.

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 with an allowance for dispersed vehicle camping access, a 300 foot buffer was applied to all alternatives. For designated motorized routes without an allowance for dispersed vehicle camping access in the North Cave Hills, a 50 foot buffer was applied to AlternativeB to account for potential vehicles turn arounds. 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, shade, and other areas on gentle terrain suitable for camping (usually 0 to 4% slopes).

Zero to 4% slopes were 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 was 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 post-large wildfires) are addressed within the following two risk groupings based on degree of vulnerability to resist impacts (resistance) and ability to recover (resiliency). The two groups are intersected with the frequent and infrequent use areas outlined above.

Because grasslands, shrub/grass, and open woodland vegetation types tend to have higher resistance (lower vulnerability to trampling) and resilience (higher resiliency to recover) elements, these cover types are used to represent areas of low risk for impacts.

Because forested vegetation types (greater that 65% canopy cover) tend to have lower resistance to impacts and moderate to high resiliency to recover, these cover types are used to represent areas of moderate risk for impacts.

High risk category (alpine / subalpine and desert / semi-desert) is not considered in this analysis since these areas do not occur in the analysis area.

Measurable Attributes
Based on the above discussion, the magnitude of area potentially impacted is stratified by risk of impacts in low and moderate risk categories. Where vehicle access for dispersed camping is allowed, potential use within each Alternative's corridor 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 two 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. The measurement is in acres and percent of potentially impacted acres compared to total project area acres. It is recognized that not all estimated acreage will be affected and therefore results will be on the conservative side.

3.3.3.3 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.

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.

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 wet periods 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 or mud holes are sometimes made by vehicles, and parallel motorized routes can become widely spaced.

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.

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 and duration of trampling, and vegetation resistance and resilience. It is recognized that not all estimated acreage will be affected and therefore results will be on the conservative side.

Table 3-30. Potential Vegetation Impacts by Risk Category - Sioux

Attributes	Alternative A	Alternative B	No Action
Moderate Risk Areas			
Acres Potential Frequent Use Areas [19] (% of Project Area)	128 (Trace)	90 (Trace)	98 (Trace)
Acres Potential Infrequent Use Areas [20] (% of Project Area)	2,191 (1%)	1,380 (1%)	1,634 (1%)
Miles in Moderate Risk Area	24	14	17
Low Risk Areas			
Acres Potential Frequent Use Areas [21] (% of Project Area)	3,839 (3%)	2,528 (2%)	3,315 (2%)
Acres Potential Infrequent Use Areas [22] (% of Project Area)	21,164 (13%)	14,586 (9%)	20,387 (12%)
Miles in Low Risk Area	412	253	352

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.

Implementation of any of the alternatives considered in this analysis would not be expected to contribute to significant cumulative effects associated with 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.

3.3.3.4 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 moderate risk categories based on various elements of frequency, duration, timing, and vegetation resistance and resilience are displayed in the Potential Vegetation Impacts by Risk Category table above. It is recognized that not all estimated acreage will be affected and therefore results are on the conservative side.

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[19] Frequent Use Areas with Moderate Risk: Areas of 0-4% slopes within 300’ of motorized routes in Ponderosa pine types with greater than 65% canopy cover.

[20] Infrequent Use Areas with Moderate Risk: Areas of greater than 4% slopes within 300’ of motorized routes in Ponderosa pine types with greater than 65% canopy cover.

[21] Frequent Use Areas with Low Risk: Areas of 0-4% slopes within 300’ of motorized routes in community types with less than 65% canopy cover.

[22] Infrequent Use Areas with Low Risk: Areas of greater than 4% slopes within 300’ of motorized routes in Ponderosa pine types with less than 65% canopy cover.

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 moderate and low risk areas could occur in about 2-3% of the project area. Potential impacts from *infrequent* use within the route's corridor in moderate and low risk areas could occur in about 10% and 14% of the project area, respectively.

Moderate risk category potential impact ranges from 1,470 (Alternative B) to 2,319 acres (Alternative A). This is about one percent of the project area. Low risk category potential impact ranges from 17,114 (Alternative B) to 25,003 acres (Alternative A). This is about 7 to 11% of the project area.

