CUSTER NATIONAL FOREST
BEARTOOTH RANGER DISTRICT
SIOUX RANGER DISTRICT
ASHLAND RANGER DISTRICT

FOREST SCALE ROADS ANALYSIS

VERSION 1.0
DECEMBER 2002

This forest scale roads analysis has been completed in accordance with FS-643.

/S/ *Nancy T. Curriden* *January 6, 2002*

NANCY T. CURRIDEN **Date**
Forest Supervisor

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 7

1.01 Background 7

1.02 Key Analysis Results and Finds 7

1.03 Next Step 8

2. INTRODUTION 8

2.01 Roads Analysis overview 8

2.02 Scope of This Analysis 9

2.03 Process/Approach 9

3. BACKGROUND AND CONTEXT 10

3.01 Historical Context 10

4. CURRENT SITUATION 11

4.01 Road Statistics 11

4.02 Management Direction 12

(a) Forest Service Manual Direction 12

(b) Forest Plan Direction 12

5. ISSUES AND KEY QUESTIONS 12

5.01 Definitions 12

5.02 Ecosystem Function and Processes (EF) 13

(a) EF (1) What ecological attributes, particularly those unique to the region, would be affected by roading of currently unroaded areas? 13

(b) EF (2) To what degree do the presence, type, and location of roads increase the introduction and spread of exotic plant and animal species, insects, diseases, and parasites? What are the potential effects of such introductions to plant and animal species and ecosystem function in the area? 14

(c) EF (3) To what degree do the presence, type, and location of roads contribute to the control of insects, diseases, and parasites? 14

(d) EF (4) How does the road system affect ecological disturbance regimes in the area? 14

(e) EF (5) What are the adverse effects of noise caused by developing, using, and maintaining roads? ... 15

5.03 Aquatic, Riparian Zone, and Water Quality (AQ) 16

(a) AQ (1) How and where does the road system modify the surface and subsurface hydrology of the area? 16

(b) AQ (2) How and where does the road system generate surface erosion?.....24

(c) AQ (3) How and where does the road system affect mass wasting?.....33

(d) AQ (4) How and where do road-stream crossings influence local stream channels and water quality?.. 34

(e) AQ (5) How and where does the road system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides to enter surface waters? 34

(f) AQ (6) How and where is the road system 'hydrologically connected' to the stream system? How do the connections affect water quality and quantity (such as delivery of sediments, thermal increases, elevated peak flows)? 35

(g) AQ (7) What downstream beneficial uses of water exist in the area? What changes in uses and demand are expected over time? How are they affected or put at risk by road-derived pollutants?.....35

(h) AQ (8) How and where does the road system affect wetlands?.....36

(i) AQ (9) How does the road system alter physical channel dynamics, including isolation of floodplains; constraints on channel migration; and the movement of large wood, fine organic matter, and sediment?.....36

(j) AQ (10) How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what extent?.....37

(k) AQ (11) How does the road system affect shading, litter fall, and riparian plant communities?.....38

(l) AQ (12) How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species?.....40

(m) AQ (13) How and where does the road system facilitate the introduction of non-native aquatic species? 40

(n) AQ (14) To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity, or areas containing rare or unique aquatic species or species of interest? 41

5.04 Terrestrial Wildlife (TW) 41

(a) TW (1) What are the direct effects of the road system on terrestrial species habitat?.....41

(b) TW (2) How does the road system facilitate human activities that affect habitat? 45

(c) TW (3) How does the road system affect legal and illegal human activities (including trapping, hunting, poaching, harassment, road kill, or illegal kill levels)? What are the effects on wildlife species? 46

(d) TW (4) How does the road system directly affect unique communities or special features in the area?50

5.05 Economics (EC) 58

(a) EC (1) what are the monetary costs associated with the current road system? how do these costs compare to the budgets for management and maintenance of the road system?.....58

(b) EC (2) What are the indirect economic contributions of roads including market and non-market costs and benefits associated with road system design, management and operations? 63

(c) EC (3) what are the direct economic impacts of the current road system and its management upon communities around the forest?.....63

5.06 Timber Management (TM) 64

(a) TM (1) How does road spacing and location affect logging system feasibility? *64*

(b) TM (2) How does the road system affect managing the suitable timber base and other lands? *64*

(c) TM (3) How does the road system affect access to timber stands needing silvicultural treatment? *64*

5.07 Mineral Management (MM) 66

(a) MM (1) How does the road system affect access to locatable, leasable, and salable minerals? *66*

5.08 Range Management (RM) 66

(a) RM (1) How does the road system affect access to range allotments? *66*

5.09 Water Production (WP) 68

(a) WP (1) How does the road system affect access, constructing, maintaining, monitoring, and operating water diversions, impoundments, and distribution canals or pipes? *68*

(b) WP (2) How does road development and use affect the water quality in municipal watersheds? *68*

(c) WP (3) How does the road system affect access to hydroelectric power generation? *68*

5.10 Special Forest Products (SP) 68

(a) SP (1) How does the road system affect access for collecting special forest products? *68*

5.11 Special-Use Permits (SU) 69

(a) SU (1) How does the road system affect managing special-use permit sites (concessionaires, communications sites, utility corridors, and so on)? *69*

(b) GT (1) How does the road system connect to public roads and provide primary access to communities? 69

(c) GT (2) How does the road system connect large blocks of land in other ownership to public roads (ad hoc communities, subdivisions, inholdings, and so on)? *69*

(d) GT (3) How does the road system affect managing roads with shared ownership or with limited jurisdiction? (RS 2477, cost-share, prescriptive rights, FLPMA easements, FRTA easements, DOT easements)? *70*

(e) GT (4) How does the road system address the safety of road users? *74*

5.12 Administrative Use (AU) 75

(a) AU (1) How does the road system affect access needed for research, inventory, and monitoring? *75*

(b) AU (2) How does the road system affect investigative or enforcement activities? *76*

5.13 Protection (PT) 76

(a) PT (1) How does the road system affect fuels management? *76*

(b) PT (2) How does the road system affect the capacity of the Forest Service and cooperators to suppress wildfires? *76*

(c) PT (3) How does the road system affect risk to firefighters and to public safety? *76*

5.14 Recreation - Unroaded Recreation (UR) 78

(a) UR (1) Is there now or will there be in the future excess supply or excess demand for unroaded recreation opportunities?....78

(b) UR (2) Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing roads causing substantial changes in the quantity, quality, or type of unroaded recreation opportunities?....79

(c) UR (3) What are the effects of noise and other disturbances caused by developing, using, and maintaining roads on the quantity, quality, and type of unroaded recreation opportunities?....79

(d) UR (4) Who participates in unroaded recreation in the areas affected by constructing, maintaining, and decommissioning roads?....79

(e) UR (5) What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?....80

5.15 Road-Related Recreation (RR) 80

(a) RR (1) Is there now or will there be in the future excess supply or excess demand for roaded recreation opportunities?....80

(b) RR (2) Is developing new roads into unroaded areas, decommissioning existing roads, or changing maintenance of existing roads causing significant changes in the quantity, quality, or type of roaded recreation opportunities?....80

(c) RR (3) What are the adverse effects of noise and other disturbances caused by constructing, using, and maintaining roads on the quantity, quality, or type of roaded recreation opportunities?....80

(d) RR (4) Who participates in roaded recreation in the areas affected by road constructing, maintaining, or decommissioning?....81

(e) RR (5) What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?....81

(f) RR(6) how does road management affect wilderness attributes, including natural integrity, natural appearance, opportunities for solitude, and opportunity for primitive recreation? 81

5.16 Passive-Use Value (PV) 82

(a) PV (1) Do areas planned for road entry, closure, or decommissioning have unique physical or biological characteristics, such as unique natural features and threatened or endangered species?....82

(b) PV (2) Do areas planned for road construction, closure, or decommissioning have unique cultural, traditional, symbolic, sacred, spiritual, or religious significance?....82

(c) PV (3) What, if any, groups of people (ethnic groups, subcultures, and so on) hold cultural, symbolic, spiritual, sacred, traditional, or religious values for unroaded areas planned for road entry or road closure?.83

(d) PV (4) Will road construction, closure, or decommissioning significantly affect passive-use value?....84

5.17 Social Issues (SI) 84

(a) SI (1) Who are the direct users of the road system and of the surrounding areas? What activities are they directly participating in on the forest? Where are these activities taking place on forest? 84

(b) SI (2) Why do people value their specific access to national forest and grasslands—what opportunities does access provide? 84

(c) SI (3) what are the broader social and economic benefits and costs of the current forest road system and its management? 84

(d) SI (4) How does the road system and road management contribute to or affect people's sense of place? 85

5.18 Cultural and Heritage Issues (CH) 86

(a) CH (1) does the road system affect access to paleontological, archaeological, and historical sites and the values people hold for these sites? 86

(b) CH (2) How does the road system and road management affect american indian treaty rights? 87

(c) CH (3) How does road use and road management affect roads that constitute historic sites? 87

5.19 Civil Rights and Environmental Justice (CR) 89

(a) CR (1) is the road system used or valued differently by minority, low-income, or disabled polulations than by the general population? Would potential changes to the road system or its management have disproportionate negative impacts on minority, low-income, or disabled populations? 89

6. KEY FINDINGS 89

7. OPTIONS AND PRIORITIES 90

8. GLOSSARY 91

9. REFERENCES 93

10. APPENDICES 95

11. INDEX 100

1. EXECUTIVE SUMMARY

1.01 BACKGROUND

This report documents the roads analysis procedure used for the Forest Scale Roads Analysis for the Custer National Forest. This report is a "living" document and reflects the conditions of the analysis area at the time of writing. The document can be updated as the need arises and conditions warrant. Any future updates will be reflected in the title (e.g., version 2.0).

1.02 KEY ANALYSIS RESULTS AND FINDS

The current maintenance level 3, 4, and 5 roads provide the minimum road system needed for safe and efficient travel for the administration, utilization and protection of National Forest System lands. Thus, the Forest has no plans to decommission or close objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis.

Road densities were calculated considering unclassified through Maintenance Level 5 roads. Tables TW(1)-1 through 3 and the spreadsheet in Appendix A display road densities by watershed It appears that road densities are highest on the Sioux District, less dense on the Ashland District, with the lowest densities on the Beartooth District. Densities do not appear to be unnecessarily high, when compared to other Forests. However, watersheds with moderate or high road densities and/or low percentages of available security habitat are good indicators of fragmented habitats and areas of excessive human access. Roads in these watersheds may hinder wildlife movement and habitat use. These areas may indicate a need for road management modifications; site-specific analysis would be necessary.

The higher the density of roads in a stream corridor, the more likely an influence to the water quality and quantity in the area. Based on an analysis of the amount of road in the stream corridor by 5th code HUC, in which at least 20% of the stream corridor is in close proximity to a road (150 feet) only two areas on the Custer NF exceed this level. These include the southeast corner of the Ekalaka Hills (10110201170) on the Sioux Ranger District and the Crooked Creek Area (10080010030) on the Beartooth Ranger District. These areas may indicate a need for road management modifications; site-specific analysis would be necessary.

The Forest, all three ranger districts, has a number of roads for which Right-of-Way is a need. Access to National Forest System lands is limited because of adjacent private land and in-holdings across which a right-of-way needs to be obtained. Table GT(3)-1 displays these roads. These ROW needs are identified on the Forest's ROW acquisition plan and will be pursued with willing landowners.

There are a number of Maintenance Level 3, 4, and 5 roads that facilitate access to areas of unique cultural, traditional, symbolic, sacred, spiritual, or religious significance. Table PV(2)-1 displays those roads that facilitate access to these areas. These areas may indicate a need for road management modifications; site-specific analysis would be necessary.

Review of ML 3, 4, and 5 roads across the Forest shows that the Forest should consider changing the objective maintenance level for some roads on each district. These recommended objective maintenance level changes are listed in Table GT(4)-1. The Forest Supervisor with each respective District Ranger and the Forest Engineer should consider making these changes.

Deferred maintenance condition surveys done on all Maintenance Level 3, 4, and 5 roads since 1999 provide information on critical health and safety needs. These surveys estimated the cost to address these needs. Again, adequate funding is necessary to address these needs. Emphasis would be to address these needs on those roads that receive the most public travel.

The present ML 3, 4, and 5 road system adequately provides for firefighter and public safety. However, there are a number of one-way roads, usually Maintenance Level 3 routes and/or areas that the Forest has identified for development of evacuation plans in the event of a large wildfire fire evacuation process. The Beartooth Ranger District has already prepared an evacuation plan for the West Fork of Rock Creek road to address this need. Table PT(3) displays the routes that should be included in these evacuation plans.

1.03 NEXT STEP

Roads analysis at the forest scale will generally provide the context for informing road management decisions and activities at the watershed, area, and project level. Where a forest-scale roads analysis has been conducted, the Responsible Official must consider the decision(s) to be made and determine how to apply the results of the forest-scale roads analysis to best inform management decisions. However, it is generally expected that road inventories and road condition assessments as identified in FSM 7712.14 would be completed at the watershed or project scale.

Roads analysis below the forest scale is not automatically required, but may be undertaken at the discretion of the Responsible Official. When the Responsible Official determines that the additional analysis is not needed for a project, the Responsible Official must document the basis for that conclusion. When needed at the watershed, area, or project level, roads analysis will follow the direction provided in FS-643 and document the results consistent with FSH 7712.13c.

2. INTRODUTION

2.01 ROADS ANALYSIS OVERVIEW

In August 1999, the Washington Office of the USDA Forest Service published Miscellaneous Report FS-643 titled *Roads Analysis: Informing Decisions about Managing the National Forest Transportation Syste*m. The objective of roads analysis is to provide decision makers with critical information to develop road systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions.

On January 12, 2001, the Forest Service issued the final National Forest System Road Management Rule. This rule revises regulations concerning the management, use, and maintenance of the National Forest Transportation System. Consistent with changes in public demands and use of National Forest System resources and the need to better manage funds available for road construction, reconstruction, maintenance, and decommissioning, the final rule removes the emphasis on transportation development and adds a requirement for science-based transportation

analysis. The final rule is intended to help ensure that additions to the National Forest System road network are those deemed essential for resource management and use; that construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; and that unneeded roads are decommissioned and restoration of ecological processes are initiated.

On March 3, 2000, the Forest Service proposed to revise 36 CFR Part 212 to shift emphasis from transportation development to managing administrative and public access within the capability of the lands. The proposal was to shift the focus of National Forest System road management from development and construction of new roads to maintaining and restoring needed roads and decommissioning unneeded roads within the context of maintaining, managing, and restoring healthy ecosystems.

The Roads Analysis is **NOT** a decision making process. It is designed to provide a science-based assessment of the existing forest road system. It highlights problem areas and opportunities in the forest road system, so Forest Service land managers can make better management decisions regarding the transportation system on National Forest System lands.

2.02 SCOPE OF THIS ANALYSIS

This Forest scale roads analysis was completed, identifying pertinent ecological, social and economic issues and needs essential to making future decisions about the characteristics of the Forest transportation system. These issues and needs were used to identify road management opportunities that would improve characteristics of the Forest road system to balance the benefits of access with road-associated environmental effects, road management costs and social/community interests.

2.03 PROCESS/APPROACH

Existing data was used to complete a forest-scale roads analysis. This analysis focused on opportunities, problems and risks associated with the Forest's maintenance level 3, 4, and 5 roads, as well as important local roads and those roads that provide legal access or ROW.

The core team consisted of:

- Co-IDT leaders
- GIS Specialist
- District Representative(s)
- Transportation Planner

The Core Team conducted preliminary and final analysis of the issues, and was responsible for completion of documentation required for the analysis.

The IDT Leader(s) facilitated the exchange of information to the line officers, and were responsible for assembling the team, managing the public involvement process, and directing the integrated analysis.

The Extended Team provided information and support to the core team during the analysis of the project. They played an integral role in the analysis of existing information, formulation of opportunities, risks, and problems, and development of transportation atlas data and report.

The roads analysis team was composed of an interdisciplinary team of specialists. The composition of the team being as follows:

IDT Team Co-Leader/Forest Planner & Environmental Coord.	Mark Slacks
IDT Team Co-Leader / Transportation Planner	Brenda Christensen
GIS Specialist	Vickey Eubank
Beartooth District Representative & Wilderness Recreation Planner	Tom Highberger
Sioux District Representative & District Resource Staff Officer	Laurie Walters-Clark
Ashland District Representative & District Environmental Coordinator	Joe Alexander
Watershed/Soil Specialist	John Lane
Lands Specialist	Susan Newell
Wildlife Biologist	Tom Whitford
Forester	John Clark
Archaeologist	Halcyon LaPoint
Fisheries Biologist	Wally McClure
Beartooth District Ranger (D2)	Rand Herzberg
Sioux District Ranger (D3)	George Foley
Ashland District Ranger (D4)	Liz McFarland

3. BACKGROUND AND CONTEXT

3.01 HISTORICAL CONTEXT

The road network across the Custer National Forest is accessed by County and State roads that pass through or by the land units that comprise the Forest's Ranger Districts. The standard of these roads varies from double-lane paved roads to limited access roads.

The primary uses of the State and County road systems include but are not limited to, farm and ranch administration and produce hauling, tourism, mineral exploration and development, oil and gas exploration and development, National Forest access, hunting and general access or through travel.

The primary uses of the National Forest System includes, but is not limited to recreation visits (e.g. pleasure driving, hunting, camping, and picnicking), National Forest administration, National Forest uses (e.g. grazing, permit administration, cattle hauling, mineral and oil and gas production, timber harvest and haul). The average daily traffic for Maintenance Level 3, 4, and 5 roads is…Generally, the heaviest use of the National Forest road system is during the big game hunting season, which also tends to coincide with wet weather conditions causing some access and soil disturbance problems.

Historically, financial constraints (Forest budget) have limited the amount of maintenance accomplished in any one year on any particular part of the transportation system.

Jurisdiction or ownership on the National Forest road system is nearly complete, except for short lengths of access routes between the Forest boundary and some county roads.

4. CURRENT SITUATION

4.01 ROAD STATISTICS

Table 4.01-1 displays the statistics related to Maintenance Level 3, 4, and 5 roads on the Forest.

Table 4.01-1: Summary Table of Number of Miles of Unclassified (Undetermined) through Maintenance Levels 3, 4, and 5 on the Forest.

SYSTEM	DISTRICT	OBJECTIVE MAINTANENCE LEVELS	Miles*
NFSR - NATIONAL FOREST SYSTEM ROAD			1519
	010802 - Beartooth Ranger District		320
		ML 1 and 2	199
		3 - SUITABLE FOR PASSENGER CARS	109
		4 - MODERATE DEGREE OF USER COMFORT	12
		5 - HIGH DEGREE OF USER COMFORT	0
	010803 - Sioux Ranger District		412
		ML 1 and 2	296
		3 - SUITABLE FOR PASSENGER CARS	116
	010804 - Ashland/Ft. Howes Ranger District		787
		ML 1 and 2	648
		3 - SUITABLE FOR PASSENGER CARS	135
		4 - MODERATE DEGREE OF USER COMFORT	4
UND - UNDETERMINED			354
	010802 - Beartooth Ranger District		67
		ML 1 and 2	67
	010803 - Sioux Ranger District		92
		ML 1 and 2	92
	010804 - Ashland/Ft. Howes Ranger District		194
		ML 1 and 2	194
Grand Total			1873

*Miles are based on ROUTE_STATUS = EX – EXISTING and JURISDICTION= FS - FOREST SERVICE

4.02 MANAGEMENT DIRECTION

(A) FOREST SERVICE MANUAL DIRECTION

Forest Service direction for the planning, construction, reconstruction, operation, and maintenance of forest transportation facilities is found in Forest Service Manual 7710.

(B) FOREST PLAN DIRECTION

The Forest Plan goal for access to and travel within the Forest is to "provide at least one access point per five miles of administrative boundary where there is not access from inside the National Forest System land. At present there are a number of areas on the Forest that are not easily accessible by the general public as private lands adjacent to the Forest preclude access or roads/trails do not exist. Some additional access points are identified and over time access to the Forest will be increased. However, the intent will not be to provide road trail access to all areas on the Forest. In other areas on the Forest there are an abundance of roads that have been built primarily for oil and gas development. When the need for these roads no longer exists many of these roads will be closed and revegetated. The continuing need for areas of motorized dispersed recreation and off-road vehicle travel is provided for by allowing these activities over suitable area of the Forest."

The Forest Plan objective for the Forest transportation system is found in the discussion for facilities on page 5. It states, "The Forest transportation system required by this plan will be constructed and managed to minimize adverse impacts on the resources, while providing access to public lands for the public and for the management of the resources."

Forest-wide standards for transportation facilities are found on pages 36 through 38 of the Forest Plan and will not be repeated here.

5. ISSUES AND KEY QUESTIONS

5.01 DEFINITIONS

For the reader's benefit, the definitions of some terms used in the responding to the Issues and key questions are provided here. These definitions may also be found in the glossary of terms in section 8.

Watershed – Subdivisions within a sub-basin. The 5th level (Fifth Code) in the hydrologic unit hierarchy. Watersheds range in size from 40,000 to 250,000 acres.