Table 3-31. Potential Vegetation Impacts by Risk Category - Sioux

Attributes	Alternative A Change from No Action	Alternative B Change from No Action
Moderate Risk Areas		
Acres Potential Frequent Use Areas	Increases by 30 Acres	Decreases by 8 Acres
Acres Potential Infrequent Use Areas	Increases by 557 Acres	Decreases by 254 Acres
Miles in Moderate Risk Area	Increases by 7 Miles	Decreases by 3 Miles
Low Risk Areas		
Acres Potential Frequent Use Areas	Increases by 524 Acres	Decreases by 748 Acres
Acres Potential Infrequent Use Areas	Increases by 777 Acres	Decreases by 5,724 Acres
Miles in Low Risk Area	Increases by 60 Miles	Decreases by 89 Miles

While impacts resulting from camping and vehicles 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.

3.3.3.5 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. In this document, the terms "weeds", "noxious weeds' and "invasive plants" are used synonymously. Invasive weeds are defined 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 routes contributes to the spread of weeds. Weeds 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 District follows many strategies to reduce populations of 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 stock has been implemented; weed-free gravel in road construction projects is required, and competitive seeding of disturbed sites is done with native vegetation. 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.

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." Additionally, the Forest Service Manual 2080 (1. b. (5)) requires a weed risk assessment be conducted for all projects that could spread weeds. 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.

Overview - 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.

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 Sioux 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, seven are considered noxious weeds on the District. Currently there are approximately 494 recorded acres infested with noxious weeds in the District boundary. Sites are generally small and widely scattered with many populations occurring along main National Forest System roads. Canopy density averages between 5-35 percent. Canada thistle, spotted knapweed, leafy spurge, and some houndstongue are the predominant noxious weed species on the District.

Human Influence

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).

Trend

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. An increase in inventoried infestations has occurred over the past 20 years due, in large part, to large scale wildfires and better inventory. 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 motorized routes are high in priority for treatment. The Custer National Forest could experience further invasion in the very near future, especially in light of some of the large scale wildfires that have occurred and will likely continue to occur.

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. Chemical weed control has historically been the primary tool for noxious weed control in the analysis area.

Effects Analysis Methodology

The degree of risk from some of the most threatening species can be evaluated when completing project weed risk assessments. The probability of exposure of each site to plant propagules affecting dispersal, the susceptibility of an area to species' establishment, and the level of threat to susceptible areas 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. 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).

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 weed species. 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). This information was referenced in determining area susceptibility and threat levels.

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. Because most of the weed species that occur on the District are considered aggressive in most non-forested and sparsely forested settings, these vegetation types are considered to be susceptible to weed invasion. Approximately 90% of the District is naturally susceptible to weed invasion. These areas are usually open areas with limited or no shade from tree overstory.

A 400 foot buffer from each side of a motorized route was used for each alternative and helps assess indirect effects. 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. These specific Alternative buffers were intersected with areas rated as susceptible to weed infestation

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.

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[23] and non-motorized travel). An average of 70% of a road related infestations on the Forest occur within the first 100 feet of the buffer, about 82% occurs within the first 300 feet, and 95% occurs within the first 400 feet of motorized routes.

Existing weed infestions within 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. The effects analysis assumption used is that weed establishment in areas susceptible to weed infestation can spread within this 400 foot distance 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.

3.3.3.6 Environmental Consequences – Weeds

Direct and Indirect Effects-Weeds
The direct effect of motorized travel routes within susceptible areas for weed invasion is an increase in weed density and distribution from vehicle and camping activities. The following table is used to make Alternative comparisons. The corridor associated with the Alternative A has the most acres currently infested with weeds (209 acres), and Alternative B has the least (149 acres). The motorized routes going through infested areas range from 30-42%.

[23] Motorized routes designated for administrative use 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.

Table 3-32. Weed Infestations and Public Motorized Routes – Sioux

	Alternative A	Alternative B	No Action Alternative
Total Infested Acres within 400' Buffer	209	149	201
Percent of Infested within 494 Inventoried Net Acres of Weeds [24]	42%	30%	41%
Miles of Designated Routes bisecting Weed Infestations	16	11	15

The following table summarizes indirect effects. Indirect effects include the risk of vegetation becoming infested from vehicles carrying and dropping weed seeds into areas susceptible to weed growth. Once aggressive weeds are introduced into the susceptible area, it would continue to spread and displace native plants, even if the area is not disturbed.