Subwatershed- Subdivisions within watersheds. Subwatershed is the sixth level (Sixth Code) in the hydrologic unit hierarchy. Subwatersheds generally range in size from 10,000 to 40,000 acres.

Maintenance Level Descriptions. Maintenance levels 1-5 (operational and objective) are described in the following paragraphs:

Roads assigned to maintenance levels 2-5 are either constant service roads or intermittent service roads during the time they are open to traffic. See exhibit 01 for the relationship between maintenance levels.

a. Level 1. Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate."

Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for nonmotorized uses.

b. Level 2. Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

c. Level 3. Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

d. Level 4. Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

e. Level 5. Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage."

5.02 ECOSYSTEM FUNCTION AND PROCESSES (EF)

(A) *EF (1)* WHAT ECOLOGICAL ATTRIBUTES, PARTICULARLY THOSE UNIQUE TO THE REGION, WOULD BE AFFECTED BY ROADING OF CURRENTLY UNROADED AREAS?

Ecological attributes unique to the Forest and hence to the Region are:

- Rimrock ecosystems; a C Management Area on the Sioux Ranger District.
- Riparian areas; Management Area M on all districts.
- Sagebrush ecosystems.
- King Mountain and Cook Mountain Hiking and Riding Areas, as well as the Tongue River Breaks; each a J Management Area on the Ashland Ranger District.
- All established Research Natural Areas (RNA) (Management Area L) on the Forest:
    - Lost Water Canyon RNA (Beartooth Ranger District)
    - Line Creek Plateau RNA (Beartooth Ranger District)
    - Poker Jim RNA (Ashland Ranger District)
- Roadless aspects of the Beartooth in addition to the Absaroka-Beartooth Wilderness.
- White bark pine ecosystems
- Grizzly bear habitat (Beartooth Ranger District)
- Aspen stands
- White and black-tailed prairie dog habitats
- Raptors (Sioux Ranger District)

(B) *EF (2)* TO WHAT DEGREE DO THE PRESENCE, TYPE, AND LOCATION OF ROADS INCREASE THE INTRODUCTION AND SPREAD OF EXOTIC PLANT AND ANIMAL SPECIES, INSECTS, DISEASES, AND PARASITES? WHAT ARE THE POTENTIAL EFFECTS OF SUCH INTRODUCTIONS TO PLANT AND ANIMAL SPECIES AND ECOSYSTEM FUNCTION IN THE AREA?

Thistle, knapweed, and hound's tongue distribution is closely related to road systems. Infestation and spread of other exotic species (toadflax, leafy spurge) are less directly tied to roading and can readily occur in unroaded areas as well. Ecosystem function consequences have been documented in the Forest Noxious Weed Program FEIS. No known invasions of problematic insects, diseases, or parasites have been documented.

For the past several years, the Forest has been part of a National survey to track gypsy moth infestations. The gypsy moth has been known to be carried on vehicles and there is suspect that they are being carried from the east to the west by vehicles as they light on the undercarriages and such and are transported to new areas. Phermone traps have been set at selected campgrounds and district offices to detect and determine the presence on the forest. To date none have been detected.

(C) *EF (3)* TO WHAT DEGREE DO THE PRESENCE, TYPE, AND LOCATION OF ROADS CONTRIBUTE TO THE CONTROL OF INSECTS, DISEASES, AND PARASITES?

The existing roads facilitate the detection and treatment of insects, diseases, parasites, and invasive species throughout the Forest.

(D) *EF (4)* HOW DOES THE ROAD SYSTEM AFFECT ECOLOGICAL DISTURBANCE REGIMES IN THE AREA?

One of the primary disturbance regimes across the Forest has been and currently is fire. This regime varies dramatically across the Forest from the Beartooth to the Sioux Ranger Districts. Large acreage fires have occurred on each district, however, ignition sources and

types of vegetation differ. Due to the presence of the transportation system, many fires that would have burnt across the landscape have been successfully detected and suppressed prior to becoming large disturbance mechanisms. Review of wildfire ignition sources reveals that the Forest does not have a human caused wildfire problem. However, increased access opportunities do increase the risk that more fires could be due to human influence then may be started under natural conditions.

Floods are another source of disturbance across the Forest. Floods have occurred because of rain on snow events and also because of major spring/summer thunderstorm events. Precipitation events in eastern Montana and northwestern South Dakota tend to be high intensity short duration storms that generate fairly high volumes of runoff over short time spans. Road maintenance, or lack thereof, has the potential to have the greatest effect in response to these disturbances. Road design and functional drainage features (culverts, drainage dips, out-sloping, etc.) that are well maintained can go a long way towards averting major resource damage as a result of flooding. Damage often occurs when these structures/features are not functional. They don't drain water away so that it is dispersed, rather it is concentrated and cuts away the roadway and contributes sediment into the drainage above that which naturally occurs.

Another disturbance event is noxious weeds. Thistle, knapweed, and hound's tongue distribution is closely related to road systems. Infestation and spread of other exotic species (toadflax, leafy spurge) are less directly tied to roading and can readily occur in unroaded areas as well. Ecosystem function consequences have been documented in the Forest Noxious Weed Program FEIS. No known invasions of problematic insects, diseases, or parasites have been documented.

The forest has no plans to decommission or close objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis. Thus, there are no substantive changes to the transportation system relative to objective maintenance level 3, 4, and 5 roads, and would have no meaningful effect on these disturbance regimes.

(E) *EF (5)* WHAT ARE THE ADVERSE EFFECTS OF NOISE CAUSED BY DEVELOPING, USING, AND MAINTAINING ROADS?

Adverse effects consist of short-term disturbance effects to forest visitors and native wildlife species that may cause avoidance of certain areas. The primary direct effects of roads on wildlife are habitat fragmentation and loss of habitat security or use due to high roads densities. Road density can be considered an ecological index of road effects on wildlife and wildlife habitat. A more in-depth response can be found in the response to question TW(1).

The road system facilitates recreational and land management activities. Common recreational activities on the Custer national Forest include picnicking, camping, hunting, firewood cutting, and wildlife viewing. Applicable land management activities include fire suppression, fuels treatments, timber management, mineral (locatable and leasable) extraction and production, administration of the recreation resource and associated facilities

(campgrounds, trailheads etc.), and grazing management. Short-term effects may disrupt the peace and quiet and could affect cultural practices. Long-term effects may consist of increased traffic and human visitation.

5.03 AQUATIC, RIPARIAN ZONE, AND WATER QUALITY (AQ)

(A) *AQ (1)* HOW AND WHERE DOES THE ROAD SYSTEM MODIFY THE SURFACE AND SUBSURFACE HYDROLOGY OF THE AREA?

How: Roads can affect the routing of water through a watershed by intercepting, concentrating, and diverting flows from their natural flow-paths. These changes in routing can result in increases in peak flows by both a volumetric increase in quickflow and change in the timing of storm runoff to streams (Wemple et al. 1996)

Where: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas have been used as indicators to assess which watershed are at highest risk for modifications to surface and subsurface hydrology due to Level 3, 4, and 5 roads. A relative-risk rating has been completed for all watershed (see data tables and maps). Those roads with the highest mileage in riparian habitat zones and the highest number of crossings have the potential to modify subsurface and surface hydrology.

In summary, the higher the density of roads in a stream corridor, the more likely an influence to the surface and subsurface hydrology in the area. Based on an analysis of the amount of road in the stream corridor by 5th code HUC, in which at least 20% of the stream corridor is in close proximity to a road (150 feet) only two areas on the Custer NF exceed this level. These include the southeast corner of the Ekalaka Hills (10110201170) on the Sioux Ranger District and the Crooked Creek Area (10080010030) on the Beartooth Ranger District.

Table AQ(1)-1: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Beartooth Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
10070005010	40	2400A	1		0.15
		2400C			0.01
		2400D			0.05
		2400			0.33
	40 Total		1		0.54
	50	2846	5	2	0.76
	50 Total		5	2	0.76
	60	2140	3	1	0.69
		2142	8	1	1.37
	60 Total		11	2	2.06
	70	2846	3	3	0.21
		2400			0.26
		2HWY419			0.61
	70 Total		3	3	1.08

Table AQ(1)-1: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Beartooth Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
10070005010 Total			**20**	**7**	**4.44**
10070005020	20	2177	9	1	1.3
		2177B	3	1	0.12
		2177D	2		0.33
		2177E			0.08
	20 Total		14	2	1.83
10070005020 Total			**14**	**2**	**1.83**
10070005030	10	2414	8	5	0.71
			7	4	0.54
	10 Total		15	9	1.25
10070005030 Total			**15**	**9**	**1.25**
10070005040	20	2072	7	2	0.08
		2072A	2		0.14
		2072B			0.12
		2072C	2		0.09
		2072D	1		0.16
	20 Total		12	2	0.59
	40	2414			0.02
	40 Total				0.02
10070005040 Total			**12**	**2**	**0.61**
10070006090	10	2223			0.46
	10 Total				0.46
10070006090 Total					**0.46**
10070006140	10	2421			0.01
		2HWY 212	1	1	0.06
	10 Total		1	1	0.07
	20	2004	5	5	1.14
		2421C			0.02
		2421	16	5	2.86
		2421A			0.18
		2421B	1		0.34
		2421D			0.11
		2421F	1		0.26
	20 Total		23	10	4.91
	30	2346	2	2	1.14
		2HWY212	5	3	
	30 Total		7	5	1.14
	40	2071	13	7	2.80

Table AQ(1)-1: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Beartooth Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
		2071B	1	1	0.07
		2071A	3	2	0.06
		2071D			0.12
		2071G			0.06
	40 Total		17	10	3.11
	50	2005	2		0.26
		2379	6	1	0.83
		2379G			0.03
		2379A	4	3	0.34
		2379B			0.01
		2379C			0.06
		2379D	2		0.09
		2379E			0.07
		2379F	1		0.06
		2379H	1	1	0.04
		2346	1		0.06
	50 Total		17	5	1.85
10070006140 Total			**65**	**31**	**11.08**
10070006150	10	2141	4		0.26
		2141A			0.03
		2141C	2	1	0.05
	10 Total		6	1	0.34
	30	2010	6	6	0.14
		21479	2	2	0.11
		2010A	3	3	0.06
			11	11	0.31
			17	**12**	**0.65**
10080010030	10	2085	10		7.25
		2308			0.36
		2849	3		7.07
		2849A			0.1
	10 Total		13		14.78
	40	2085	4		1.94
		2849			0.07
	40 Total		4		2.01
10080010030 Total			**17**		**16.79**
10080010050	10	2849			1.37
	10 Total				1.37
10080010050 Total					**1.37**
10080014010	10	2073	1		0.58

Table AQ(1)-1: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Beartooth Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
		2083	1		0.23
		2223	1		0.46
		2308	13		1.55
	10 Total		16		2.82
10080014010 Total			**16**		**2.82**

Table AQ(1)-2: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Sioux Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
19	(blank)	3114	3		0.61
		3131			0.06
		3132	2		0.11
	(blank) Total		5		0.78
19 Total			**5**		**0.78**
24	(blank)	3114	1		0.40
		3120	2		0.04
	(blank) Total		3		0.44
24 Total			**3**		**0.44**
40	(blank)	3120	4	1	0.55
		3131			0.05
	(blank) Total		4	1	0.60
40 Total			**4**	**1**	**0.60**
61	(blank)	3113	1		0.15
	(blank) Total		1		0.15
61 Total			**1**		**0.15**
62	(blank)	3113	1		0.06
	(blank) Total		1		0.06
62 Total			**1**		**0.06**
71	(blank)	3113			0.04
	(blank) Total				0.04

Table AQ(1)-2: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Sioux Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
71 Total					**0.04**
117	(blank)	3124			0.08
	(blank) Total				0.08
117 Total					**0.08**
121	(blank)	3115			0.05
	(blank) Total				0.05
121 Total					**0.05**
151	(blank)	3115	2		0.65
		3HWY79	3		0.48
	(blank) Total		5		1.13
151 Total			**5**		**1.13**
175	(blank)	3HWY79			0.40
	(blank) Total				0.40
175 Total					**0.40**
179	(blank)	3111			0.18
	(blank) Total				0.18
179 Total					**0.18**
10110201130	40	3045	2		0.22
		3119	2		0.67
	40 Total		4		0.89
	50	3116			0.05
	50 Total				0.05
10110201130 Total			**4**		**0.94**
10110201140	10	3049	1		1.00
		3052			0.11
		3116			0.07
			1		1.18
	30	3116	23	2	0.08
		3118	6		1.20
	30 Total		29	2	1.28
10110201140 Total			**30**	**2**	**2.46**
10110201150	10	3048	4		0.28
		3086	5		0.60
		3117	3		0.48
	10 Total		12		1.36
10110201150 Total			**12**		**1.36**
10110201170	10	3104	2		0.53
	10 Total		2		0.53
10110201170 Total			**2**		**0.53**

Table AQ(1)-2: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Sioux Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
10110201180	10	3101	2		0.17
		3104	4		0.77
		3813	6		1.63
	10 Total		12		2.57
	20	3101	7	1	1.29
	20 Total		7	1	1.29
	40	3101	2		0.36
	40 Total		2		0.36
10110201180 Total			**21**	**1**	**4.22**
10110202050	20	3818			2.10
		3819			0.10
	20 Total				2.20
	30	3813	2	1	0.35
		3813A	1		0.18
	30 Total		3	1	0.53
	40	3818	7		
	40 Total		7		
	50	3104			0.06
	50 Total				0.06
	70	3117	21	1	3.59
	70 Total		21	1	3.59
10110202050 Total			**31**	**2**	**6.38**

Table AQ(1)-3: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Ashland Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
10090101090	40	4795	10		1.48
	40 Total		10		1.48
	50	4095	14	2	1.46
		4797	6		0.54
		4801	22	2	2.19
	50 Total		42	4	4.19
10090101090 Total			**52**	**4**	**5.67**

Table AQ(1)-3: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Ashland Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
10090102020	40	4021	5	1	1.67
		4095			0.03
		4131	16	6	2.12
	40 Total		21	7	3.82
	50	4515	4		0.57
	50 Total		4		0.57
10090102020 Total			**25**	**7**	**4.39**
10090102030	50	4034	1		0.10
	50 Total		1		0.10
	60	4033	8	3	0.87
	60 Total		8	3	0.87
	70	4034	3		0.40
		4501	16	1	2.35
		4HWY484	1		0.06
	70 Total		20	1	2.81
10090102030 Total			**29**	**4**	**3.78**
10090102040	10	4790	4		0.45
	10 Total		4		0.45
	20	4HWY484	6	1	0.95
	20 Total		6	1	0.95
	30	4HWY484	1		0.06
	30 Total		1		0.06
	40	4127	17	1	1.900
		4437			0.34
		4787	16	2	1.91
		4790	2		0.15
	40 Total		35	3	4.30
	50	4127	2		0.19
	50 Total		2		0.19
	60	4095	5	2	1.17
		4127	3		0.19
		4095A	1		0.25
		4HWY484	16	1	0.98
	60 Total		25	3	2.59
	80	4516	6		0.64
	80 Total		6		0.64
	90	4094	18	3	1.74
		4784	1		0.16
	90 Total		19	3	1.90

Table AQ(1)-3: Number of road crossings, miles of road within riparian habitat zones, and miles of road in wetland type areas.

Ashland Ranger District					
FIFTH CODE	SIXTH CODE	ROAD #	NUMBER OF ROADS CROSSING STREAMS	NUMBER OF ROADS CROSSING STREAMS IN 40 PLUS SLOPES	MILES OF RD IN 150' STRM BUFFER
	100	4092	24	3	1.71
	100 Total		24	3	1.71
	110	4094			0.10
		4516	1		0.10
	110 Total		1		0.20
10090102040 Total			**123**	**13**	**12.99**
10090102050	10	4703	9	5	1.54
	10 Total		9	5	1.54
	20	4703	2		0.26
		4775	3		0.92
		4HWY212	22		1.89
	20 Total		27		3.07
	30	4775	3		0.67
		4HWY212	3		0.21
	30 Total		6		0.88
10090102050 Total			**42**	**5**	**5.49**
10090102060	10	4423	26	2	
	10 Total		26	2	
10090102060 Total			**26**	**2**	
10090102070	10	4133	8	1	0.61
	10 Total		8	1	0.61
10090102070 Total			**8**	**1**	**0.61**
10090102080	10	4770	2		0.27
	10 Total		2		0.27
10090102080 Total			**2**		**0.27**
10090102120	10	4092	1		0.08
	10 Total		1		0.08
	40	4431	1		0.06
	40 Total		1		0.06
10090102120 Total			**2**		**0.14**
10090102130	10	4431	1		0.12
		4777	4		0.51
		4423	6	1	0.54
	10 Total		11	1	1.17
	20	4769	3		0.45
	20 Total		3		0.45
10090102130 Total			**14**	**1**	**1.62**

(B) *AQ (2)* HOW AND WHERE DOES THE ROAD SYSTEM GENERATE SURFACE EROSION?

How: Surface erosion occurs on most wildland roads because their surfaces, cutslopes, fill-slopes and associated drainage structures are usually composed of erodible material and are exposed to rainfall and concentrated surface runoff. Surface erosion differs greatly depending on many factors, the most influential of which are usually: the erodibility of the exposed surface; the slope of the exposed surface; and the area of exposed surface that generates and concentrates runoff. Surface erosion and associated sedimentation are highly sensitive to road maintenance practices. Small changes in road drainage configuration can result in large changes in erosion and the routing of eroded sediments.

Where: The lands administered by the Forest have a great variety of geology and soils. The variation should be expected in view of the distances and diverse areas represented. Geologic settings range from the igneous-metamorphic rocks of the Beartooth Mountains, to deep sedimentary basins. Surface materials range from coarse glacial till and scoured bedrock in the Beartooth Mountains to finer textured silty and clayey soils in eastern Montana and northwestern South Dakota. Silty and clayey soils with moderate to strong horizon development are typical of most of the land from the Pryor Mountains eastward to the western parts of the Dakotas. Precipitation events in eastern Montana and northwestern South Dakota tend to be high intensity short duration storms that generate fairly high volumes of runoff over short time spans. Large volumes of runoff generate unusually large volumes of sediment there because of poor infiltration and the lack of vegetative cover.

Geologic restraints on the land are mainly attributable to the lithology. Roads in highly erodable landscapes and on highly erodable soils need to be surfaced to prevent erosion. Non-surfaced roads should be used as little as possible when wet to prevent rutting, erosion, and resulting sedimentation. Care needs to be exercised in locating roads and other development to prevent mass gravity movement. The materials have a tendency to move when slopes are over-steepened or if they become saturated. The natural erosion processes will be accelerated and will result in excessive environmental damage if developments are not properly designed and located.

Soils formed from granitic lithologies and sedimentary landforms are highly erodible, especially given the nature of the precipitation events on these landforms. Level 3, 4, and 5 roads traversing these areas may require the most intensive maintenance, with associated high management costs, to mitigate erosion of road surface material. Soil productivity is not considered a management issue with Level 3, 4, and 5 roads, as these road surfaces are a dedicated use, and are not productive lands (Region 1 Soil Quality Standards, FSH 2500, supplement No 2500-99-1). Stream sedimentation associated with soil loss is a management issue with Level 3, 4, and 5 roads, but is addressed in other aquatic risk assessment questions (AQ 4 and 6). Level 3, 4, and 5 roads have been identified which traverse these soils or landty0pes (see data tables and maps). Those roads that have the highest mileage in highly erodible soils are listed in the following Tables.

Table AQ(2)-1: Roads that have the highest mileage in highly erodible soils.

Beartooth Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC MATERIAL	A_LTA_NAME	Total Miles
2846	(FDR) WEST FK STILLWATER	High	90	Mass Failure	Mass Wasted	0.46
2CNTY16C	COUNTY ROAD 16C (DAISY PASS)	High	90	Mass Failure	Mass Wasted	0.15
2CNTY16D	COUNTY ROAD 16D (LULU PASS)	High	14	Alluvium/ Depositional	Recent Deposits, Fine	1.23
Grand Total						1.84

Table AQ(2)-2: Roads that have the highest mileage in highly erodible soils.

Sioux Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC MATERIAL	A_LTA_NAME	Total Miles
3045	(FDR) FOSTER ROAD	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.48
			5	Shales, Siltstones, Sandstones	Badlands	0.46
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.72
3045 Total						1.66
3048	(FDR) PENDELTON	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.91
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.03
3048 Total						1.94
3049	(FDR) WICKHAM GULCH	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.22
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.55
3049 Total						2.77
3052	(FDR) WICKHAM GULCH CAMPGROUND	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.12
3052 Total						0.12
3086	(PO) SLICK CREEK	High	3	Shales, Siltstones, Sandstones	Dissected Plains	1.13
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.15
3086 Total						1.28
3101	(FDR) OPEECHE PARK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.38
			5	Shales, Siltstones, Sandstones	Badlands	0.37
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	4.27
3101 Total						5.02
3104	(FDR) RIMROCK CARTER	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.16
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	7.42
3104 Total						7.58

Table AQ(2)-2: Roads that have the highest mileage in highly erodible soils.

Sioux Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC MATERIAL	A_LTA_NAME	Total Miles
3105	(FDR) ORIGINAL HWY	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.46
3105 Total						0.46
3111	(FDR) 3111 BOX SPRINGS	High	5	Shales, Siltstones, Sandstones	Badlands	0.14
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.05
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.13
	(P0) 3111 (BOX SPRINGS)	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0
			5	Shales, Siltstones, Sandstones	Badlands	1.44
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.88
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.81
3111 Total						4.45
3113	(FDR) S CAVE HILLS	High	3	Shales, Siltstones, Sandstones	Dissected Plains	1.15
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.28
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	3.86
3113 Total						6.29
3114	(FDR) FULLER PASS	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.41
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.73
3114 Total						2.14
3115	(FDR) J B PASS	High	3	Shales, Siltstones, Sandstones	Dissected Plains	2.69
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.75
3115 Total						4.44
3116	(FDR) CAPITAL ROCK	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.42
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	6.28
3116 Total						6.7
3117	(FDR) SNOW CREEK	High	14	Alluvium/Depositional	Recent Deposits, Fine	1.8
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	12.82
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	2.43
3117 Total						17.05
3117A	(FDR) LANTIS SPRING CAMPGR'D	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.63
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.11
3117A Total						0.74
3118	(FDR) PLUM CREEK	High	3	Shales, Siltstones,	Dissected Plains	0.66

Table AQ(2)-2: Roads that have the highest mileage in highly erodible soils.

Sioux Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC MATERIAL	A_LTA_NAME	Total Miles
				Sandstones		
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	6.56
3118 Total						7.22
3119	(FDR) EXIE	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.43
			5	Shales, Siltstones, Sandstones	Badlands	0.55
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.8
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.49
3119 Total						3.27
3120	(FDR) RILEY PASS	High	3	Shales, Siltstones, Sandstones	Dissected Plains	2.39
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.3
3120 Total						3.69
3121	(C) JB CLARKSON	High	3	Shales, Siltstones, Sandstones	Dissected Plains	1.65
3121 Total						1.65
3123	(FDR) PICNIC SPRING RD	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.77
3123 Total						0.77
3123A	(FDR) PICNIC SPRINGS CMPGRND.	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.93
3123A Total						0.93
3124	(FDR) REDCROSS	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.06
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.95
3124 Total						3.01
3126	(FDR) REVA CAMPGROUND	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.76
3126 Total						0.76
3130	(FDR) URANIUM ROAD	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.76
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.49
3130 Total						2.25
3131	(FDR) CRAIG PASS (ODELL CREEK)	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.63
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.74
3131 Total						1.37
3132	(FDR) DEVILS CANYON	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.6
3132 Total						0.6
3401	(FDR) MC NAB POND	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.36

Table AQ(2)-2: Roads that have the highest mileage in highly erodible soils.

Sioux Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC MATERIAL	A_LTA_NAME	Total Miles
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.41
3401 Total						0.77
3401A	(FDR) MC NAB POND CAMP GROUND	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.07
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.04
3401A Total						0.11
3812	(FDR) RIDGE ROAD	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.4
3812 Total						2.4
3813	(FDR) STAGVILLE DRAW	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	3.61
3813 Total						3.61
3813A	(FDR) EKALAKA PARK CMPGRND.	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.19
3813A Total						0.19
3814	(FDR) J T SMITH	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.03
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.17
3814 Total						2.2
3818	(FDR) SPEELMON CR.	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.1
			5	Shales, Siltstones, Sandstones	Badlands	3.78
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.87
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.21
3818 Total						4.96
3819	(FDR) LOST FARM	High	5	Shales, Siltstones, Sandstones	Badlands	0.26
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.95
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	1.1
3819 Total						4.31
3CNTY_MI	COUNTY RD. - MILL IRON	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.7
3CNTY_MI Total						0.7
3CNTY_PD	COUNTY RD. - PRAIRIE DALE	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.9
3CNTY_PD Total						0.9
3HWY20	STATE HIGHWAY 20	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.57
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.89
3HWY20 Total						1.46
3HWY323	COUNTY HWY 323 (EKALAKA)	High	14	Alluvium/Depositional	Recent Deposits, Fine	0.42
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.29
3HWY323 Total						2.71

Table AQ(2)-2: Roads that have the highest mileage in highly erodible soils.

Sioux Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC MATERIAL	A_LTA_NAME	Total Miles
3HWY79	STATE HIGHWAY 79	High	3	Shales, Siltstones, Sandstones	Dissected Plains	3.17
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.02
3HWY79 Total						4.19
Grand Total						116.67

Table AQ(2)-3: Roads that have the highest mileage in highly erodible soils.

Ashland Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC_MATERIAL	A_LTA_NAME	Total Miles
4021	(FDR) STOCKER BRANCH	High	7	Shales, Siltstones, Sandstones	Plateaus and Buttes	2.8
4021 Total						2.8
4033	(FDR) OTTER CR	High	14	Alluvium/ Depositional	Recent Deposits, Fine	2.882
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.3
4033 Total						3.182
4034	(FDR) BEAR CR	High	14	Alluvium/ Depositional	Recent Deposits, Fine	1.389
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.294
4034 Total						1.683
4092	(FDR) TEN MILE CR.	High	1	Shales, Siltstones, Sandstones	Rolling Plains	0.433
			14	Alluvium/ Depositional	Recent Deposits, Fine	4.533
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	6.681
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.622
4092 Total						12.269
4093	(FDR) FORT HOWES STATION	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.408
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.167
4093 Total						0.575
40931	FORT HOWES HELECOPTER HANGER	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.132
40931 Total						0.132
4094	(FDR) FIFTEEN MILE	High	1	Shales, Siltstones, Sandstones	Rolling Plains	0.691
			14	Alluvium/ Depositional	Recent Deposits, Fine	4.397
			3	Shales, Siltstones, Sandstones	Dissected Plains	0.608
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	5.674
4094 Total						11.37

Table AQ(2)-3: Roads that have the highest mileage in highly erodible soils.

Ashland Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC_MATERIAL	A_LTA_NAME	Total Miles
4095	(FDR) COW CREEK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	1.303
			3	Shales, Siltstones, Sandstones	Dissected Plains	0.44
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	5.289
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	6.398
4095 Total						13.43
4095A	(FDR) PICNIC AREA	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.361
4095A Total						0.361
4096E	(FDR) RED SHALE CPGD EAST LOOP	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.342
4096E Total						0.342
4096W	(FDR) RED SHALE CPGD WEST LOOP	High	3	Shales, Siltstones, Sandstones	Dissected Plains	0.378
4096W Total						0.378
4127	(FDR) TAYLOR CREEK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	1.518
			3	Shales, Siltstones, Sandstones	Dissected Plains	0.123
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	4.779
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	11.244
4127 Total						17.664
4131	(FDR) O'DELL CREEK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	5.274
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	4.7
4131 Total						9.974
4133	(FDR) BEAVER CR	High	14	Alluvium/ Depositional	Recent Deposits, Fine	2.636
			3	Shales, Siltstones, Sandstones	Dissected Plains	1.611
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.088
4133 Total						6.335
4423	(FDR) E FK OTTER CR	High	14	Alluvium/ Depositional	Recent Deposits, Fine	10.043
			3	Shales, Siltstones, Sandstones	Dissected Plains	2.113
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	4.752
4423 Total						16.908
4427	(FDR) BEAVER PUMPKIN DIVIDE	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	4.793
4427 Total						4.793
4431	(FDR) GRIFFIN PASS	High	14	Alluvium/ Depositional	Recent Deposits, Fine	1.174
			3	Shales, Siltstones, Sandstones	Dissected Plains	1.265
4431 Total						2.439
4432	(FDR) BRIDGE CANYON	High	1	Shales, Siltstones, Sandstones	Rolling Plains	6.063

Table AQ(2)-3: Roads that have the highest mileage in highly erodible soils.

Ashland Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC_MATERIAL	A_LTA_NAME	Total Miles
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.138
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	4.378
4432 Total						11.579
4436	(FDR) TAYLOR DIVIDE	High	1	Shales, Siltstones, Sandstones	Rolling Plains	2.898
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.63
4436 Total						3.528
4436A	(FDR) 4436-A	High	1	Shales, Siltstones, Sandstones	Rolling Plains	0.705
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.032
4436A Total						0.737
4436C	(FDR) 4436-C	High	7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.107
4436C Total						0.107
4436D	(FDR) 4436-D	High	1	Shales, Siltstones, Sandstones	Rolling Plains	0.35
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.25
4436D Total						0.6
4437	(FDR) UPPER SOUTH FORK	High	7	Shales, Siltstones, Sandstones	Plateaus and Buttes	1.588
4437 Total						1.588
4466	(FDR) WHITETAIL ADMIN. SITE	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.06
4466 Total						0.06
4501	(FDR) TOOLEY CREEK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	2.172
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.023
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	3.681
4501 Total						5.876
4516	(FDR) DROP TUBE	High	3	Shales, Siltstones, Sandstones	Dissected Plains	3.234
4516 Total						3.234
4703	(FDR) TEN MILE HOME CREEK	High	1	Shales, Siltstones, Sandstones	Rolling Plains	0.481
			14	Alluvium/ Depositional	Recent Deposits, Fine	0.507
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	7.417
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	2.794
4703 Total						11.199
4769	(FDR) BEAVER STACEY	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.203
			3	Shales, Siltstones, Sandstones	Dissected Plains	1.277

Table AQ(2)-3: Roads that have the highest mileage in highly erodible soils.

Ashland Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC_MATERIAL	A_LTA_NAME	Total Miles
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	3.449
4769 Total						4.929
4770	(FDR) LISCOM BUTTE WEST	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.273
			3	Shales, Siltstones, Sandstones	Dissected Plains	0.321
4770 Total						0.594
4775	(FDR) WILBUR CREEK CUTOFF	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.502
			3	Shales, Siltstones, Sandstones	Dissected Plains	0.449
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	4.001
4775 Total						4.952
4777	(FDR) SUICIDE PASS	High	3	Shales, Siltstones, Sandstones	Dissected Plains	1.28
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	8.573
4777 Total						9.853
4777B	(FDR) HOLIDAY CAMPGROUND	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	0.187
4777B Total						0.187
4784	(FDR) TAYLOR-15MILE CREEK	High	1	Shales, Siltstones, Sandstones	Rolling Plains	1.556
			14	Alluvium/ Depositional	Recent Deposits, Fine	0.17
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.016
4784 Total						2.742
4787	(FDR) N.FORK TAYLOR CREEK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.149
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.742
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	4.572
4787 Total						7.463
4790	(FDR) DIVIDE	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.971
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	4.193
4790 Total						5.164
4792	(FDR) HIGHLINE ROAD	High	1	Shales, Siltstones, Sandstones	Rolling Plains	1.481
			14	Alluvium/ Depositional	Recent Deposits, Fine	0.171
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.142
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	1.629
4792 Total						4.423
4794	(FDR) HORSE CREEK BUTTE	High	6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	1.16
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	5.868
4794 Total						7.028

Table AQ(2)-3: Roads that have the highest mileage in highly erodible soils.

Ashland Ranger District						
ID	NAME	ERODIBILITY POTENTIAL	A_LTA	GEOLOGIC_MATERIAL	A_LTA_NAME	Total Miles
4795	(FDR) LEE CREEK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	3.887
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.02
4795 Total						3.907
4797	(FDR) POKER JIM N FORK LEE	High	7	Shales, Siltstones, Sandstones	Plateaus and Buttes	2.404
4797 Total						2.404
4801	(FDR) POKER JIM BUTTE (4801)	High	14	Alluvium/ Depositional	Recent Deposits, Fine	0.14
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	5.709
4801 Total						5.849
4801A	(FDR) POKER JIM LOOKOUT	High	7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.285
4801A Total						0.285
4802	(FDR) HAY STOCKER	High	7	Shales, Siltstones, Sandstones	Plateaus and Buttes	2.155
4802 Total						2.155
4CNTY52	(blank)	High	14	Alluvium/ Depositional	Recent Deposits, Fine	3.124
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	6.795
4CNTY52 Total						9.919
4HWY212	US HWY 212 - ASHLAND	High	14	Alluvium/ Depositional	Recent Deposits, Fine	8.99
			3	Shales, Siltstones, Sandstones	Dissected Plains	3.432
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.407
4HWY212 Total						14.829
4HWY484	STATE HIGHWAY 484 - OTTER CRK	High	14	Alluvium/ Depositional	Recent Deposits, Fine	2.757
			3	Shales, Siltstones, Sandstones	Dissected Plains	4.483
			6	Shales, Siltstones, Sandstones	Eroded Uplands (Volcanic Tuffs)	2.421
			7	Shales, Siltstones, Sandstones	Plateaus and Buttes	0.154
4HWY484 Total						9.815
Grand Total						239.64

(C) *AQ (3)* HOW AND WHERE DOES THE ROAD SYSTEM AFFECT MASS WASTING?

Mass Wasting does periodically occur in limited locations on the Forest. It has been observed in West Fork of the Stillwater and Crooked Creek on Beartooth District, and Schlierchart Draw and Chiesman Draw on Sioux District. Often this process has taken place after a fire or some other kind of disturbance that removes the vegetation. However,

Maintenance Level 3, 4, and 5 roads have had no observed effect to the occurrence of mass wasting on the Forest.

(D) *AQ (4)* HOW AND WHERE DO ROAD-STREAM CROSSINGS INFLUENCE LOCAL STREAM CHANNELS AND WATER QUALITY?

The potential effects of roads on stream channels and water quality are most pronounced at stream crossings. In general, lower slope position roads have much greater impact on stream channels and water quality than do mid and upper slope position roads. Culverts can cause large amounts of sediment when hydraulic capacity is exceeded, or the culvert inlet is plugged and road fills are over topped. When road fills are breached sediment loadings can be catastrophic. Road fills and particularly those associated with rock riprap protection can reduce stream channel cross-sectional profiles, accelerate stream velocities, and increase stream scour and bank erosion rates. In severe cases stream segments can become unsuitable for fish habitat due to over simplefication of the stream channel and increased velocities.

Roads frequently generate overland flow, particularly from relatively impermeable, un-vegetated running surface and cut slopes. In addition, the interception of interflow by cut slopes can generate substantial amounts of runoff, converting subsurface flows to surface flows. Where surface flows are continuous between streams and road systems, such as where ditches convey road runoff from the road to the stream channel, the road generating the runoff is considered to be hydrologically connected to the stream. Where hydraulic connectivity exists, rapid runoff, sediment delivery, and road-associated channels generated on the road surface provide an efficient sediment route into the natural channel network.

In summary, the higher the density of roads in a stream corridor, the more likely an influence to the local stream channel and water quality in the area. Based on an analysis of the amount of road in the stream corridor by 5th code HUC, in which at least 20% of the stream corridor is in close proximity to a road (150 feet) only two areas on the Custer NF exceed this level. These include the southeast corner of the Ekalaka Hills (10110201170) on the Sioux Ranger District and the Crooked Creek Area (10080010030) on the Beartooth Ranger District.

(E) *AQ (5)* HOW AND WHERE DOES THE ROAD SYSTEM CREATE POTENTIAL FOR POLLUTANTS, SUCH AS CHEMICAL SPILLS, OILS, DE-ICING SALTS, OR HERBICIDES TO ENTER SURFACE WATERS?

Potential pollutants could be introduced into streamcourses on the Forest from noxious weed treatments, recreational uses, or accidents that could occur on the road. Noxious weed treatment occurs on each ranger district, but is implemented pursuant to Federal, State and local laws concerning the application of herbicides, as well as the Forest Noxious Weed Treatment Program FEIS. Monitoring during application of herbicides occurs to ensure there is little to no drift and that none enters any surface water source(s). Transport of produced oil and gas in the North Cave Hills on the Sioux Ranger District poses the potential risk of a crude oil or salt-water spill, but there have been no spills reported related to this activity. [please check with John Clark regarding oil spills in NCH] The abandoned uranium mine at Riley Pass, also in the North Cave Hills and a CERCLA site, produces

sediment that enters Schliechart and Pete's Creek drainages. Treatment of this sediment will be addressed under the CERCLA process.

In summary, Maintenance Level 3, 4, and 5 roads have created limited circumstances for some potential for pollutants to enter surface waters on the Forest.

(F) *AQ (6)* HOW AND WHERE IS THE ROAD SYSTEM 'HYDROLOGICALLY CONNECTED' TO THE STREAM SYSTEM? HOW DO THE CONNECTIONS AFFECT WATER QUALITY AND QUANTITY (SUCH AS DELIVERY OF SEDIMENTS, THERMAL INCREASES, ELEVATED PEAK FLOWS)?

Roads frequently generate overland flow, particularly from relatively impermeable, un-vegetated running surface and cut slopes. In addition, the interception of interflow by cut slopes can generate substantial amounts of runoff, converting subsurface flows to surface flows. Where surface flows are continuous between streams and road systems, such as where ditches convey road runoff from the road to the stream channel, the road generating the runoff is considered to be hydrologically connected to the stream. Where hydraulic connectivity exists, rapid runoff, sediment delivery, and road-associated channels generated on the road surface provide an efficient sediment route into the natural channel network.

In summary, the higher the density of roads in a stream corridor, the more likely an influence to the water quality and quantity in the area. Based on an analysis of the amount of road in the stream corridor by 5th code HUC, in which at least 20% of the stream corridor is in close proximity to a road (150 feet) only two areas on the Custer NF exceed this level. These include the southeast corner of the Ekalaka Hills (10110201170) on the Sioux Ranger District and the Crooked Creek Area (10080010030) on the Beartooth Ranger District.

(G) *AQ (7)* WHAT DOWNSTREAM BENEFICIAL USES OF WATER EXIST IN THE AREA? WHAT CHANGES IN USES AND DEMAND ARE EXPECTED OVER TIME? HOW ARE THEY AFFECTED OR PUT AT RISK BY ROAD-DERIVED POLLUTANTS?

Current beneficial uses across the Forest are domestic use, irrigation, livestock watering, etc. as defined by the Montana Department of Natural Resources and Conservation. Some surface water sources are currently over claimed and are undergoing State adjudication. No increased demands for beneficial use of water originating in the drainage are anticipated. Road derived pollutants such as sediment could negatively affect domestic (household) beneficial uses. However, there has not been a concern expressed by downstream water users to date. Appropriate water quality for all downstream beneficial uses has been maintained within the drainage.

A major beneficial use in and downstream of the Custer National Forest is trout/fish habitat. The Yellowstone River, the Clarks Fork of the Yellowstone River, and several major tributaries including the Rock Creeks, Rosebud Creeks, and Still Water River drainages requiring B1 or higher water quality standards to support the beneficial use of propagation and support of cold water biota; including important salmonid fisheries. The Tongue and

Powder River systems also support important warm water fisheries. As human populations increase within the area an increased demand for high quality recreational fisheries is expected. Anthropogenic effects to water quality and fish populations are possible from potential increases in road densities associated with urbanization, oil and gas development, and water diversion.

(H) *AQ (8)* HOW AND WHERE DOES THE ROAD SYSTEM AFFECT WETLANDS?

Wetlands are lands in transition between terrestrial and aquatic systems where the water table is at or near the surface of the land and often covered with shallow water. In order to be considered a jurisdictional wetland, the wetland must be saturated and at least part of the year has un-drained hydric soils, and support predominately hydrophytic vegetation. Wetlands are extremely valuable wildlife, esthetic, and recreational habitats, and have important functions such as sediment filtration, flow moderation, nutrient and pollution attenuation, and act as sources of organic energy for adjacent aquatic habitats. The Custer National Forest is well dissected and well drained and has limited areas of wetlands. The two eastern Districts have limited precipitation. The most frequent type of wetland on the Custer NF include Lacustrine wetlands along lake and pond shorelines, Palustrine wetlands or wet meadows and forested wet areas, and Riverine wetlands along perennial stream channels and springs.

Roads can affect wetlands by direct encroachment or through changes in water regimes. Roads can fill wetlands, particularly small palustine wetlands, encroach in stream channels with filling of riverine wetlands, or can create artificial wetlands by impounding water on the upstream side of road prisms. As wetlands on the Custer NF as so rare the most frequent wetland impact has been the disturbing, filling, and road/drainage sediment impacts to riverine wetlands were roads parallel or cross streams.

(I) *AQ (9)* HOW DOES THE ROAD SYSTEM ALTER PHYSICAL CHANNEL DYNAMICS, INCLUDING ISOLATION OF FLOODPLAINS; CONSTRAINTS ON CHANNEL MIGRATION; AND THE MOVEMENT OF LARGE WOOD, FINE ORGANIC MATTER, AND SEDIMENT?

(i) Channel dynamics and floodplain isolation discussion

Depending on location and design, forest roads have the potential to physically alter the development of stream channels flood plains and wetlands (Trombulak & Frissell 2000). These physical effects are often realized distally from the point of road stream/floodplain incursion (Richards et al.1975). The physical response of stream channels to roads is typically dependent on the degree of interference with flood plain access and constricting channel migration across the flood plain. Roads can affect natural sediment supply and hydrologic regimes by altering erosion rates and overland flow patterns, sediment delivery transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, stream flows, turbidity, and riparian condition within the watershed (Quigley 1997).