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 90% of the buffered areas are susceptible to weed infestations. Alternative A has the greatest area at high-risk of weed invasion near motorized travel routes (34,572 acres), while Alternative B has the least (22,136 acres). The areas of high susceptibility are summarized in the following table:

Table 3-33. Susceptibility to Weed Infestation by Alternative - Sioux

Susceptible Area within Route Corridor [25]	Alternative A	Alternative B	No Action
Susceptible Acres	34,572	22,136	30,604
Area, within Route Corridor, Infested with Weeds (Acres)	1	1	1

Cumulative Effects-Weeds

All of the activities identified as past and present activities in the beginning portion of this chapter, have influenced the spread of weeds. Future activities have the potential to spread weeds.

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. Weeds will continue to be spread as a result of resource management and other human activities. The mitigation measures that are addressed in the Forest Service Manual 2080 are being implemented and will help to slow the spread of weeds.

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. Having motorized travel in these areas may carry the weeds to new locations. The best management practices outlined in Forest Service Manual 2080 will help to reduce the spread rate but may not prevent the spread altogether.

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[24] Most of the remaining acreage not occurring adjacent to motorized routes are a result of wildfire effects or animal vectors.

[25] 400 foot buffer from motorized route under all alternatives except for those portions of routes under Alternative B that do not allow dispersed vehcile camping. A 100 foot buffer was used on those routes. See Methodology section.

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 improper 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.

3.3.3.7 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 than Alternative B.

Table 3-34. Summary of Changes in Effects *Compared to the No Action Alternative* - Sioux

Change from the No Action Alternative	Alternative A	Alternative B
Exposure to Current Weed Infestations		
Change in motorized route corridor exposure to weed infestation acreage from No Action (% change from No Action)	Motorized route corridor exposure to weed infestations increased by 8 acres (4%)	Motorized route corridor exposure to weed infestations reduced by 52 Acres (26%)
Weed Susceptibility		
Change in acreage of Weed Susceptible areas, within motorized route corridor, from No Action (% change from No Action)	Weed Susceptible Area increased by 3968 (17%) Acres	Weed Susceptible Area reduced by 8468 Acres (28%)

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 policy.

3.3.3.8 Affected Environment – Sensitive Plants

Introduction

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.

Regulatory Framework

The *1987 Custer National Forest Land and Resource Management Plan* (Forest Plan) and *Forest Service Manual 2670.22 Sensitive Species* provides direction for sensitive plants. *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 the following table. Five species are known to occupy habitat and have documented occurrences in the District. One sensitive species is suspected to be present on the District.

Table 3-35. R-1 Sensitive Plant Species - Sioux

Common & Scientific Name	Type [26]	Global Rank [27]	State Rank [28]	Habitat	Sensitive in MT	Sensitive in SD	Closest known population	Flowering Period	Fruiting Period
BADLANDS / SPARSE TO DRY HILLSLOPES									
Dakota buckwheat (Known) *Eriogonum visheri*	2	G3	S3	Barren, often bentonitic badlands slopes and outwashes in the plains. Elev. 3,140-3,760		X	Slim Buttes - Irish Butte (S. of Mtn Ranch Sp. #1)	July - Sept	
Barr's milkvetch (Suspected) *Astragalus barrii*	2	G3	S3	Gullied knolls, buttes, and barren hilltops, often on calcareous soft shale and siltstone. Elev. 2,940 - 4,000	X	X	West of Ekalaka Hills	May-early June	May-June