The proximity of roads to streams and the number of stream crossing is related to the potential for interference with stream channel dynamics (Jones et al. 2000). Roads can

directly effect the hydrology of stream channels by intercepting shallow ground water flows, efficiently rerouting flows to the stream channel at stream crossings (Megahan 1972; Wemple et al 1996). This can result in changes in the timing and intensity of runoff which can have a profound effect on stream channels; effects may be more evident in smaller streams (Jones & Grant 1996). Changes in how surface and subsurface flow are routed to the stream can result in channel down cutting, new gully or head initiation and a subsequent overall lowering of the water table (Megahan 1972; Richardson et al. 1975. Wemple et al. 1996. Seyedbaggheri 1996). These processes can adversely affect aquatic biota including fish over a large portion of the stream channel for long periods of time (Hagans et al. 1986; Hicks et al. 1991).

(ii) *Movement of large woody debris, fine organic matter and sediment discussion*

Roads can impair the natural recruitment of woody debris into the stream channel from the floodplain (Piegay & Landon 1997). Stream crossing in the form of culverts, bridges and fords can also interfere with the transport of water, sediment, and woody material along the stream course. Poorly designed or undersized crossing structures can increase the risk of sediment delivery from the failure of associated fill material or through increased localized erosion. Channel constriction resulting from undersized bridges and culverts also tend to create upstream depositional areas, which promote lateral migration and downstream scour.

Accelerated fine sediment delivery to streams from unpaved roads in combination with reduced routing efficiencies can reduce productivity, survival, and growth of fish (Newcombe & Jensen 1996). Road restoration activities can reduce the potential of erosion and delivery, however the consequences of cumulative sediment delivery are often long.lasting and excessive deposition cannot be effectively mitigated (Hagans et al. 1986)

In summary, the higher the density of roads in a stream corridor, the more likely they are to influence to the physical channel dynamics in the area. Based on an analysis of the amount of road in the stream corridor by 5th code HUC, in which at least 20% of the stream corridor is in close proximity to a road (150 feet) only two areas on the Custer NF exceed this level. These include the southeast corner of the Ekalaka Hills (10110201170) on the Sioux Ranger District and the Crooked Creek Area (10080010030) on the Beartooth Ranger District. Also, the Sioux District has a low water stream crossing on Boxelder Creek and a bridge over Campbell Creek.

(J) *AQ (10)* HOW AND WHERE DOES THE ROAD SYSTEM RESTRICT THE MIGRATION AND MOVEMENT OF AQUATIC ORGANISMS? WHAT AQUATIC SPECIES ARE AFFECTED AND TO WHAT EXTENT?

Movement of aquatic organisms both up and down stream is important for dispersal, reproduction (spawning migrations), genetic exchange, and seasonal habitat utilization. Culverts in the road system can block migration of fish and other aquatic organisms, including macroinvertebrates (Pearce and Watson 1983) (Furniss et al. 1991), which can have serious consequences on fish life histories and populations. Salmonids may move from main

channel into floodplains or small tributaries to escape stress of main channel flood flows (Copp 1989). Salmonids especially require a variety of habitats that provide food, shelter, suitable water quality and access to upstream and down stream habitats for spawning and overwintering habitat (Meehan. 1991). Trombulak and Frissell (2000) suggest "persistent barriers may encourage local selection of behaviors that do not include natural migration patterns, potentially reducing the distribution and productivity of a population."

Culverts pose the most common migration barrier associated with the road systems on the Custer National Forest. Many of the culverts on the CNF are located on low order streams, which typically receive short duration high intensity flow events during spring runoff that, although highly variable, coincides with migration of spring spawning native salmonids. The increase of flow from spring runoff can compounded fish passage by increasing flow velocities in the culvert (Ashton & Carlson 1984).

Road culverts in some instances have protected populations of native cutthroat trout from introgression of non-native species and in other instances; road culverts have restricted access to habitats or effectively isolating populations. Road culverts conditions that can block fish passage include high water velocity, shallow water depth in the culvert, no resting/jumping pool below culvert, and height of culvert outlet to fish jumping capability height. Stuart (1962) identified the ideal leaping conditions for fish under laboratory conditions was a ratio 1:1.25 barrier height to water depth. Burst swimming speeds for resident salmonids average 4-13.5 ft/sec (Bell 1991).

Road crossings consisting of culverts on perennial streams on the Beartooth Ranger District have the greatest potential to effect the migration and movement of aquatic species on the Custer National Forest. The lack of large numbers of perennial streams in the Ashland and Sioux Districts minimize the potential for effects. Onsite inspections of approximately 30 culverts located on fish bearing streams in the Beartooth Ranger District during 2002 indicate that channel constrictions have resulted in at least a partial blockage of upstream fish passage under some flows, particularly for juvenile fish. However, based on the limited productivity of these high elevation stream systems and the very high gradients of many of these tributary streams the potential for significant effects to the migration of aquatic species (fish) appears to be very low for the Forest as a whole.

(K) *AQ (11)* HOW DOES THE ROAD SYSTEM AFFECT SHADING, LITTER FALL, AND RIPARIAN PLANT COMMUNITIES?

The importance of riparian plant communities for stream shading and the subsequent effects on water temperatures is the primary concern. Roading activities within the stream corridor can reduce the amount of vegetation available for thermal buffering, nutrient input (litterfall), and result in a change in riparian plant composition and structure. Temperature effects on fish have been a topic of numerous studies. The direct and indirect influences of temperature on fish include; effects on metabolism, food requirements, growth rates, developmental rates of embryos, timing of migration, fry emergence, competitor and predator interactions, and disease (Spence et al 1996). Streamside vegetation is important in providing shade over low order streams, which helps maintain cool stream temperature in the summer and insulates the stream from excessive heat loss in winter (Meehan 1991). Roads and associated maintenance activities can result in sustained physical removal of riparian vegetation, which would other wise shade the stream.

Allochthonous sources of organic matter can be altered be removing riparian vegetation (Duncan & Brusven 1985). Leaves , needles and woody debris is the primary energy source used by microbes and invertebrates in headwater streams (Vannote 1980). Litterfall or detritus plays a key role in the productivity of small streams by providing an important food source for invertebrates. Small streams are efficient in retaining litter; almost all leaves that fall into a stream are retained within the next 10-1000 meters downstream (Speaker et al 1984).

A reduction in litterfall can result in localized effects the stream biota where road activities have directly removed riparian vegetation. Large woody debris is also an impotent in the retention and trapping of detritus (Meehan 1991). Reduction of litterfall can affect aquatic invertebrate communities and over all productivity of the stream. Trees, which fall into the stream, contribute logs that shape channel morphology retain organic matter, and provide essential cover for fish. This appears to be especially true in class A and B (Rosgen 1994) streams, which are the most common channel types found on the GNF. The presence of a road closely paralleling the stream cooridor effectively reduces the recruitment of LWD by 50% by intercepting the flow of wood from upslope areas.

Riparian vegetation contributes an important role in the creation and modification of stream geomorphic features (Pringle et al. 1988 Swanson et a 1988; Gregory et al 1991), which can affect fish habitat. For instance riparian vegetation stabilizes stream banks, making them less likely to erode during high flow events influences bank morphology, and aids in reducing stream bank damage from ice and debris flows and animal trampling (Karr and Schiosser 1978, Platts 1979, Marlow and Pogacnik 1985). Riparian areas also function as sediment filters, aquifer recharge, and dissipating high-energy stream flow. Healthy root systems stabilize banks and maintain undercut banks that offer cover for salmonids (Meehan 1991).

In small, dimly lit mountain streams, heavy canopy cover can limit primary production (Gregory 1980). Removal of the stream canopy can result in an increase in primary production, which can be beneficial to fish, however often the loss of thermal buffering nullifies this benefits (Meehan 1991). Shortreed and Stockner (1983) found that even if the canopy is opened primary production might not increase if nutrients remain scarce. Road system can mobilize dust, which can settle on plants reducing photosynthesis, respiration and transpiration causing physical injuries (Farmer 1993). These effects are significant enough to alter plant community composition, especially lichens and moss (Auerbach et al. 1997)

As with findings dealing with potential effects to channel dynamics from road systems in close proximity to streams, the same relationship applies to effects on the riparian community. In summary the higher the density of roads in the riparian community the more likely a negative influence will occur to the aquatic environment. Several of the main roads accessing the Beartooth Face drainages are located in narrow valley bottoms within or just above the riparian corridor, such as the West Fork of Rock Creek. Direct removal or changes in riparian plant communities have occurred in association with road construction and maintenance in some of these isolated locations. However, as such a small proportional area of streams and riparian areas within the analysis area are affected by the existing and

proposed road reconstruction work. The risk of adverse effects to riparian communities is very low.

(L) *AQ (12)* HOW AND WHERE DOES THE ROAD SYSTEM CONTRIBUTE TO FISHING, POACHING, OR DIRECT HABITAT LOSS FOR AT-RISK AQUATIC SPECIES?

Generally, roads in or near the stream corridor allow for increased access for recreational fishing opportunities with a possible subsequent increase in angler harvest and the potential for poaching activities (Allen & Flecker 1993, Trombulak & Frissell 1999). Catch and release regulations may also lead to declines in abundances, due to additional bioenergetic stresses on individuals, for example Schill and other (1986) estimated that an individual Yellowstone cutthroat trout was caught and released an average of 9.7 times in an 108 day angling season in Yellowstone National Park. Angler harvest has contributed to declines in abundance of Yellowstone and westslope cutthroat trout throughout their historic range (Binns 1977; Gresswell and Varley 1988; Rieman and Apperson 1989; Thurow and others 1988; Varley and Gresswall 1988). Increased access to streams can lead to overexploitation of westslope cutthroat trout populations due to the naturally aggressive feeding behavior of this subspecies (Rieman and Apperson 1989. As four the five know genetically pure populations of Yellowstone cutthroat trout are located in streams on the Custer National Forest that are characterized as difficult to access, due to the lack of having roads in close proximity to the stream. This is not a significant concern for cutthroat populations on the Custer National Forest.

Direct fish habitat loss has occurred through armoring (rip-rapping), of the road segments in a few locations on the Beartooth Ranger District of the CNF. Armoring outside meander bends with riprap typically simplifies habitat, accelerate stream flows, and often resulted in subsequent downstream channel adjustment. These chronic problem areas should be moved out of the stream corridor where constant maintenance is need to maintain the presence of the road. However, as such a small proportion of the streams within the analysis area are affected by the existing and proposed road reconstruction work that has the potential to directly affect the stream channel. The risk of adverse effects to direct habitat loss is very low across the Forest for at-risk aquatic species.

(M) *AQ (13)* HOW AND WHERE DOES THE ROAD SYSTEM FACILITATE THE INTRODUCTION OF NON-NATIVE AQUATIC SPECIES?

Roads allowing public access increases the potential for illegal introduction of non-native aquatic species. This situation is compounded by the presence of non-native fish (brook, brown and rainbow) in almost all of the drainages that support fish populations on across the Forest. Extensive introduction of rainbow brook and brown trout has occurred from the late 1800's up until the mid 1950's in Montana. Active stocking of non-native salmonids currently occurs primarily in reservoirs and alpine lakes.

Current state of Montana fishing regulations prohibits the possession or transportation of live fish away from the body of water from which it was caught with few exceptions. This regulation reduces the risk of transport and introduction of non-native invasive species such as whirling disease and New Zealand mud snails.

The risk of introduction of non-native aquatic species is relatively low across the Forest. Further degradation of the genetic integrity of existing hybridized Yellowstone Cutthroat trout on the Beartooth Ranger District is not expected from illegal introductions from the road system.

(N) *AQ (14)* TO WHAT EXTENT DOES THE ROAD SYSTEM OVERLAP WITH AREAS OF EXCEPTIONALLY HIGH AQUATIC DIVERSITY OR PRODUCTIVITY, OR AREAS CONTAINING RARE OR UNIQUE AQUATIC SPECIES OR SPECIES OF INTEREST?

Currently five populations of genetically pure Yellowstone cutthroat trout are know to exist on the Beartooth Ranger District, Custer National Forest. With the exception of Crooked Creek in ((10080010030), the road systems associated with these populations have minimal overlap and influence in the way of direct or indirect effects to those populations. Due to the above analyzed effects of having roads in close proximity to stream corridors, and particularly as it relates to the process of sediment delivery, the Crooked Creek Road does overlap and pose a risk to this sensitive fish population.

Due to the lack of suitable habitat and documented presence of sturgeon chub or sicklefin chub on the Ashland and Sioux Ranger Districts, road systems on those Districts are expected to have minimal or no effect on those rare fish species.

5.04 TERRESTRIAL WILDLIFE (TW)

(A) *TW (1)* WHAT ARE THE DIRECT EFFECTS OF THE ROAD SYSTEM ON TERRESTRIAL SPECIES HABITAT?

The primary direct effects of roads on wildlife are habitat fragmentation and loss of habitat security or use due to high roads densities. Road density can be considered an ecological index of road effects on wildlife and wildlife habitat. In this analysis road density was calculated by the number of road miles per square mile within a watershed (5th Code) or sub-watershed (6th Code). Watersheds or sub-watersheds with medium (>1 mile/mile^2) and high (>2 mile/mile^2) road densities are displayed in Tables TW (1)-1, 2, and 3.

Various wildlife studies have indicated behavioral changes or avoidance of roads within ½ mile of an open road. The degree of wildlife impacts by roads is influenced by factors such road width and traffic volume. Wildlife security habitat was measured using a ½ mile buffer on all classified and unclassified roads, maintenance levels 1, 2, 3, 4, and 5, on the Forest. Tables TW (1)-1, 2, and 3 displays percent of available wildlife security habitat by watershed and sub-watershed. Watersheds or sub-watersheds with high road densities generally correspond with low security values.

Table TW (1)-1. District's percent wildlife security habitat and road density rating by watershed.

Beartooth Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Miles of Road in FS Boundary	% Security Habitat within HUC	Miles of road/sq.mile within HUC in FS Boundary	Wildlife road density effects rating
10070005030	10	27.49	15%	2.33	High
10070006150	30	9.49	29%	2.04	High
10080010030	10	46.74	16%	2.15	High
10080010030	50	5.76	0%	4.20	High
10080014020	30	8.32	0%	2.58	High
10080014030	20	3.87	0%	2.78	High
10070005010	70	30.98	42%	1.20	Medium
10070005030		38.93	46%	1.11	Medium
10080010030		69.23	25%	1.86	Medium
10080010030	40	14.63	47%	1.20	Medium
10080010030	20	2.08	13%	1.15	Medium
10080014010		55.73	18%	1.89	Medium
10080014010	10	51.88	19%	1.92	Medium
10080014010	40	3.85	4%	1.52	Medium
10080014020		33.45	14%	1.63	Medium
10080014020	10	3.64	2%	1.49	Medium
10080014020	20	8.14	12%	1.25	Medium
10080014020	50	13.34	26%	1.61	Medium
10080014030		28.25	21%	1.41	Medium
10080014030	10	24.37	23%	1.30	Medium

Table TW (1)-2. District's percent wildlife security habitat and road density rating by watershed.

Sioux Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Miles of Road in FS Boundary	% Security Habitat within HUC	Miles of road/sq.mile within HUC in FS Boundary	Wildlife road density effects rating
24		9.15	3%	2.99	High
41		3.67	2%	2.45	High
61		2.79	4%	2.05	High
62		14.58	1%	2.18	High
117		11.65	14%	2.25	High
182		6.57	2%	2.61	High
10110201130	50	9	0%	2.37	High
10110201130	60	0.83	0%	2.26	High
10110201140		51.41	4%	2.45	High

Table TW (1)-2. District's percent wildlife security habitat and road density rating by watershed.

Sioux Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Miles of Road in FS Boundary	% Security Habitat within HUC	Miles of road/sq.mile within HUC in FS Boundary	Wildlife road density effects rating
10110201140	30	34.73	5%	2.45	High
10110201140	20	6.49	0%	2.31	High
10110201140	10	10.18	0%	2.52	High
10110201150	20	0.48	7%	2.45	High
10110201170	40	6.67	6%	2.77	High
10110201180		41.8	12%	2.21	High
10110201180	20	8.48	0%	4.59	High
10110201180	10	23.1	9%	2.22	High
10110202050		115.79	6%	2.13	High
10110202050	60	7.73	12%	2.62	High
10110202050	70	41	3%	2.36	High
10110202050	80	6.32	0%	2.43	High
10110202050	30	5.76	1%	3.51	High
10110202050	40	35.77	4%	2.04	High
19		14.46	10%	1.92	Medium
33		1.77	5%	1.88	Medium
40		13.62	9%	1.46	Medium
64		5.97	28%	1.05	Medium
71		7.34	19%	1.51	Medium
112		15.83	15%	1.66	Medium
151		24.57	14%	1.45	Medium
160		20.93	12%	1.95	Medium
179		5.17	20%	1.01	Medium
10090209070		10.52	28%	1.52	Medium
10090209070	20	10.52	28%	1.52	Medium
10110201130		35.86	6%	1.92	Medium
10110201130	40	24.13	7%	1.81	Medium
10110201130	20	1.88	9%	1.71	Medium
10110201150		36.44	10%	2.00	Medium
10110201150	10	35.96	10%	1.99	Medium
10110201170		19.06	13%	2.00	Medium
10110201170	10	12.39	15%	1.74	Medium
10110201180	30	3.07	31%	1.02	Medium
10110201180	40	7.12	10%	1.97	Medium
10110202040		3.37	39%	1.01	Medium
10110202040	10	3.32	47%	1.37	Medium

Table TW (1)-2. District's percent wildlife security habitat and road density rating by watershed.

Sioux Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Miles of Road in FS Boundary	% Security Habitat within HUC	Miles of road/sq.mile within HUC in FS Boundary	Wildlife road density effects rating
10110202050	50	19.18	9%	1.66	Medium
10110202060		7.04	22%	1.41	Medium
10110202060	10	7.04	22%	1.41	Medium

Table TW (1)-3. District's percent wildlife security habitat and road density rating by watershed.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Miles of Road in FS Boundary	% Security Habitat within HUC	Miles of road/sq.mile within HUC in FS Boundary	Wildlife road density effects rating
10090102040	80	30.31	3%	2.20	High
10090102050	20	110.88	5%	2.10	High
10090102120		38.72	14%	2.00	High
10090102120	60	0.92	1%	2.44	High
10090102120	10	7.65	0%	2.88	High
10090101090		92.01	14%	1.40	Medium
10090101090	50	48.94	11%	1.51	Medium
10090101090	40	37.4	15%	1.27	Medium
10090101090	60	5.14	39%	1.59	Medium
10090102020		97.9	24%	1.09	Medium
10090102020	80	22.85	21%	1.25	Medium
10090102020	40	53.11	17%	1.25	Medium
10090102030		52.33	5%	1.62	Medium
10090102030	70	33.71	1%	1.70	Medium
10090102030	60	12.45	8%	1.56	Medium
10090102030	50	5.9	12%	1.39	Medium
10090102040		408.83	11%	1.55	Medium
10090102040	100	48.03	18%	1.26	Medium
10090102040	90	37.35	11%	1.60	Medium
10090102040	70	36.28	6%	1.71	Medium
10090102040	60	57.05	11%	1.55	Medium
10090102040	50	44.9	8%	1.47	Medium
10090102040	30	21.03	4%	1.54	Medium
10090102040	40	83.46	6%	1.84	Medium
10090102040	20	9.88	19%	1.14	Medium
10090102040	10	29.35	19%	1.17	Medium
10090102050		249.3	11%	1.70	Medium

Table TW (1)-3. District's percent wildlife security habitat and road density rating by watershed.

Ashland Ranger District					
Fifth Code Watershed	**Sixth Code Subwatershed**	**Miles of Road in FS Boundary**	**% Security Habitat within HUC**	**Miles of road/sq.mile within HUC in FS Boundary**	**Wildlife road density effects rating**
10090102050	30	66.11	10%	1.61	Medium
10090102050	10	66.02	15%	1.47	Medium
10090102070		63.9	20%	1.26	Medium
10090102070	20	15.38	8%	1.65	Medium
10090102070	10	36.32	5%	1.66	Medium
10090102080		28.07	7%	1.86	Medium
10090102080	10	28.07	7%	1.86	Medium
10090102120	40	12.92	26%	1.87	Medium
10090102120	20	17.2	10%	1.83	Medium
10090102130		64.5	19%	1.64	Medium
10090102130	20	13	17%	1.83	Medium
10090102130	10	51.5	20%	1.60	Medium
10090207070		59.64	19%	1.21	Medium
10090207070	50	46.59	21%	1.20	Medium
10090207070	40	12.65	12%	1.38	Medium
10090207070	90	0.39	0%	1.38	Medium

Shaded areas are 5th code watersheds.

Watersheds with moderate or high road densities and/or low percentages of available security habitat are good indicators of fragmented habitats and areas of excessive human access. Roads in these watersheds may hinder wildlife movement and habitat use. These areas may indicate a need for road management modifications.

(B) *TW (2)* HOW DOES THE ROAD SYSTEM FACILITATE HUMAN ACTIVITIES THAT AFFECT HABITAT?

The road system facilitates recreational and land management activities. Common recreational activities on the Custer national Forest include picnicking, camping, hunting, firewood cutting, and wildlife viewing. Applicable land management activities include fire suppression, fuels treatments, timber management, mineral (locatable and leasable) extraction and production, and grazing management.

Snag reduction. Firewood gathering often reduces snag densities adjacent to roads. Typically firewood gathering will reach one to two tree lengths from the road, and usually from the uphill side of the road, making the job easier for the firewood gatherer. If road densities are low in an area, snag densities are not typically restrictive to snag dependent wildlife species such as cavity nesters (e.g., American kestrel, black-backed woodpecker).

Areas that have recently burned, primarily by wildfire, offer some of the best snag habitat on the Custer NF. These areas are often focus areas for firewood cutters. Tables TW(4)-1, 2, and 3 displays miles of road, by watershed, through wildfire burn areas since 1988. Based on the large amount of snag habitat available across the Forest, over 250,000 acres of wildfire burn areas since 1988; firewood gathering should not have a long-term negative impact on snag habitat availability. However, for the short-term, watersheds with high road miles through burned areas could indicate a need for snag management by way of travel management.

Disturbance. Roads allow travel by humans that can affect wildlife use patterns as discussed above. Many wildlife species avoid contact with humans and their vehicles. Hunters use the road to hunt from and to access more remote areas. This disturbance can reduce wildlife use of areas adjacent to a road for up to a ½ mile. People also use roads to access the Forest for wildlife viewing and other passive recreational activities. This passive use may still disturb wildlife use patterns, causing wildlife to avoid roaded areas. Again road density is an effective means to measure impacts of roads on wildlife and wildlife habitat. See Tables TW (1)-1, 2, and 3 for HUCs that were rated for medium and high road density.

(C) *TW (3)* HOW DOES THE ROAD SYSTEM AFFECT LEGAL AND ILLEGAL HUMAN ACTIVITIES (INCLUDING TRAPPING, HUNTING, POACHING, HARASSMENT, ROAD KILL, OR ILLEGAL KILL LEVELS)? WHAT ARE THE EFFECTS ON WILDLIFE SPECIES?

The road system also provides access for hunting, snowmobiling, camping, trapping, and OHV/motorcycle use. Legal hunting and trapping removes individual animals from the population and other activities temporarily displace individuals, but such human activities probably do not have a long-term affect on the overall behavior or reproductive success of most animal species across the Forest. The Montana Department of Fish, Wildlife and Parks regulates these legal activities, determining the appropriate levels of harvest on numerous species, such as deer, elk, bear, mountain lion, and beaver. These levels have been determined using social and resource objectives.

Some poaching and taking of nontarget wildlife probably occurs on the Forest. Specific locations of these activities are not known. Illegal takings of animals could include wolves, grizzly bear, black bear, elk, deer, bighorn sheep, prairie dogs, as well as other non-game animals. Road density data provides a way to quantify high to low levels of access. Roads may allow easier access to some areas for poachers. Harassment, illegal trapping and poaching (illegal activities) are not easily addressed because these activities could occur in areas with high or low road densities. These illegal activities probably do not occur frequently enough to substantially affect population dynamics. There have been no documented accounts of poaching of Threatened and Endangered Species in the recent past on the Custer NF. Tables TW (3)-1, 2, and 3, and Tables TW (3)-4 and 5 display road miles within available (mapped) TES and MIS habitat and occupation sites on the Custer National Forest.

TABLE TW (3)-1. Acres of mapped TES and MIS habitat on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Beartooth Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within 30' of Road Corridor	
10070005010	10	42,111.20	413.15	Core Grizzly Bear habitat	135.21
				Potential Lynx Foraging	134.71
				Potential Lynx Denning	143.23
10070005010	50	40,822.74	32.46	Core Grizzly Bear habitat	32.46
10070006140	50	23,688.24	143.09	Potential Lynx Foraging	93.08
				Potential Lynx Denning	50.01
10080010030	10	13,941.46	136.23	Potential Lynx Foraging	95.22
				Potential Lynx Denning	41.01
10080010030	20	1,161.28	6.48	Potential Lynx Foraging	6.48
10080010030	40	7,805.03	25.58	Potential Lynx Foraging	17.91
				Potential Lynx Denning	7.67
10080010030	50	877.93	7.89	Potential Lynx Foraging	7.89
10080010050	10	9,350.89	33.48	Potential Lynx Foraging	15.87
				Potential Lynx Denning	17.61
10080014010	10	17,250.63	98.7	Potential Lynx Foraging	28.72
				Potential Lynx Denning	69.98
10080014010	40	1,621.46	0.43	Potential Lynx Foraging	0.06
				Potential Lynx Denning	0.37
10080014020	10	1,563.96	0.13	Potential Lynx Foraging	0.13
				Potential Lynx Denning	0
10080014020	20	4,169.17	5.79	Potential Lynx Foraging	5.79
10080014020	30	2,061.90	1.59	Potential Lynx Foraging	1.59
10080014020	50	5,317.22	11.11	Potential Lynx Foraging	9.83
				Potential Lynx Denning	1.28
10080014030	10	11,960.49	17.19	Potential Lynx Foraging	16.93
				Potential Lynx Denning	0.26
10080014030	20	890.27	3.66	Potential Lynx Foraging	3.66

TABLE TW (3)-2. Acres of mapped TES and MIS habitat on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Sioux Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within 30' of Road Corridor	
10090209070	20	4,418.01	72.12	Big Game Seasonal Range	72.12
10110201130	40	8,553.65	159.56	Big Game Seasonal Range	159.56
10110201130	50	2,434.08	63.98	Big Game Seasonal Range	63.98

TABLE TW (3)-2. Acres of mapped TES and MIS habitat on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Sioux Ranger District					
10110201140	10	2,583.53	51.57	Big Game Seasonal Range	51.57
10110201140	30	9,069.34	219.48	Big Game Seasonal Range	219.48
10110201150	10	11,558.24	176.15	Big Game Seasonal Range	176.15
10110201150	20	125.19	3.53	Big Game Seasonal Range	3.53
10110201170	10	4,557.23	89.73	Big Game Seasonal Range	89.73
10110201170	40	1,542.45	45.95	Big Game Seasonal Range	45.95
10110201180	10	6,660.15	93.58	Big Game Seasonal Range	93.58
10110201180	20	1,183.37	46.95	Big Game Seasonal Range	46.95
10110201180	30	1,927.31	19.91	Big Game Seasonal Range	19.91
10110201180	40	2,317.49	45.4	Big Game Seasonal Range	45.4
10110202040	10	1,550.06	16.63	Big Game Seasonal Range	16.63
10110202050	30	1,048.94	41.31	Big Game Seasonal Range	41.31
10110202050	40	11,198.90	232.04	Big Game Seasonal Range	232.04
10110202050	50	7,412.09	133.36	Big Game Seasonal Range	133.36
10110202050	60	1,886.55	55.81	Big Game Seasonal Range	55.81
10110202050	70	11,109.88	178.64	Big Game Seasonal Range	178.64
10110202050	80	1,664.50	32.4	Big Game Seasonal Range	32.4
10110202060	10	3,203.87	23.17	Big Game Seasonal Range	23.17

TABLE TW (3)-3. Acres of mapped TES and MIS habitat on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within 30' of Road Corridor	
10090101090	30	456.59	2.52	Big Game Seasonal Range	2.52
10090101090	40	18,869.10	108.19	Big Game Seasonal Range	108.19
10090101090	50	20,771.35	138.06	Big Game Seasonal Range	138.06
10090101090	60	2,072.23		Big Game Seasonal Range	8.68
10090102020	10	11,470.60	41.62	Big Game Seasonal Range	41.62
10090102020	40	27,170.91	282.7	Big Game Seasonal Range	282.7
10090102020	50	5,042.06	30.85	Big Game Seasonal Range	30.85
10090102020	80	11,731.05	155.61	Big Game Seasonal Range	155.61
10090102030	40	167.93	1.82	Big Game Seasonal Range	1.82
10090102030	50	2,715.21	4.04	Big Game Seasonal Range	4.04
10090102030	60	5,123.82	89.36	Big Game Seasonal Range	89.36
10090102030	70	12,679.01	100.73	Big Game Seasonal Range	100.73
10090102040	10	16,029.94	128.78	Big Game Seasonal Range	128.78
10090102040	20	5,546.22	50.21	Big Game Seasonal Range	50.21
10090102040	30	8,765.12	57.88	Big Game Seasonal Range	57.88
10090102040	40	29,050.86	235.32	Big Game Seasonal Range	235.32
10090102040	50	19,595.98	82.13	Big Game Seasonal Range	82.13
10090102040	60	23,534.10	291.21	Big Game Seasonal Range	291.21
10090102040	70	13,558.71	118.32	Big Game Seasonal Range	118.32
10090102040	80	8,803.45	25.19	Big Game Seasonal Range	25.19

TABLE TW (3)-3. Acres of mapped TES and MIS habitat on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Ashland Ranger District					
10090102040	90	14,900.55	256.52	Big Game Seasonal Range	256.52
10090102040	100	24,451.22	270.46	Big Game Seasonal Range	270.46
10090102040	110	4,743.92	40.22	Big Game Seasonal Range	40.22
10090102050	10	28,755.81	198.09	Big Game Seasonal Range	198.09
10090102050	20	33,751.65	457.74	Big Game Seasonal Range	457.74
10090102050	30	26,302.54	237.8	Big Game Seasonal Range	237.8
10090102050	40	5,055.89	37.08	Big Game Seasonal Range	37.08
10090102070	10	13,978.56	263.45	Big Game Seasonal Range	263.45
10090102070	20	5,951.69	110.76	Big Game Seasonal Range	110.76
10090102070	30	7,633.57	10.46	Big Game Seasonal Range	10.46
10090102080	10	9,647.14	58.1	Big Game Seasonal Range	58.1
10090102120	10	1,699.77	52.39	Big Game Seasonal Range	52.39
10090102120	20	6,001.63	124.2	Big Game Seasonal Range	124.2
10090102120	40	4,424.55	46.39	Big Game Seasonal Range	46.39
10090102120	60	240.83	6.83	Big Game Seasonal Range	6.83
10090102130	10	20,545.80	356.75	Big Game Seasonal Range	356.75
10090102130	20	4,557.01	90.6	Big Game Seasonal Range	90.6

Table TW (3)-4. Mapped TES and MIS sites on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Ashland Ranger District				
Fifth Code Watershed	Sixth Code Subwatershed	Total Unique Habitat Sites	Sites within 30' of Road Corridor	
10090101090	40	2	Grouse Lek Sites	2
10090101090	50	2	Goshawk Nest Territories	1
			Grouse Lek Sites	1
10090101090	60	1	Grouse Lek Sites	1
10090102020	10	3	Goshawk Nest Territories	2
			Grouse Lek Sites	1
10090102020	40	4	Grouse Lek Sites	4
10090102040	20	2	Grouse Lek Sites	2
10090102040	30	4	Grouse Lek Sites	4
10090102040	40	4	Grouse Lek Sites	4
10090102040	50	1	Grouse Lek Sites	1
10090102040	60	2	Grouse Lek Sites	2
10090102040	80	1	Grouse Lek Sites	1
10090102040	90	2	Grouse Lek Sites	2
10090102040	110	2	Grouse Lek Sites	2
10090102050	10	7	Goshawk Nest Territories	1
			Grouse Lek Sites	6
10090102050	20	3	Grouse Lek Sites	3
10090102050	30	2	Grouse Lek Sites	2
10090102130	10	4	Goshawk Nest Territories	4

Table TW (3)-5. Mapped TES and MIS sites on the Custer National Forest within 30 feet (avg. right-of-way width) of a road.

Ashland Ranger District		
Fifth Code Watershed	Sixth Code Subwatershed	Miles of Road within Prairie Dog Town
10090102020	10	2.13
10090102030	60	1.73
10090102030	70	0.01
10090102040	10	1.72
10090102040	20	0.35
10090102040	30	3.21
10090102050	10	6.95
10090102050	20	4.95
10090102050	30	0.27
10090102070	10	3.77
10090102080	10	1.80

(D) *TW (4)* HOW DOES THE ROAD SYSTEM DIRECTLY AFFECT UNIQUE COMMUNITIES OR SPECIAL FEATURES IN THE AREA?

Several unique habitats are available for wildlife across the Custer NF. These habitats include sagebrush communities, aspen stands/clones, hardwood draws, mature forest, wetland communities, and snag patches (see burned area discussion above). Table TW (4) displays the number of road miles that bisects these unique habitats by watershed and Ranger District.

Table TW (4)-1. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Beartooth Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10070005010	10	42111.2	5.80	Mature Forest Habitat (tsmrs & silc3)	0.53
				Wetland Habitat	5.27
10070005010	40	39784.13	10.48	Mature Forest Habitat (tsmrs & silc3)	0.66
				Wetland Habitat	9.82
10070005010	50	40822.74	62.42	Mature Forest Habitat (tsmrs & silc3)	35.33
				Wetland Habitat	27.09
10070005010	60	27265.39	137.88	Mature Forest Habitat (tsmrs & silc3)	42.06
				Wetland Habitat	95.82
10070005010	70	16495.02	74.31	Mature Forest Habitat (tsmrs & silc3)	18.67
				Wetland Habitat	55.64
10070005020	20	32258.85	69.21	Mature Forest Habitat (tsmrs & silc3)	8.48

Table TW (4)-1. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Beartooth Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
				Wetland Habitat	60.73
10070005030	10	7564.42	103.93	Mature Forest Habitat (tsmrs & silc3)	81.38
				Wetland Habitat	22.55
10070005030	30	7163.79	45.39	Mature Forest Habitat (tsmrs & silc3)	5.03
				Wetland Habitat	40.36
10070005030	40	5839.53	67.90	Mature Forest Habitat (tsmrs & silc3)	12.99
				Wetland Habitat	54.91
10070005040	20	25956.78	56.92	Mature Forest Habitat (tsmrs & silc3)	14.56
				Wetland Habitat	42.36
10070005040	30	6291.31	1.27	Wetland Habitat	1.27
10070005040	40	17807.78	27.91	Mature Forest Habitat (tsmrs & silc3)	20.82
				Wetland Habitat	7.09
10070006090	10	8816.6	35.77	Mature Forest Habitat (tsmrs & silc3)	3.41
				Wetland Habitat	32.36
10070006090	30	1444.72	6.73	Wetland Habitat	6.73
10070006090	40	1278.26	4.36	Wetland Habitat	4.3636
10070006140	10	2816.97	2.58	Mature Forest Habitat (tsmrs & silc3)	1.49
				Wetland Habitat	1.09
10070006140	20	19902.43	255.57	Mature Forest Habitat (tsmrs & silc3)	79.21
				Wetland Habitat	176.36
10070006140	30	24367.15	36.25	Mature Forest Habitat (tsmrs & silc3)	8.8
				Wetland Habitat	27.45
10070006140	40	42739.33	117.55	Mature Forest Habitat (tsmrs & silc3)	19.73
				Wetland Habitat	97.82
10070006140	50	23688.24	68.47	Mature Forest Habitat (tsmrs & silc3)	8.7
				Wetland Habitat	56.36
				Burned Areas (Snag Habitat)	3.41
10070006150	10	19634.1	37.17	Mature Forest Habitat (tsmrs & silc3)	25.35
				Wetland Habitat	11.82
10070006150	30	2983.21	13.65	Mature Forest Habitat (tsmrs & silc3)	7.83
				Wetland Habitat	5.82
10080010030	10	13941.46	995.31	Sagebrush Habitat (silc3)	0.07
				Wetland Habitat	850.00
				Mature Forest Habitat (tsmrs & silc3)	70.7
				Burned Areas (Snag Habitat)	74.54
10080010030	20	1161.28	41.55	Mature Forest Habitat (tsmrs & silc3)	3.73
				Wetland Habitat	37.82

Table TW (4)-1. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Beartooth Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10080010030	40	7805.03	339.35	Mature Forest Habitat (tsmrs & silc3)	12.12
				Wetland Habitat	266.00
				Burned Areas (Snag Habitat)	61.23
10080010030	50	877.93	121.79	Mature Forest Habitat (tsmrs & silc3)	1.25
				Wetland Habitat	104.73
				Burned Areas (Snag Habitat)	15.81
10080010050	10	9350.89	164.61	Aspen (silc3)	0.47
				Wetland Habitat	156.18
				Mature Forest Habitat (tsmrs & silc3)	7.96
10080014010	10	17250.63	300.93	Sagebrush Habitat (silc3)	0
				Wetland Habitat	261.27
				Aspen (silc3)	4.16
				Mature Forest Habitat (tsmrs & silc3)	35.5
10080014010	40	1621.46	23.27	Wetland Habitat	23.27
10080014020	10	1563.96	15.24	Sagebrush Habitat (silc3)	4.88
				Wetland Habitat	10.36
10080014020	20	4169.17	59.45	Wetland Habitat	59.45
10080014020	30	2061.9	79.13	Sagebrush Habitat (silc3)	0.04
				Wetland Habitat	79.09
10080014020	50	5317.22	87.58	Sagebrush Habitat (silc3)	1.79
				Wetland Habitat	82.00
				Mature Forest Habitat (tsmrs & silc3)	3.79
10080014030	10	11960.49	328.37	Sagebrush Habitat (silc3)	21.25
				Wetland Habitat	301.82
				Mature Forest Habitat (tsmrs & silc3)	2.5
				Burned Areas (Snag Habitat)	2.8
10080014030	20	890.27	75.10	Sagebrush Habitat (silc3)	2.84
				Wetland Habitat	71.27
				Mature Forest Habitat (tsmrs & silc3)	0.7
				Burned Areas (Snag Habitat)	0.29

Table TW (4)-2. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Sioux Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10090209070	20	4418.01	52.82	Hardwood Draw Habitat (tsmrs)	1.64
				Wetland Habitat	38.00
				Mature Forest Habitat (tsmrs & silc3)	13.18
10110201130	20	702.33	13.75	Mature Forest Habitat (tsmrs & silc3)	3.57
				Wetland Habitat	10.18
10110201130	40	8553.65	275.38	Hardwood Draw Habitat (tsmrs)	3.03
				Wetland Habitat	82.73
				Mature Forest Habitat (tsmrs & silc3)	15.04
				Burned Areas (Snag Habitat)	174.58
10110201130	50	2434.08	125.46	Burned Areas (Snag Habitat)	65.28
				Wetland Habitat	60.18
10110201130	60	234.81	1.82	Mature Forest Habitat (tsmrs & silc3)	0.91
				Wetland Habitat	0.91
10110201140	10	2583.53	112.93	Burned Areas (Snag Habitat)	73.29
				Wetland Habitat	39.64
10110201140	20	1795.94	68.90	Burned Areas (Snag Habitat)	46.9
				Wetland Habitat	22.00
10110201140	30	9069.34	361.30	Hardwood Draw Habitat (tsmrs)	4.25
				Wetland Habitat	106.55
				Burned Areas (Snag Habitat)	250.5
10110201150	10	11558.24	380.08	Hardwood Draw Habitat (tsmrs)	2.95
				Wetland Habitat	145.27
				Burned Areas (Snag Habitat)	231.86
10110201170	10	4557.23	92.18	Mature Forest Habitat (tsmrs & silc3)	32
				Wetland Habitat	60.18
10110201170	40	1542.45	41.62	Hardwood Draw Habitat (tsmrs)	0.15
				Wetland Habitat	39.27
				Mature Forest Habitat (tsmrs & silc3)	2.2
10110201180	10	6660.15	144.25	Mature Forest Habitat (tsmrs & silc3)	15.7
				Wetland Habitat	128.55
10110201180	20	1183.37	40.78	Mature Forest Habitat (tsmrs & silc3)	4.6
				Wetland Habitat	36.18
10110201180	30	1927.31	9.99	Mature Forest Habitat (tsmrs & silc3)	1.44
				Wetland Habitat	8.55
10110201180	40	2317.49	42.25	Mature Forest Habitat (tsmrs & silc3)	3.7
				Wetland Habitat	38.55
10110202040	10	1550.06	6.50	Mature Forest Habitat (tsmrs & silc3)	2.14
				Wetland Habitat	4.36

Table TW (4)-2. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Sioux Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10110202040	20	590.85	0.91	Wetland Habitat	0.91
10110202050	30	1048.94	46.76	Hardwood Draw Habitat (tsmrs)	2.23
				Wetland Habitat	34.73
				Mature Forest Habitat (tsmrs & silc3)	9.8
10110202050	40	11198.9	441.34	Hardwood Draw Habitat (tsmrs)	4.79
				Wetland Habitat	159.27
				Mature Forest Habitat (tsmrs & silc3)	27.03
				Burned Areas (Snag Habitat)	250.25
10110202050	50	7412.09	202.72	Mature Forest Habitat (tsmrs & silc3)	2.88
				Wetland Habitat	73.27
				Burned Areas (Snag Habitat)	126.57
10110202050	60	1886.55	14.06	Hardwood Draw Habitat (tsmrs)	0.61
				Wetland Habitat	13.45
10110202050	70	11109.88	391.35	Hardwood Draw Habitat (tsmrs)	1.74
				Wetland Habitat	207.09
				Mature Forest Habitat (tsmrs & silc3)	16.54
				Burned Areas (Snag Habitat)	165.98
10110202050	80	1664.5	19.21	Mature Forest Habitat (tsmrs & silc3)	3.94
				Wetland Habitat	15.27
10110202060	10	3203.87	35.64	Mature Forest Habitat (tsmrs & silc3)	1.27
				Wetland Habitat	13.09
				Burned Areas (Snag Habitat)	21.28