[26] 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

[27] and [27] 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

Table 3-35. R-1 Sensitive Plant Species - Sioux

Common & Scientific Name	Type[26]	Global Rank[27]	State Rank[28]	Habitat	Sensitive in		Closest known population	Flowering Period	Fruiting Period
					MT	SD			
SANDY, GRAVELLY, CLAYEY PRAIRIES AND WOODLANDS									
Ovalleaf milkweed (Known) *Asclepias ovalifolia*	3	G5?	S1	Sandy, gravelly or clayey soils of prairies and woodlands Elev. 3,760-3,840	X		Long Pines below Icebox Spring	July – Aug	Aug -Oct
MESIC CONDITIONS									
Mountain bluebells (Known) *Mertensia ciliata*	3	G5	S1	Forested slopes-damp thickets in course to medium textured soils. Valley bottoms associated with springs, seeps, and spring fed water courses; occasionally found in non-wetlands. Intermediate shade tolerance. Very drought intolerant. Its Slim Butte population is located on the lower slope of a steep north facing slope. Elev. 5,500 plus		X	Known in Tepee Canyon of Slim Buttes; West Short Pines – 1912 Collection (land ownership unknown)	Late spring to summer	
Pregnant sedge (Known) *Carex gravida var. gravida*	3	G5	S1	Open woods, often in ravines with deciduous trees, on the plains. Elev. 3,880 - 4,000.	X		Chalk Buttes		July
Prairie gentian (Known) *Gentiana affinis*	3	G5	S2	Wet meadows, shores, springs, seepage areas and low prairie. Elev. 5,870-9,740.		X	Collected in 1910 from "Cave Hills" & described as abundant. Spring fed springs (most in hardwood draws) in the N. and S. Cave Hills were extensively surveyed in 1994. No plants were found.	Aug - Sept	

The following table outlines routes where potential impacts could occur.

Table 3-36. Motorized Routes Adjacent to Sensitive Plant Populations - Sioux

Route Name	Route ID#	Sensitive Plant
Lost Farm / Belltower	3819	Ovalleaf milkweed
Trenk Pass	3816	Heavy sedge

Effects Analysis Methodology-Sensitive Plants

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 (Heidel, et. al, 1995; Heidel, et. al., 1996; Heidel, et. al., 2001; Heidel, et. al., 2002; Heidel, 2004; Barton, et. al., 2003; Hansen, et. al., 1987; Mincemoyer. 2006; MNHP. 2008; NatureServe. 2007; Ode, 1987, Schmoller, 1993; Schmoller, 1995; USDA. 2001; USDA, 2008; USDI, 2005; Vanderhorst, et. al., 1998; SDNHP, 2008, and WYNDD, 2005).

The potential direct effects are direct mortality which may come from more frequent ground disturbing activities within or near sensitive plant populations, such as 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 (300 foot buffer for vehicle access to dispersed camping for each alternative).

Indirect effects may come from frequency and duration of camping use resulting in more difficult recovery due to soil compaction and vegetation composition change (including weeds) which may out-compete sensitive plants. A 400 foot buffer was applied to each 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.

3.3.3.9 Environmental Consequences – Sensitive Plants

Direct and Indirect Effects-Sensitive Plants

Actions proposed in all Alternatives have the potential to affect 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 accessing dispersed camping sites and dispersed camping.

Indirect effects may come from 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 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.

Vulnerability and Exposure

Two known species' populations are exposed (see table above) and moderately vulnerable to direct effects from travel management. All 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 exposure and vulnerabilities to direct and indirect effects are displayed in the following table.

Table 3-37. Sensitive Plant Exposure and Vulnerability - Sioux

Species	Direct Effects – Populations / Habitats Vulnerable to Direct Disturbance	Indirect Effects - Habitat Vulnerable to Weed Spread
Species with Known Populations		
Dakota buckwheat *Eriogonum visheri*	Low; known populations do not occur within 300 feet of designated routes under any alternative.	Moderate vulnerability - habitat can be vulnerable to weed spread, but Low exposure - populations not within 400 foot indirect effects corridor.
Ovalleaf milkweed *Asclepias ovalifolia*	Moderate; one route crosses through one known location – no known historic dispersed camping adjacent to the route.	Moderate vulnerability - habitat can be vulnerable to weed spread. Moderate exposure – habitat within 400 feet of designated routes under any alternative.
Mountain bluebells *Mertensia ciliata*	Low; known populations do not occur within 300 feet of designated routes under any alternative.	Moderate vulnerability - habitat can be vulnerable to weed spread, but Low exposure - populations not within 400 foot indirect effects corridor.
Pregnant sedge *Carex gravida var. gravida*	Moderate; one route crosses through one known location – no known historic dispersed camping adjacent to the route.	Moderate vulnerability - habitat can be vulnerable to weed spread. Moderate exposure – habitat within 400 feet of designated routes under any alternative.
Prairie gentian *Gentiana affinis*	Low; known populations do not occur within 300 feet of designated routes under any alternative.	Moderate vulnerability - habitat can be vulnerable to weed spread, but Low exposure - populations not within 400 foot indirect effects corridor.
Suspected Species		
Barr's milkvetch *Astragalus barrii*	Low; there are no known populations within the project area.	Moderate vulnerability - habitat can be vulnerable to weed spread, but Low exposure - populations not within 400 foot indirect effects corridor.