Table TW (4)-3. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10090101090	30	456.59	0.34	Sagebrush Habitat (silc3)	0.34
10090101090	40	18869.1	216.88	Sagebrush Habitat (silc3)	1.59
				Wetland Habitat	179.09
				Mature Forest Habitat (tsmrs & silc3)	17.35
				Burned Areas (Snag Habitat)	18.85
10090101090	50	20771.35	217.93	Sagebrush Habitat (silc3)	12.21
				Wetland Habitat	164.73
				Mature Forest Habitat (tsmrs & silc3)	40.99
10090101090	60	2072.23	9.34	Sagebrush Habitat (silc3)	3.66

Table TW (4)-3. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
				Wetland Habitat	0.91
				Mature Forest Habitat (tsmrs & silc3)	4.77
10090102020	10	11470.6	83.50	Sagebrush Habitat (silc3)	11.88
				Wetland Habitat	53.64
				Mature Forest Habitat (tsmrs & silc3)	17.04
				Burned Areas (Snag Habitat)	0.94
10090102020	20	2257.4	3.18	Sagebrush Habitat (silc3)	3.18
10090102020	40	27170.91	518.15	Sagebrush Habitat (silc3)	25.27
				Wetland Habitat	260.55
				Mature Forest Habitat (tsmrs & silc3)	7.67
				Burned Areas (Snag Habitat)	224.66
10090102020	50	5042.06	70.59	Sagebrush Habitat (silc3)	1.72
				Wetland Habitat	43.27
				Mature Forest Habitat (tsmrs & silc3)	25.6
10090102020	80	11731.05	310.45	Sagebrush Habitat (silc3)	17.78
				Wetland Habitat	176.91
				Burned Areas (Snag Habitat)	115.76
10090102030	40	167.93	0.54	Mature Forest Habitat (tsmrs & silc3)	0.54
10090102030	50	2715.21	24.31	Mature Forest Habitat (tsmrs & silc3)	3.95
				Wetland Habitat	20.36
10090102030	60	5123.82	68.90	Sagebrush Habitat (silc3)	3.42
				Wetland Habitat	42.18
				Mature Forest Habitat (tsmrs & silc3)	23.3
10090102030	70	12679.01	187.90	Sagebrush Habitat (silc3)	9.34
				Wetland Habitat	159.27
				Mature Forest Habitat (tsmrs & silc3)	19.29
10090102040	10	16029.94	173.73	Sagebrush Habitat (silc3)	20.45
				Wetland Habitat	119.27
				Mature Forest Habitat (tsmrs & silc3)	34.01
10090102040	20	5546.22	44.58	Sagebrush Habitat (silc3)	1.05
				Wetland Habitat	32.00
				Mature Forest Habitat (tsmrs & silc3)	10.29
				Burned Areas (Snag Habitat)	1.24
10090102040	30	8765.12	143.82	Sagebrush Habitat (silc3)	2.51
				Wetland Habitat	93.45
				Mature Forest Habitat (tsmrs & silc3)	11.36
				Burned Areas (Snag Habitat)	36.5
10090102040	40	29050.86	331.62	Sagebrush Habitat (silc3)	71.03

Table TW (4)-3. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
				Wetland Habitat	197.64
				Mature Forest Habitat (tsmrs & silc3)	55.79
				Burned Areas (Snag Habitat)	7.16
10090102040	50	19595.98	184.44	Sagebrush Habitat (silc3)	10.7
				Wetland Habitat	140.55
				Mature Forest Habitat (tsmrs & silc3)	33.19
10090102040	60	23534.1	414.42	Sagebrush Habitat (silc3)	12.38
				Wetland Habitat	199.09
				Mature Forest Habitat (tsmrs & silc3)	13.3
				Burned Areas (Snag Habitat)	189.65
10090102040	70	13558.71	148.53	Sagebrush Habitat (silc3)	16.98
				Wetland Habitat	110.00
				Mature Forest Habitat (tsmrs & silc3)	21.55
10090102040	80	8803.45	323.24	Sagebrush Habitat (silc3)	13.12
				Wetland Habitat	120.55
				Burned Areas (Snag Habitat)	189.57
10090102040	90	14900.55	167.59	Sagebrush Habitat (silc3)	3.17
				Wetland Habitat	109.82
				Mature Forest Habitat (tsmrs & silc3)	54.6
10090102040	100	24451.22	266.06	Sagebrush Habitat (silc3)	4.94
				Wetland Habitat	183.64
				Mature Forest Habitat (tsmrs & silc3)	77.48
10090102040	110	4743.92	52.13	Sagebrush Habitat (silc3)	2.11
				Burned Areas (Snag Habitat)	50.02
10090102050	10	28755.81	378.09	Sagebrush Habitat (silc3)	29.96
				Wetland Habitat	240.18
				Mature Forest Habitat (tsmrs & silc3)	70.9
				Burned Areas (Snag Habitat)	37.05
10090102050	20	33751.65	896.34	Sagebrush Habitat (silc3)	161.82
				Wetland Habitat	539.09
				Mature Forest Habitat (tsmrs & silc3)	87.22
				Burned Areas (Snag Habitat)	108.21
10090102050	30	26302.54	393.52	Sagebrush Habitat (silc3)	32.91
				Wetland Habitat	294.55
				Mature Forest Habitat (tsmrs & silc3)	66.06
10090102050	40	5055.89	67.68	Sagebrush Habitat (silc3)	1.64
				Wetland Habitat	39.64
				Mature Forest Habitat (tsmrs & silc3)	2.54
				Burned Areas (Snag Habitat)	23.86
10090102060	10	3659.86	31.16	Sagebrush Habitat (silc3)	8.98
				Wetland Habitat	22.18

Table TW (4)-3. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10090102060	50	1446.61	1.80	Sagebrush Habitat (silc3)	0.71
				Wetland Habitat	1.09
10090102070	10	13978.56	217.44	Sagebrush Habitat (silc3)	5.92
				Wetland Habitat	157.27
				Mature Forest Habitat (tsmrs & silc3)	54.25
10090102070	20	5951.69	152.99	Sagebrush Habitat (silc3)	4.46
				Wetland Habitat	97.64
				Mature Forest Habitat (tsmrs & silc3)	50.89
10090102070	30	7633.57	30.95	Sagebrush Habitat (silc3)	0.02
				Wetland Habitat	30.36
				Mature Forest Habitat (tsmrs & silc3)	0.57
10090102070	40	3623.53	36.91	Mature Forest Habitat (tsmrs & silc3)	10.36
				Wetland Habitat	26.55
10090102080	10	9647.14	183.80	Sagebrush Habitat (silc3)	2.14
				Wetland Habitat	130.36
				Mature Forest Habitat (tsmrs & silc3)	51.3
10090102120	10	1699.77	24.90	Sagebrush Habitat (silc3)	0.25
				Wetland Habitat	20.00
				Mature Forest Habitat (tsmrs & silc3)	4.65
10090102120	20	6001.63	88.48	Sagebrush Habitat (silc3)	3.39
				Wetland Habitat	46.18
				Mature Forest Habitat (tsmrs & silc3)	38.91
10090102120	40	4424.55	47.59	Sagebrush Habitat (silc3)	0.01
				Wetland Habitat	35.82
				Mature Forest Habitat (tsmrs & silc3)	11.76
10090102120	60	240.83	4.18	Wetland Habitat	4.18
10090102130	10	20545.8	237.87	Sagebrush Habitat (silc3)	4.34
				Wetland Habitat	178.91
				Mature Forest Habitat (tsmrs & silc3)	54.62
10090102130	20	4557.01	56.98	Sagebrush Habitat (silc3)	3.1
				Wetland Habitat	32.91
				Mature Forest Habitat (tsmrs & silc3)	20.97
10090207070	40	5885.57	41.83	Sagebrush Habitat (silc3)	4.8
				Wetland Habitat	28.55
				Mature Forest Habitat (tsmrs & silc3)	8.48
10090207070	50	24905.95	273.14	Sagebrush Habitat (silc3)	18.96
				Wetland Habitat	209.45
				Mature Forest Habitat (tsmrs & silc3)	44.73

Table TW (4)-3. Acres of unique habitat within watersheds and sub-watersheds by District on the Custer National Forest.

Ashland Ranger District					
Fifth Code Watershed	Sixth Code Subwatershed	Acres of Watershed within FS Boundary	Total Unique Habitat Acres	Acres of Habitat within Road Corridor[1]	
10090207070	90	366.29	0.68	Sagebrush Habitat (silc3)	0.68

[1] A **150 foot buffer from roads was used for wetland habitat and a 30 foot buffer from roads was used for all other unique habitats.**

The data displayed in all of the tables in the terrestrial wildlife section can be used in combination. For example, watersheds with high or moderate road densities in combination with unique habitats may indicate focus areas for travel management planning.

5.05 ECONOMICS (EC)

(A) *EC (1)* WHAT ARE THE MONETARY COSTS ASSOCIATED WITH THE CURRENT ROAD SYSTEM? HOW DO THESE COSTS COMPARE TO THE BUDGETS FOR MANAGEMENT AND MAINTENANCE OF THE ROAD SYSTEM?

Over the past years the availability of funds to maintain our road system has been very low. Because of the lack of maintenance many of the roads have deteriorated to the point that road maintenance cannot be adequately accomplished to Forest Service standards.

Starting in 1999 the forest was mandated to conduct deferred and annual maintenance surveys on all of our higher standard roads. Data on the Forest is available for the roads with an objective maintenance level 3, 4, and 5. The following table displays the estimated annual and deferred maintenance information that was collected during the summer of 1999, 2000, 2001, and 2002.

Table EC(1)-1: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Beartooth Ranger District				
ID	**NAME**	**Deferred Maintenance**	**Annual Maintenance**	**Capital Improvements**
2004	HELL ROARING CREEK	$262,224	$47,906	
2005	SNOW & SHEEP CR SUMMER	$46,011	$12,202	
2010	PALISADES CAMP	$42,562	$4,971	
2010A	PALISADES CAMPGROUND EAST LOOP	$3,997	$143	
2071	WEST FORK ROCK CREEK	$2,442,281	$70,679	
2071A	ROCK CREEK WC	$17,218	$9,072	
2071C	BASIN CR CAMP	$56,344	$3,754	
2071D	CASCADE CPGD. E. LOOP	$6,456	$1,226	
2071F	WILD BILLS LAKE PARKING	$13,387	$ 2,613	
2071G	CASCADE C.G. WEST LOOP	$14,735	$ 3,543	

Table EC(1)-1: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Beartooth Ranger District				
2071H	BASIN TRAILHEAD	$4,600	$855	
2072	WEST ROSEBUD	$487,010	$119,678	
2072A	PINE GROVE CAMPGROUND	$21,289	$ 2,895	
2072A1	2072A1	$9,992	$1,956	
2072B	PINE GROVE NORTH LOOP	$21,084	$6,141	
2072C	EMERALD LAKE INLET	$13,655	$9,187	
2072D	EMERALD LAKE SOUTH LOOP	$21,009	$4,132	
2083	SAGE CR CAMP	$19,696	$804	$19,872
2085	CROOKED CREEK	$335,491	$25,347	
2087	RED LODGE R S	$44,624	$2,917	
2140	PICKET PIN	$695,694	$20,612	
2141	RED LODGE CREEK	$265,677	$45,385	
2141A	WEST REDLODGE CREEK	$2,997	$739	
2141C	2141 C	47,465	$10,112	
2144	FIVE BAR	$43,915	$5,360	
2177	EAST ROSEBUD	$861,428	$53,183	
2177A	UPPER SAND DUNE	$19,553	$3,207	
2177B	EAST ROSEBUD CAMP	$15,698	$2,914	
2177D	JIMMY JOE CAMP	$69,952	$7,987	$42,750
2177E	LOWER SAND DUNE	$14,666	$2,014	
2177F	2177-F	$450		
2223	SAGE CREEK G S	$8,268	$4,103	
2308	PRYOR MOUNTAIN ROAD	$2,128,663	$893,725	$1,444,066
2346	LAKE FORK	$273,105	$37,137	
2379A	SPRING CR SUMMER HOMES-A	$50,886	$7,394	
2379B	SHERIDAN CAMP	$22,159	$2,227	
2379C	RATINE REC AREA	$19,223	$3,767	
2379D	WESTMINSTER SPIRES	$8,143	$1,831	
2379E	SPRING CREEK HOMES E	$6,991	$5,392	
2379F	SPRING CREEK HOMES F	$6,548	$4,911	
2379G	CORRAL CREEK TRAIL HEAD	$3,559	$592	
2379H	SPRING CREEK HOMES H	$5,892	$4,532	
2379I	SPRING CREEK HOMES-I	$6,461	$245	
2400	STILLWATER TRAILHEAD RD	$330,990	$22,686	

Table EC(1)-1: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Beartooth Ranger District				
2400A	WOODBINE CG ENTRANCE ROAD	$5,495	$2,296	
2400B	WOODBINE CG FIRST LOOP LEFT	$22,948	$3,249	
2400C	WOODBINE CG SECOND LOOP LEFT	$8,422	$1,922	
2400D	WOODBINE CG FIRST LOOP RIGHT	$9,587	$2,202	
2400E	WOODBINE CG SECOND LOOP RIGHT	$4,092	$1,041	
2414	BENBOW	$231,757	$14,673	
2421	MAIN FK ROCK CREEK	$538,264	$80,807	
2421A	UPPER PARKSIDE CAMP	$42,344	$2,696	
2421B	LIMBER PINE	$27,761	$4,681	
2421C	M K CAMP	$9,747	$4,437	
2421D	GREENOUGH LAKE CAMP GRD	$45,624	$3,572	$39,456
2421F	LOWER PARKSIDE LOOP	$13,179	$2,577	
2846	WEST FK STILLWATER	$454,378	$80,491	
2849	DRY HEAD OVERLOOK	$356,178	$66,106	
2849A	BIG ICE CAVE CAMPGROUND	$3,508	$56	
Total for Beartooth Ranger District		$10,565,330	$1,740,880	$1,546,144

Table EC(1)-2: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Sioux Ranger District				
ID	**NAME**	**Deferred Maintenance**	**Annual Maintenance**	**Capital Improvements**
3042	DOUBLE F ROAD	$34,813	$2,642	
3045	FOSTER ROAD	$146,138	$30,278	
3048	PENDELTON	$83,799	$1,937	
3049	WICKHAM GULCH	$32,857	$5,982	
3052	WICKHAM GULCH CAMPGROUND	$6,061	$2,007	
3086	SLICK CREEK	$9,300	$2,469	
3101	OPEECHE PARK	$233,480	$12,677	
3104	RIMROCK CARTER	$395,889	$95,000	
3105	ORIGINAL HWY	$32,174	$16,554	
3111	3111 BOX SPRINGS	$539,297	$21,694	
3113	S CAVE HILLS	$309,139	$64,225	
3114	FULLER PASS	$423,860	$5,476	
3115	J B PASS	$191,660	$7,579	
3116	CAPITAL ROCK	$819,815	$58,117	
3117	SNOW CREEK	$767,614	$155,336	$332,590
3117A	LANTIS SPRING CAMPGR'D	$39,214	$8,049	

Table EC(1)-2: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Sioux Ranger District				
3118	PLUM CREEK	$645,595	$73,059	
3119	EXIE	$219,574	$33,439	
3120	RILEY PASS	$246,816	$6,243	
3123	PICNIC SPRING RD	$130,811	$34,450	
3123A	PICNIC SPRINGS CMPGRND.	$32,389	$8,620	
3124	REDCROSS	$4,924	$3,383	
3126	REVA CAMPGROUND	$18,939	$6,614	
3131	CRAIG PASS (ODELL CREEK)	$2,892	$37,900	
3132	N. CAVE DEVILS CANYON	$26,929	$5,994	
3401	MC NAB POND	$27,951	$5,683	
3401A	MC NAB POND CAMP GROUND	$2,854	$5,154	
3812	RIDGE ROAD	$83,069	$20,868	
3813	STAGVILLE DRAW	$244,970	$50,988	
3813A	EKALAKA PARK CMPGRND.	$6,733	$935	
3816	TRENK PASS	$166,268	$52,277	
3818	SPEELMON CR.	$181,101	$14,424	
3819	LOST FARM	$148,589	$38,260	
3RS	D3 RANGER STATION	$10,625	$865	
Total for Sioux Ranger District		$6,266,140	$889,176	$332,590

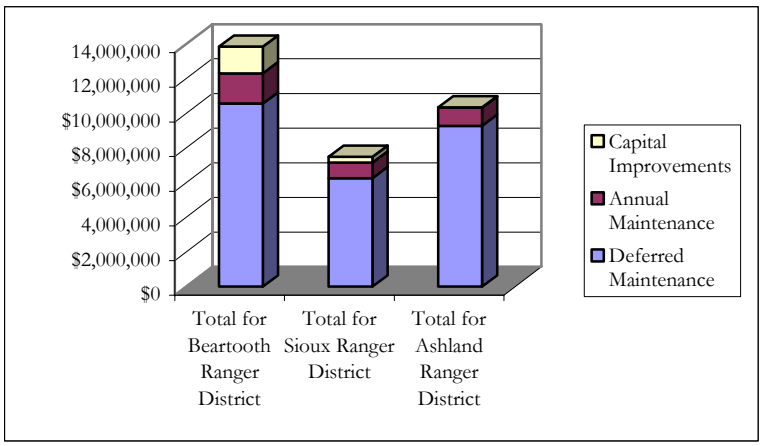
Table EC(1)-3: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Ashland Ranger District				
ID	**NAME**	**Deferred Maintenance**	**Annual Maintenance**	**Capital Improvements**
4021	STOCKER BRANCH	$131,514	$26,435	
4034	BEAR CR	$87,213	$3,567	
4091	ASHLAND R S	$12,138	$1,841	
4091A	ASHLAND HELO PORT	$8,165	$175	
4091B	ASHLAND PARKING LOT	$22,168	$1,425	
4092	TEN MILE CR.	$740,177	$32,648	
4093	FORT HOWES STATION	$26,638	$4,106	
40931	FORT HOWES LOOP	$5,011	$5,011	
40931A	FORT HOWES HELECOPTER HANGER	$4,648	$786	
4094	FIFTEEN MILE	$891,572	$122,932	
4095	COW CREEK	$735,232	$33,454	
4095A	PICNIC AREA	$15,126	$2,034	

Table EC(1)-3: District's estimated annual and deferred maintenance information collected during the summer of 1999, 2000, 2001, and 2002.

Ashland Ranger District				
4096E	RED SHALE CPGD EAST LOOP	$9,738	$2,145	
4096W	RED SHALE CPGD WEST LOOP	$16,639	$3,453	
4127	TAYLOR CREEK	$669,728	$26,104	
4131	O'DELL CREEK	$186,828	$23,158	$20,704
4133	BEAVER CR	$229,775	$46,654	
4423	E FK OTTER CR	$100		
4427	BEAVER PUMPKIN DIVIDE	$216,020	$35,268	
4428	LISCOM BUTTE EAST	$47,388	$9,460	
4431	GRIFFIN PASS	$196,721	$13,351	
4432	BRIDGE CANYON	$260,408	$39,718	
4432A	4432-A	$24,910	$5,917	
4436	TAYLOR DIVIDE	$164,943	$7,107	
4436A	4436-A	$20,111	$21,760	
4436C	4436-C	$27,853	$6,418	
4436D	4436-D	$44,633	$567	
4437	UPPER SOUTH FORK	$85,050	$5,755	
4466	WHITETAIL ADMIN. SITE	$4,769	$1,691	
4501	TOOLEY CREEK	$536,646	$106,982	
4515	POKER TEECHEE	$14,704	$3,340	
4516	DROP TUBE	$134,770	$16,866	
4703	LEMONADE ROAD	$803,613	$107,884	
4769	BEAVER STACEY	$356,335	$24,276	
4770	LISCOM BUTTE WEST	$178,595	$35,346	
4775	WILBUR CREEK CUTOFF	$374,230	$44,932	
4777	SUICIDE PASS	$302,213	$5,597	
4777B	HOLIDAY CAMPGROUND	$10,834	$2,401	
4784	TAYLOR-15MILE CREEK	$335,996	$57,512	
4787	N.FORK TAYLOR CREEK	$101,719	$2,607	
4790	DIVIDE	$152,591	$9,788	
4795	LEE CREEK	$366,160	$32,524	
4797	POKER JIM N FORK LEE	$150,650	$4,354	
4801	POKER JIM BUTTE (4801)	$410,642	$67,583	
4801A	POKER JIM LOOKOUT	$25,651	$4,102	
4802	HAY STOCKER	$143,453	$31,294	
Total for Ashland Ranger District		$9,284,018	$1,040,327	$20,704

This chart summarizes the deferred maintenance; annual maintenance and capital improvements by district that was identified by engineering from 1999-2002 using the electronic road log deferred maintenance data collection process.



The cost to maintain the roads annually is based on the assumption that all deferred maintenance work has been accomplished and the road is being maintained annually.

Table EC(1)-4: Estimated costs of maintaining Maintenance Level 3, 4, and 5 roads once they are up to required standards.

	Miles of Objective ML 3, 4, 5 Roads	Deferred Maintenance Cost/mile	Annual Maintenance Cost/mile
Beartooth Ranger District	121	$76,652	$8,589
Sioux Ranger District	116	$54,173	$7,687
Ashland Ranger District	139	$75,949	$12,514

By bringing the roads up to the required standards and keeping them maintained annually, the long-term costs associated with roads would be less.

(B) *EC (2)* WHAT ARE THE INDIRECT ECONOMIC CONTRIBUTIONS OF ROADS INCLUDING MARKET AND NON-MARKET COSTS AND BENEFITS ASSOCIATED WITH ROAD SYSTEM DESIGN, MANAGEMENT AND OPERATIONS?

Refer to EC(3).

(C) *EC (3)* WHAT ARE THE DIRECT ECONOMIC IMPACTS OF THE CURRENT ROAD SYSTEM AND ITS MANAGEMENT UPON COMMUNITIES AROUND THE FOREST?

A thorough answer to these questions requires input from an Economist. A procedure is needed to compare relative economic values of various benefits. Roads are significant facilities that provide access to and within the Forest. One of the Forest's issues is the long-term public and resource management access needs. The access to National Forest System lands varies across the Forest. All three ranger districts, in a number of instances, have limited access to National Forest System lands because of adjacent private land and in-holdings across which a right-of-way must be obtained. The Forest provides some of the larger consolidated blocks of public lands available for hunting, thus there is certainly an indirect benefit to the State through hunting license receipts. Grazing permittees benefit

from the transportation system for ingress and egress to allotments, as well as shipment to market. The public and government derive benefit from roads well maintained through timber sale contract provisions, operating plans for locatable and leaseable minerals, and special use road permits. The recreating public derives benefits from the National Forest Transportation System directly and indirectly through access to the National Forest and the plethora of activities, roaded and unroaded, that it makes available (i.e. access to A-B Wilderness trailheads, institutional camps, hunting, fishing, sightseeing, skiing etc.). Certainly benefits and costs would be calculated on a road-by-road basis depending on a proposal to improve, close or decommission a road.

Commodity Production

5.06 TIMBER MANAGEMENT (TM)

(A) *TM (1)* HOW DOES ROAD SPACING AND LOCATION AFFECT LOGGING SYSTEM FEASIBILITY?

Transporting logs begins at the stump and end at the mill. A good collector road and well-planned local roads facilitate harvest activities. Planning involves an analysis of yarding systems that are feasible to use in the area and road spacing that allows the effective transportation of the logs to a landing at the road and from the landing to the mill.

(B) *TM (2)* HOW DOES THE ROAD SYSTEM AFFECT MANAGING THE SUITABLE TIMBER BASE AND OTHER LANDS?

It makes it much simpler and roads are sometimes necessary to make management feasible. Much of our vegetation management can only be accomplished if there is access to the area. Roads provide access for heavy equipment, crew transport and burn control equipment.

(C) *TM (3)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS TO TIMBER STANDS NEEDING SILVICULTURAL TREATMENT?

The transportation system provides access, making treatment more feasible and cheaper. Generally, the collector system is in place on the Custer. Following is a list of objective maintenance level 3, 4, 5 roads that provide access to timber stands.

Table TM(3)-1: Objective maintenance level 3, 4, and 5 roads that provide access to timber stands.

Beartooth Ranger District		Sioux Ranger District		Ashland Ranger District	
ID	NAME	ID	NAME	ID	NAME
2010	PALISADES CAMP	3045	FOSTER ROAD	4021	STOCKER BRANCH
2071	WEST FORK ROCK CREEK	3048	PENDELTON	4034	BEAR CR
2072	WEST ROSEBUD	3049	WICKHAM GULCH	4094	FIFTEEN MILE
2085	CROOKED CREEK	3101	OPEECHE PARK	4095	COW CREEK

Table TM(3)-1: Objective maintenance level 3, 4, and 5 roads that provide access to timber stands.

Beartooth Ranger District	
2140	PICKET PIN
2141	RED LODGE CREEK
2141A	WEST REDLODGE CREEK
2141C	2141 C
2144	FIVE BAR
21479	PALISADES
2177	EAST ROSEBUD
2308	PRYOR MOUNTAIN ROAD
2400	STILLWATER TRAILHEAD RD
2414	BENBOW
2846	WEST FK STILLWATER
2849	DRY HEAD OVERLOOK

Sioux Ranger District	
3104	RIMROCK CARTER
3111	3111 BOX SPRINGS
3114	FULLER PASS
3116	CAPITAL ROCK
3117	SNOW CREEK
3118	PLUM CREEK
3119	EXIE
3123	PICNIC SPRING RD
3124	REDCROSS
3132	N. CAVE DEVILS CANYON
3401	MC NAB POND
3812	RIDGE ROAD
3813	STAGVILLE DRAW
3816	TRENK PASS
3818	SPEELMON CR.

Ashland Ranger District	
4127	TAYLOR CREEK
4131	O'DELL CREEK
4133	BEAVER CR
4423	E FK OTTER CR
4427	BEAVER PUMPKIN DIVIDE
4431	GRIFFIN PASS
4432	BRIDGE CANYON
4432A	4432-A
4436	TAYLOR DIVIDE
4436A	4436-A
4436C	4436-C
4436D	4436-D
4437	UPPER SOUTH FORK
4501	TOOLEY CREEK
4516	DROP TUBE
4703	LEMONADE ROAD
4769	BEAVER STACEY
4775	WILBUR CREEK CUTOFF
4777	SUICIDE PASS
4784	TAYLOR-15MILE CREEK
4787	N.FORK TAYLOR CREEK
4790	DIVIDE
4795	LEE CREEK
4797	POKER JIM N FORK LEE
4801	POKER JIM BUTTE (4801)
4802	HAY STOCKER

5.07 MINERAL MANAGEMENT (MM)

(A) *MM (1)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS TO LOCATABLE, LEASABLE, AND SALABLE MINERALS?

It improves access and makes their operations more economically efficient. Locatable mineral prospecting often depends on existing road access to allow economic or even feasible operations. The larger companies are more concerned with having the ability to build a road to the site. Hardrock mineral development has occurred on the area now known as the Beartooth Ranger District since the mid-1800's. Exploration for uranium occurred on the Sioux Ranger District in the late 1950's and early 1960's, but not in commercial quantities. Limited oil and gas has been produced in the North Cave Hills and West Short Pines land units on the Sioux District since the mid to late 1950's. Coal bed methane has been developed on private and other Federal lands near Decker, Wyoming and on lands adjacent to the Ashland Ranger District near Ashland, Montana. No National Forest System lands on the Ashland Ranger District have been leased for oil and gas. Coal bed methane is considered a part of the leaseable oil and gas estate. Preliminary review of the geology across the Forest indicates that the highest potential for coal bed methane development is on the Ashland District. An environmental analysis of the effects of coal bed methane exploration, development, and production would have to occur, and be approved, before such activities could occur on the Ashland District.

Table MM(1)-1: Maintenance level 3, 4, and 5 roads that provide access to existing mineral claims.

Beartooth Ranger District	
ID	**NAME**
2085	CROOKED CREEK
2087	RED LODGE R S
2140	PICKET PIN
2414	BENBOW
2846	WEST FK STILLWATER

Sioux Ranger District	
ID	**NAME**
20S3	(S) SD. HWY 20
3113	S CAVE HILLS
3114	FULLER PASS
3120	RILEY PASS
3121	(C) JB CLARKSON
3123	PICNIC SPRING RD
3123A	PICNIC SPRINGS CMPGRND.
3131	CRAIG PASS (ODELL CREEK)
3132	N. CAVE DEVILS CANYON

5.08 RANGE MANAGEMENT (RM)

(A) *RM (1)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS TO RANGE ALLOTMENTS?

The road system improves access to allotments, makes their operations more economically efficient, and improves the permittee's management of the allotment and the Forest Service's ability to manage the allotment as well as administer the permit.

The following is a list of roads that provide access for range management.

Table RM(1)-1: Maintenance level 3, 4, and 5 roads that provide access for range management.

Beartooth Ranger District	
ID	**NAME**
2072	WEST ROSEBUD
2073	STEVENS DRAW

Sioux Ranger District	
ID	**NAME**
20S3	(S) SD. HWY 20
3042	DOUBLE F ROAD

Ashland Ranger District	
ID	**NAME**
4021	STOCKER BRANCH
4033	OTTER CR

Table RM(1)-1: Maintenance level 3, 4, and 5 roads that provide access for range management.

Beartooth Ranger District	
2083	SAGE CR CAMP
2085	CROOKED CREEK
2140	PICKET PIN
2141	RED LODGE CREEK
2141A	WEST REDLODGE CREEK
2141C	2141 C
2142	MEYERS/ LODGEPOLE CREEK
2144	FIVE BAR
2177	EAST ROSEBUD
2177A	UPPER SAND DUNE
2177D	JIMMY JOE CAMP
2177E	LOWER SAND DUNE
2177F	2177-F
2223	SAGE CREEK G S
2308	PRYOR MOUNTAIN ROAD
2379	(C) EAST SIDE ROAD
2400	STILLWATER TRAILHEAD RD
2414	BENBOW
2846	WEST FK STILLWATER
2849	DRY HEAD OVERLOOK
2849A	BIG ICE CAVE CAMPGROUND

Sioux Ranger District	
3045	FOSTER ROAD
3048	PENDELTON
3049	WICKHAM GULCH
3052	WICKHAM GULCH CAMPGROUND
3086	(PO) SLICK CREEK
3101	OPEECHE PARK
3104	RIMROCK CARTER
3105	ORIGINAL HWY
3111	3111 BOX SPRINGS
3113	S CAVE HILLS
3114	FULLER PASS
3115	J B PASS
3116	CAPITAL ROCK
3117	SNOW CREEK
3117A	LANTIS SPRING CAMPGR'D
3118	PLUM CREEK
3119	EXIE
3120	RILEY PASS
3121	(C) JB CLARKSON
3123	PICNIC SPRING RD
3123A	PICNIC SPRINGS CMPGRND.
3124	REDCROSS
3126	REVA CAMPGROUND
3131	CRAIG PASS (ODELL CREEK)
3132	N. CAVE DEVILS CANYON
3401	MC NAB POND
3401A	MC NAB POND CAMP GROUND
3812	RIDGE ROAD
3813	STAGVILLE DRAW
3813A	EKALAKA PARK CMPGRND.
3814	JT SMITH
3816	TRENK PASS
3818	SPEELMON CR.
3819	LOST FARM
3CNTY_MI	COUNTY RD. - MILL IRON
3CNTY733	COUNTY RD - 733
3HWY79	STATE HIGHWAY 79
3RS	D3 RANGER STATION

Ashland Ranger District	
4034	BEAR CR
4092	TEN MILE CR.
4094	FIFTEEN MILE
4095	COW CREEK
4095A	PICNIC AREA
4096E	RED SHALE CPGD EAST LOOP
4127	TAYLOR CREEK
4131	O'DELL CREEK
4133	BEAVER CR
4423	E FK OTTER CR
4427	BEAVER PUMPKIN DIVIDE
4428	LISCOM BUTTE EAST
4431	GRIFFIN PASS
4432	BRIDGE CANYON
4436	TAYLOR DIVIDE
4436A	4436-A
4436C	4436-C
4436D	4436-D
4466	WHITETAIL ADMIN. SITE
4501	TOOLEY CREEK
4515	POKER TEECHEE
4516	DROP TUBE
4703	LEMONADE ROAD
4769	BEAVER STACEY
4770	LISCOM BUTTE WEST
4775	WILBUR CREEK CUTOFF
4777	SUICIDE PASS
4777B	HOLIDAY CAMPGROUND
4784	TAYLOR-15MILE CREEK
4787	N.FORK TAYLOR CREEK
4790	DIVIDE
4795	LEE CREEK
4797	POKER JIM N FORK LEE
4801	POKER JIM BUTTE (4801)
4801A	POKER JIM LOOKOUT
4802	HAY STOCKER
4HWY212	US HWY 212 - ASHLAND
4HWY484	STATE HIGHWAY 484 - OTTER CRK

5.09 WATER PRODUCTION (WP)

(A) *WP (1)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS, CONSTRUCTING, MAINTAINING, MONITORING, AND OPERATING WATER DIVERSIONS, IMPOUNDMENTS, AND DISTRIBUTION CANALS OR PIPES?

Only one stream on the Forest has been dammed for hydropower, West Rosebud Creek on the north side of the Beartooth Mountains. There are numerous spring developments, stock ponds, stock dugouts, and small ponds and reservoirs located across the Forest. Maintenance Levels 3, 4, and 5 roads access directly in some cases, but mostly facilitate access to the lower maintenance level standard roads that provide service to the aforementioned facilities. Over the past years the availability of funds to maintain our road system has been very low. Because of the lack of maintenance many of the roads have deteriorated to the point the road must be reconstructed.

(B) *WP (2)* HOW DOES ROAD DEVELOPMENT AND USE AFFECT THE WATER QUALITY IN MUNICIPAL WATERSHEDS?

On the Beartooth Ranger District, Management Area R, which includes that part of the West Fork of Rock Creek outside of the Absaroka-Beartooth Wilderness and the developed recreation sites along the creek, is the only municipal watershed on the Forest. This watershed used to provide much of the water for the community of Red Lodge, Montana. . Recently however, the city of Red Lodge began acquiring their water from wells. The West Fork of Rock Creek is still identified by the city of Red Lodge as a back-up water source. There is no road development planned within the watershed in the foreseeable future. Please refer to discussion provided at AQ 4, 6, 7.

(C) *WP (3)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS TO HYDROELECTRIC POWER GENERATION?

Road 2072 is the only road used to access the Mystic Lake hydroelectric power generators in the West Rosebud drainage.

5.10 SPECIAL FOREST PRODUCTS (SP)

(A) *SP (1)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS FOR COLLECTING SPECIAL FOREST PRODUCTS?

Maintenance Levels 3, 4, and 5 roads provide access directly in some cases, but mostly facilitate access to the lower maintenance level standard roads which in turn also provide access for the collection and removal of special use products. It appears that ML 3, 4, and 5 roads are adequate to provide this access.

5.11 SPECIAL-USE PERMITS (SU)

(A) *SU (1)* HOW DOES THE ROAD SYSTEM AFFECT MANAGING SPECIAL-USE PERMIT SITES (CONCESSIONAIRES, COMMUNICATIONS SITES, UTILITY CORRIDORS, AND SO ON)?

There are a number of special use activities authorized across the Forest, communication sites, grazing, organization camps, outfitting, recreation cabins, roads, and utility corridors, to name a few. The existing road system provides access to these facilities. There is a road system to get to all communication sites but not all have legal access. Maintenance level 3, 4, and 5 roads are adequate for access, except for NFSR #4777, Suicide Pass road. There appears to be adequate access for all other special use activities given the current demand, i.e. summer cabins, power lines, and organization camps.

General Public Transportation (GT)

(B) *GT (1)* HOW DOES THE ROAD SYSTEM CONNECT TO PUBLIC ROADS AND PROVIDE PRIMARY ACCESS TO COMMUNITIES?

Several Federal and State Highways provide access to a number of ML 3, 4, and 5 roads across the Forest. U.S. 212 and 310 connect directly to or facilitate access to ML 3, 4, and 5 roads on the Beartooth Ranger District. Further east, U.S. 212 also provides access directly to ML 3, 4, and 5 roads, as does Secondary Highway 484 on the Ashland Ranger District. State Highway 7 and Secondary Highways 277, 323, and 328 all facilitate access to the three land units of the Sioux Ranger District in Montana. In South Dakota U.S. 85 provides access to State Highway 20, which then facilitates access to ML 3 roads that access the five remaining land units on the Sioux District.

The Forest lies adjacent to the communities of Cooke City, Red Lodge, Ashland, and Ekalaka, Montana, and Camp Crook and Buffalo, South Dakota. There are other smaller communities that lie within relatively short distances of the Forest. None of these communities is reliant upon ML 3, 4, and 5 roads to provide access to them.

(C) *GT (2)* HOW DOES THE ROAD SYSTEM CONNECT LARGE BLOCKS OF LAND IN OTHER OWNERSHIP TO PUBLIC ROADS (AD HOC COMMUNITIES, SUBDIVISIONS, INHOLDINGS, AND SO ON)?

There are several roads that provide access to private in-holdings within the administrative boundaries of the Custer National Forest.

Table GT(2)-1: Maintenance level 3, 4, and 5 roads that provide access to private in-holdings within the administrative boundaries of the Custer National Forest.

Beartooth Ranger District	
ID	**NAME**
2071	WEST FORK ROCK CREEK
2071B	TIMBER CREST GIRL SCOUT CAMP
2072	WEST ROSEBUD
2073	STEVENS DRAW
2140	PICKET PIN
2141	RED LODGE CREEK
2141A	WEST REDLODGE CREEK
2141C	2141 C
2142	MEYERS/ LODGEPOLE CREEK
2144	FIVE BAR
21479	PALISADES
2177	EAST ROSEBUD
2308	PRYOR MOUNTAIN ROAD
2379	(C) EAST SIDE ROAD

Sioux Ranger District	
ID	**NAME**
3101	OPEECHE PARK
3104	RIMROCK CARTER
3111	3111 BOX SPRINGS
3115	J B PASS
3117	SNOW CREEK
3118	PLUM CREEK
3119	EXIE
3124	REDCROSS
3812	RIDGE ROAD
3816	TRENK PASS
3818	SPEELMON CR.

Ashland Ranger District	
ID	**NAME**
4021	STOCKER BRANCH
4033	OTTER CR
4034	BEAR CR
4092	TEN MILE CR.
4094	FIFTEEN MILE
4095	COW CREEK
4127	TAYLOR CREEK
4131	O'DELL CREEK
4133	BEAVER CR
4423	E FK OTTER CR
4437	UPPER SOUTH FORK
4703	LEMONADE ROAD
4769	BEAVER STACEY
4770	LISCOM BUTTE WEST
4775	WILBUR CREEK CUTOFF
4777	SUICIDE PASS
4784	TAYLOR-15MILE CREEK
4787	N.FORK TAYLOR CREEK
4790	DIVIDE
4795	LEE CREEK
4797	POKER JIM N FORK LEE

(D) *GT (3)* HOW DOES THE ROAD SYSTEM AFFECT MANAGING ROADS WITH SHARED OWNERSHIP OR WITH LIMITED JURISDICTION? (RS 2477, COST-SHARE, PRESCRIPTIVE RIGHTS, FLPMA EASEMENTS, FRTA EASEMENTS, DOT EASEMENTS)?

There are no roads that the Forest Service, Custer National Forest, shares ownership with another entity or individual across the Forest.

Custer National Forest has granted a number of Forest Road and Trail (FRTA) easements and concurred with several Department of Transportation grants to appropriate county and state public road agencies, transferring jurisdiction of the road to respective counties or states. The following tables identify those roads. Situations that make the transfer of jurisdiction appropriate include roads that serve local and state residents for purposes such as mail service, school bus, emergency services and access to homes/residences. Roads that only provide a travel route to National Forest System lands are more properly retained in NFS jurisdiction and management.

Deed terms and conditions include resource restrictions, termination-reversion directions, use of herbicides direction, civil rights requirements and direction to coordinate with Forest Service.

Table GT(3)-1: Roads for which a Forest Road and Trail (FRTA) easement has been issued and to whom.

Beartooth Ranger District						
ID	**Road**	**Legal**	**To**	**Date**	**County Record**	**Remarks**
2414	Benbow Mine/Mill Quitclaim FPDSA of 1949	T5S,R16E M & B; Outside Forest only	Stillwater County	9/3/1958	B59,p285	public road and Mine & Mill use
2379	East Side Rd #379 FRTA easement	T8S,R19E T8S,R20E	Carbon County	3/27/1992	B125,p387 B125, p396	Grant; Assign
2HWY212	Highway 212 Beartooth Highway DOT Grant	see deed FH59-2(1) FL59(1), FL59-2, FH59-2(2), FHP59D	State Montana	4/1/1986	B55,p381	
2HWY212	Highway 212 Beartooth Highway DOT Grant	T8S, R19,20E F272(2) & FHP59-2(4)	State MT	2/3/1971	B89, 582	
21479	Griz Peak Rd DOT Grant	T8S, R20E T7S, R19E FAS 274(1)	State MT	7/29/1986	B113, p692	

Table GT(3)-2: Roads for which a Forest Road and Trail (FRTA) easement has been issued and to whom.