There are no direct or indirect effects to Barr's milkvetch, prairie gentian, mountain bluebells or Dakota buckwheat. There could be direct or indirect effects to individuals of the pregnant sedge and ovalleaf milkweed populations.

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 3-38. Effects Determination - Sioux

Species	Effects Components	Alternative A	Alternative B	No Action Alternative
Known Populations				
Dakota buckwheat *Eriogonum visheri*	Vulnerability - Direct	Low	Low	Low
	Exposure - Direct	Low	Low	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low
	Effects Determination	NI [29]	NI	NI
Ovalleaf milkweed *Asclepias ovalifolia*	Vulnerability - Direct	Moderate	Moderate	Moderate
	Exposure - Direct	Moderate	Moderate	Moderate
	Vulnerability - Indirect	Moderate	Moderate	Moderate
	Exposure - Indirect	Moderate	Moderate	Moderate
	Effects Determination	MIIH [30]	MIIH	MIIH
Mountain bluebells *Mertensia ciliata*	Vulnerability - Direct	Low	Low	Low
	Exposure - Direct	Low	Low	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low
	Effects Determination	NI	NI	NI
Prairie gentian *Gentiana affinis*	Vulnerability - Direct	Low	Low	Low
	Exposure - Direct	Low	Low	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low
	Effects Determination	NI	NI	NI
Pregnant sedge *Carex gravida var. gravida*	Vulnerability - Direct	Moderate	Moderate	Moderate
	Exposure - Direct	Moderate	Moderate	Moderate
	Vulnerability - Indirect	Moderate	Moderate	Moderate
	Exposure - Indirect	Moderate	Moderate	Moderate
	Effects Determination	MIIH	MIIH	MIIH
Suspected Species Habitat				
Barr's milkvetch (Suspected *Astragalus barrii*	Vulnerability - Direct	Low	Low	Low
	Exposure - Direct	Low	Low	Low
	Vulnerability - Indirect	Moderate	Moderate	Moderate
	Exposure - Indirect	Low	Low	Low
	Effects Determination	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, without

[29] NI = No Impact
[30] 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

mitigation, 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.

Roadside low density infestations of various noxious weeds are found adjacent to routes, but none are known to exist near known populations of sensitive plant species that occur within 400 feet of motorized route corridor under any alternative.

Travel along these routes by Forest users increases the potential that weed seed will be spread to other portions of the motorized route 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. 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 analysis 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.

3.3.3.10 Conclusion - Sensitive Plants

Under all alternatives, four of the six 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.

Table 3-39. Effects Determination Summary - Sioux

Species	Alternative A	Alternative B	No Action Alternative
Known Populations			
Dakota buckwheat *Eriogonum visheri*	No Impact [31]	No Impact	No Impact
Ovalleaf milkweed *Asclepias ovalifolia*	MIIH [32]	MIIH	MIIH
Mountain bluebells *Mertensia ciliata*	No Impact	No Impact	No Impact

[31] NI: No Impact
[32] 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 3-39. Effects Determination Summary - Sioux

Species	Alternative A	Alternative B	No Action Alternative
Prairie gentian *Gentiana affinis*	No Impact	No Impact	No Impact
Pregnant sedge *Carex gravida var. gravida*	MIIH	MIIH	MIIH
Suspected Species Habitat			
Barr's milkvetch *Astragalus barrii*	No Impact	No Impact	No Impact

Table 3-40. Summary of Number of Species by Effects Determination - Sioux

Effects Determination	Alternative A	Alternative B	No Action Alternative
Number of Species with No Impact	4	4	4
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	2	2	2

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.

- End of Chapter 3 -