Sioux Ranger District						
ID	**Road**	**Legal**	**To**	**Date**	**County Record**	**Remarks**
3CNTY_PD	Prairie Dale Rd FRTA easement	T1N, R59E PM, MT	Carter Co. MT	31918	B53, P311	
3121	JB Clarkson Rd 121 FRTA easement	T21N, R5E, BHM	Harding Co.	34584	B55Misc, P11	
3CNTY_MI	Mill Iron Rd FRTA easement	T2S, R62E, PM, MT	Carter Co.	34942	B112Misc, Document 165360	
3131	Odell Crk Rd 131 FRTA easement	T22N, R5E, BHM	Harding Co.	34584	B55Msc, p15	
3132	Devil's Canyon #132 FRTA easement	T22N, R5E	Harding BHM	34584	B55Msc, p7	
3HWY79	Highway 79 DOT Grant	T16N, R8E, BHM	State South Dakota	25723	B6plats, p49	
3120	Riley Pass #120 Public Highwy deed Haskevitz to Harding Co	T22N, R5E BHM	State South Dakota	8885	B11Deeds, p592	
3114	Fuller Pass Road #114 Feist to Harding Co.	T22N, R5E BHM	Harding Co.	27121	????????	
3HWY323	Ekalaka/Alzada Rd 323 DOT grant	T1N, R58&59E PM,MT S347(101)	State MT	27059	B44deeds, p314	
3HWY323	Ekalaka/Alzada Rd 323 DOT grant 318(3)	T1N, R58E PM,MT	State MT	27059	B44deeds, p306	

Table GT(3)-3: Roads for which a Forest Road and Trail (FRTA) easement has been issued and to whom.

Ashland Ranger District						
ID	**Road**	**Legal**	**To**	**Date**	**County Record**	**Remarks**
4094	Fifteen Mile Road FRTA easement	T5S, R45E PM, MT	Powder River County	7/20./1992	B47,p844	#118421
4HWY484	Otter Crk Rd DOT Grant	T 7S, R45E PM,MT FAS STPS 484-1(6)20	State MT	3/27/1998	B56, p271	
4HWY212	Ashland-Broadus DOT Grant	T3S, R45,46,47E PM,MT FHP 53A2B2C2DE1	State MT	31365	B33Msc, p670	111229
4HWY212	Camps Pass DOT Grant NH 37-3(7)77F	T3S, R46& 47E PM, MT	State MT	35824	#122096 microfilm	
4HWY212	Highway 212 DOT Grant	T3S, R45E, PM, MT F37-2(8)63	State MT	33329	#117617 microfilm B40, p291	
4795? 4769? 4797?	N.Fk. Lee Crk #797 Quarter Circle U to Rosebud Co.	T7S, R44E, PM, MT	Rosebud Co	31895	B83, p72	
4HWY484	Otter-Ashland DOT Grant	T5S, R45E, T6S, R46E	State MT	25855	B36, p171	

Roads that are part of an existing Schedule A agreement are listed below in Table GT(3)-4.

Table GT(3)-4: Maintenance level 3, 4, and 5 roads that are part of a Schedule A agreement.

Beartooth Ranger District		
ID	**NAME**	**COUNTY**
2140	PICKET PEN	STILLWATER
2400	STILLWATER	STILLWATER
2414	BENBOW	STILLWATER
2072	WEST ROSEBUD	STILLWATER
2HWY419	NYE	STILLWATER
2142	MEYERS/LODGEPOLE CREEK	STILLWATER

Ashland Ranger District		
ID	**NAME**	**COUNTY**
4423	EAST FORK OTTER CREEK	POWDER RIVER
4133	BEAVER CREEK	POWDER RIVER
4094	FIFTEEN MILE	POWDER RIVER
4790	DIVIDE	POWDER RIVER
4034	BEAR CREEK	POWDER RIVER
4501	TOOLEY CREEK	POWDER RIVER
4127	TAYLOR CREEK	POWDER RIVER
4775	WILBUR CREEK CUTTOFF	POWDER RIVER
4792	HIGHLINE	POWDER RIVER
4092	TENMILE	POWDER RIVER
4795	LEE CREEK	ROSEBUD
4131	O'DELL CREEK	ROSEBUD
4095	COW CREEK	ROSEBUD

Sioux Ranger District		
ID	**NAME**	**COUNTY**
3117	SNOW CREEK	CARTER
3816	TRENK PASS	CARTER
2CNTY_MI	MILL IRON	CARTER
3102A	MCNAB POND	CARTER
3104	RIMROCK CARTER	CARTER
3116	CAPITAL ROCK	CARTER
3813	STAGVILLE DRAW	CARTER
3113	SOUTH CAVE HILLS	HARDING
3124	RED CROSS	HARDING
3126	REVA GAP CG	HARDING
3115	JB PASS	HARDING
3111	BOX SPRINGS	HARDING
3114	FULLER PASS	HARDING
3120	RILEY PASS	HARDING
3116	CAPITAL ROCK	HARDING
3118	PLUM CREEK	HARDING
2CNTY_MI	MILL IRON	HARDING
3131	CRAIG PASS	HARDING
3132	DEVILS CANYON	HARDING

The following is a list of objective maintenance level 3, 4, and 5 roads that currently have concerns with Right-of-way.

Table GT(3)-5: Maintenance level 3, 4, and 5 roads that have a right-of-way concern.

Beartooth Ranger District	
ID	**NAME**
2073	STEVENS DRAW
2141C	2141 C
2144	FIVE BAR
2177	EAST ROSEBUD
2308	PRYOR MOUNTAIN ROAD
2414	BENBOW

Sioux Ranger District	
ID	**NAME**
3048	PENDELTON
3118	PLUM CREEK
3816	TRENK PASS
3117	SNOW CREEK
3116	CAPITAL ROCK

Ashland Ranger District	
ID	**NAME**
4034	BEAR CR
4094	FIFTEEN MILE
4095	COW CREEK
4131	O'DELL CREEK
4428	LISCOM BUTTE EAST
4437	UPPER SOUTH FORK
4501	TOOLEY CREEK
4703	LEMONADE ROAD
4769	BEAVER STACEY
4777	SUICIDE PASS
4784	TAYLOR-15MILE CREEK

Table GT(3)-5: Maintenance level 3, 4, and 5 roads that have a right-of-way concern.

Beartooth Ranger District	Sioux Ranger District	Ashland Ranger District	
		4787	N.FORK TAYLOR CREEK
		4790	DIVIDE
		4795	LEE CREEK
		4775	WILBUR CREEK CUTOFF
		4033	OTTER CREEK
		4515	POKER TEECHEE
		4797	POKER JIM N FORK LEE

(E) *GT (4)* HOW DOES THE ROAD SYSTEM ADDRESS THE SAFETY OF ROAD USERS?

The existing condition of Maintenance Level 3, 4, and 5 roads across the Forest meets safety requirements as specified in Forest Service Manual 7700 and Handbook 7710 direction. These roads are traveled by the public for at least a portion of the year. Roads designated ML 3-5 means they should be suitable for the prudent person driving a typical passenger vehicle. The definitions for Maintenance Level 3, 4, and 5 roads is provided at the beginning of section 5 and is also provided in the glossary in section 8.

Maintenance level 4 and 5 roads on the Custer NF generally are suitable for travel by the public. These roads have a consistent surface, either asphalt, aggregate or native, have good alignment and sight distance, and are signed appropriately. Damaged or missing regulatory signs are replaced as soon as is practicable.

The condition of ML 3 roads varies greatly across the Forest when it comes to public safety. Some of the roads closely resemble maintenance level 4 roads in that their surface is uniform; there is good alignment and site distance, and adequate signing. Other ML 3 roads have a very inconsistent surface, ranging from very smooth to very rough. This can lead to situations where a driver unfamiliar with the road "over drives" for the road conditions. The range of standards applicable to Maintenance Level 3 roads means there is a range of conditions that a driver should expect on the ground. Alignment on a ML 3 road more closely conforms to the topography with fewer cuts and fills, design speeds are slower, thus site clearance distances would be shorter (i.e. roadside brush is not cleared as far away at curves and blind spots as on a higher maintenance level road) there might be more blind spots, and while there may be turnouts, they may not be inter-visible. All this combines to give the driver an inconsistent feel as to what to expect while driving. Some of these conditions can be corrected, while others can be reduced, provided adequate funding becomes available and which roads are priority for work.

Deferred maintenance condition surveys done on all Maintenance Level 3, 4, and 5 roads since 1999 provide information on critical health and safety needs. These surveys estimated the cost to address these needs. Again, adequate funding is necessary to address these needs. Emphasis would be to correct, reduce, and/or sign these hazards on those roads that receive the most public travel.

Data gathered from the deferred maintenance inventories the forest has been doing from 1999-2002 shows every road on the forest has deficient maintenance items. The Forest continues to address these needs as funding permits.

Travel management with appropriate signing and mapping needs improvement across the forest. The Forest is engaged in travel management planning, starting with the Beartooth Ranger District. The Sioux and Ashland Ranger District have been assigned as medium priority areas with site-specific planning initiated within five years of the joint BLM/Forest Service Off-Highway Vehicle FEIS and Record of Decision that amended nine national forest land and resource management plans in Montana, North and South Dakota

Review of ML 3, 4, and 5 roads across the Forest shows that the Forest should consider changing the objective maintenance level for some roads on each district. These recommended objective maintenance level changes are listed in Table GT(4)-1, below.

Table GT(4)-1: Recommended objective maintenance level changes for each district.

Beartooth Ranger District		
ID	**NAME**	**From→To**
2073	STEVENS DRAW	ML 3→ML 2
2849	DRY HEAD OVERLOOK	ML 3→ML 2

Sioux Ranger District		
ID	**NAME**	**From→To**
3042	DOUBLE F ROAD	ML 3→ML 2
3045	FOSTER ROAD	ML 3→ML 2
3104	RIMROCK CARTER	ML 3→ML 2
3105	ORIGINAL HWY	ML 3→ML 2
3113	S CAVE HILLS	ML 3→ML 2
3132	N. CAVE DEVILS CANYON	ML 3→ML 2
3814	JT SMITH	ML 2→ML 3
3819	LOST FARM	ML 3→ML 2
3RS	D3 RANGER STATION	ML 3→ML 4

Ashland Ranger District		
ID	**NAME**	**From→To**
4432A	4432-A	ML 3→ML 2
4436A	4436-A	ML 3→ML 2
4436C	4436-C	ML 3→ML 2
4436D	4436-D	ML 3→ML 2
4770	LISCOM BUTTE WEST	ML 3→ML 2
4784	TAYLOR-15 MILE CREEK	ML 3→ML 2
4787	NORTH FORK TAYLOR CR.	ML 3→ML 2
4792	HIGHLINE	ML2→ML 3
4794	HORSE CREEK BUTTE	ML2→ML 3
4797	POKER JIM N FORK LEE	ML 3→ML 2

5.12 ADMINISTRATIVE USE (AU)

(A) *AU (1)* HOW DOES THE ROAD SYSTEM AFFECT ACCESS NEEDED FOR RESEARCH, INVENTORY, AND MONITORING?

The road system makes these activities more feasible by reducing the cost and travel time. It appears that ML 3,4 and 5 roads provide adequate access for these kinds of activities on the Forest.

(B) *AU (2)* HOW DOES THE ROAD SYSTEM AFFECT INVESTIGATIVE OR ENFORCEMENT ACTIVITIES?

The road system affects investigative or enforcement activities in at least two ways. On one hand, the road system provides access for Forest Service and other Federal, State, or local law enforcement agencies to conduct investigative or enforcement activities. On the other hand, roads management often results in additional restrictions to protect resources or provide non-motorized recreational opportunities. These restrictions increase enforcement needs. It appears that ML 3,4 and 5 roads provide adequate access for these kinds of activities on the Forest

5.13 PROTECTION (PT)

(A) *PT (1)* HOW DOES THE ROAD SYSTEM AFFECT FUELS MANAGEMENT?

All ML 3,4, and 5 roads provide primary access for the purpose of conducting fuels treatments. Often, mechanical treatments are needed before prescribed burning is feasible to accomplish management objectives. Roads are needed for the majority of mechanical fuels treatments. Typically these activities consist of machine and/or hand-line construction, machine and/or hand piling, lopping, limbing, scattering slash, slash pile burning (machine and hand piles), broadcast burning, and jackpot burning. Also, roads are used as fuels breaks and safety zones. It appears that ML 3, 4, and 5 provides adequate access for management.

(B) *PT (2)* HOW DOES THE ROAD SYSTEM AFFECT THE CAPACITY OF THE FOREST SERVICE AND COOPERATORS TO SUPPRESS WILDFIRES?

Maintenance level 3, 4, and 5 roads provide adequate access for ground based fire suppression forces. However, the current conditions of some the road systems do not allow access of large structure protection engines to summer cabin areas. If the existing roads were not present on the ground and available for use, fire suppression would involve costly alternative suppression methods.

Most Initial Attack evaluations are based on engine response times. Thus, if efforts were made to start closing numerous roads, the Forest would need to re-assess response times.

(C) *PT (3)* HOW DOES THE ROAD SYSTEM AFFECT RISK TO FIREFIGHTERS AND TO PUBLIC SAFETY?

The present ML 3, 4, and 5 road system adequately provides for firefighter and public safety. However, there are a number of one-way roads, usually Maintenance Level 3 routes and/or areas that the Forest has identified for development of evacuation plans in the event of a large wildfire fire evacuation process. The Beartooth Ranger District has already prepared an evacuation plan for the West Fork of Rock Creek road to address this need. Table PT(3) displays the routes that should be included in these evacuation plans.

Table PT(3): Maintenance level 3, 4, and 5 roads that should be included in plans for a large wildfire evacuation process.

Beartooth Ranger District	
ID	**NAME**
2004	HELL ROARING CREEK
2005	SNOW & SHEEP CR SUMMER
2008	ROBERTSON DRAW
2010	PALISADES CAMP
2010A	PALISADES CAMPGROUND EAST LOOP
2071	WEST FORK ROCK CREEK
2071A	ROCK CREEK WC
2071B	TIMBER CREST GIRL SCOUT CAMP
2071C	BASIN CR CAMP
2071D	CASCADE CPGD. E. LOOP
2071F	WILD BILLS LAKE PARKING
2071G	CASCADE C.G. WEST LOOP
2071H	BASIN TRAILHEAD
2072	WEST ROSEBUD
2072A	PINE GROVE CAMPGROUND
2072A1	2072A1
2072B	PINE GROVE NORTH LOOP
2072C	EMERALD LAKE INLET
2072D	EMERALD LAKE SOUTH LOOP
2073	STEVENS DRAW
2083	SAGE CR CAMP
2085	CROOKED CREEK
2140	PICKET PIN
2141	RED LODGE CREEK
2141A	WEST REDLODGE CREEK
2141C	2141 C
2142	MEYERS/ LODGEPOLE CREEK
2144	FIVE BAR
21479	PALISADES
2177	EAST ROSEBUD
2177A	UPPER SAND DUNE
2177B	EAST ROSEBUD CAMP
2177D	JIMMY JOE CAMP
2177E	LOWER SAND DUNE
2223	SAGE CREEK G S
2308	PRYOR MOUNTAIN ROAD
2346	LAKE FORK
2379	(C) EAST SIDE ROAD
2379A	SPRING CR SUMMER HOMES-A
2379B	SHERIDAN CAMP
2379C	RATINE REC AREA
2379D	WESTMINSTER SPIRES
2379E	SPRING CREEK HOMES E
2379F	SPRING CREEK HOMES F

Sioux Ranger District	
ID	**NAME**
3042	DOUBLE F ROAD
3049	WICKHAM GULCH
3052	WICKHAM GULCH CAMPGROUND
3115	J B PASS
3116	CAPITAL ROCK
3117	SNOW CREEK
3117A	LANTIS SPRING CAMPGR'D
3126	REVA CAMPGROUND
3132	N. CAVE DEVILS CANYON

Table PT(3): Maintenance level 3, 4, and 5 roads that should be included in plans for a large wildfire evacuation process.

Beartooth Ranger District		Sioux Ranger District
2379G	CORRAL CREEK TRAIL HEAD	
2379H	SPRING CREEK HOMES H	
2379I	SPRING CREEK HOMES-I	
2400	STILLWATER TRAILHEAD RD	
2400A	WOODBINE CG ENTRANCE ROAD	
2400B	WOODBINE CG FIRST LOOP LEFT	
2400C	WOODBINE CG SECOND LOOP LEFT	
2400D	WOODBINE CG FIRST LOOP RIGHT	
2400E	WOODBINE CG SECOND LOOP RIGHT	
2414	BENBOW	
2421	MAIN FK ROCK CREEK	
2421A	UPPER PARKSIDE CAMP	
2421B	LIMBER PINE	
2421C	M K CAMP	
2421D	GREENOUGH LAKE CAMP GRD	
2421F	LOWER PARKSIDE LOOP	
2846	WEST FK STILLWATER	
2849A	BIG ICE CAVE CAMPGROUND	

PT (4) How does the road system contribute to airborne dust emissions resulting in reduced visibility and human health concerns?

There has never been an expressed public or Forest Service concern related to airborne dust emissions resulting in reduced visibility and human health concerns. However, the Forest did receive a complaint that dust was affecting the respiratory systems of cows during the execution of a maintenance project on the Ashland district in 2000. Surfacing (or lack thereof, and kind, and speed limits) affects the amounts of fugitive dust. However, the unpaved portions of roads undoubtedly contribute dust particulates to the air shed on each district. However, it is doubtful that dust liberated by infrequent traffic stays suspended in the air for long periods of time.

5.14 RECREATION - UNROADED RECREATION (UR)

(A) *UR (1)* IS THERE NOW OR WILL THERE BE IN THE FUTURE EXCESS SUPPLY OR EXCESS DEMAND FOR UNROADED RECREATION OPPORTUNITIES?

For the Beartooth Ranger District, as future recreation demands grow based on general population growth in the greater Billings area (Yellowstone County) the demand for unroaded recreation will increase. The Beartooth Ranger District currently has more unroaded acreage available for primitive recreation than the other Ranger Districts. For the Sioux District, the situation doesn't appear to apply, and currently serves the local communities wants and needs. Ashland District has the potential to supply unroaded opportunities in the future.

(B) *UR (2)* IS DEVELOPING NEW ROADS INTO UNROADED AREAS, DECOMMISSIONING OF EXISTING ROADS, OR CHANGING THE MAINTENANCE OF EXISTING ROADS CAUSING SUBSTANTIAL CHANGES IN THE QUANTITY, QUALITY, OR TYPE OF UNROADED RECREATION OPPORTUNITIES?

The forest has no plans to decommission objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis. Table GT(4)-1 displays the roads recommend for a change in maintenance level. Given the limited number of roads recommended for these changes, and the fact that these roads are Maintenance Level 3, 4, and 5 roads, it is unlikely these changes would result in substantial changes to the quantity, quality, or type of unroaded experiences on any of the districts.

(C) *UR (3)* WHAT ARE THE EFFECTS OF NOISE AND OTHER DISTURBANCES CAUSED BY DEVELOPING, USING, AND MAINTAINING ROADS ON THE QUANTITY, QUALITY, AND TYPE OF UNROADED RECREATION OPPORTUNITIES?

Please refer to the responses to questions UR(1) and UR(2). On the Beartooth District, a limited number of roads sustain relatively high use all during the summer season except the road to Red Lodge Mountain Ski Area, which receives high use during the winter season. Most roads on the Sioux and Ashland Districts receive limited use most of the summer season, with relatively high use during the hunting season. It is likely there would be little change to the quantity, quality and type of unroaded recreation opportunities than what is currently available across the Forest. Currently, unroaded recreation enthusiasts travel to Wilderness or unroaded areas and know they must move some distance away to achieve their desired sense isolation. Maintenance of roads is limited in time and space to a specific road or transportation system. Construction/re-construction and maintenance projects will adversely affect the quality, quantity, and type of unroaded recreational opportunities anytime that construction/re-construction and maintenance is performed. Short-term effects related to noise and disturbance will likely occur during construction/re-construction and maintenance activities. Short-term effects are usually limited in time and space to the locale of the work and last a few weeks to a summer season in duration. Long-term effects may consist of increased forest visitation in the areas accessed by ML 3, 4, or 5 roads. Hence the conclusion that there would likely be few changes to the current situation on the Forest.

For ecological review of the effects created by the developing, using and maintaining the transportation system, please refer to EF(5).

(D) *UR (4)* WHO PARTICIPATES IN UNROADED RECREATION IN THE AREAS AFFECTED BY CONSTRUCTING, MAINTAINING, AND DECOMMISSIONING ROADS?

On the Beartooth District, a collection of forest recreationists participates in unroaded recreation in the areas potentially affected by road construction/re-construction/decommissioning. This includes Wilderness users, horseman, fisherman, hikers, and other user groups. They have a strong attachment for those places that provide unroaded recreation opportunities.

On the Sioux District, there is a small segment of the hunting population and horseback riders that participate in these types of activities. This small segment of users has very strong attachments to areas on public lands since they have to pay to obtain these activities on other non-Federal and private lands.

On the Ashland District horseback riders, hunters, and hikers seek out these kinds of opportunities. There are fewer opportunities on the Ashland District, thus there is a strong attachment for those areas that do provide such opportunities.

(E) *UR (5)* WHAT ARE THESE PARTICIPANTS' ATTACHMENTS TO THE AREA, HOW STRONG ARE THEIR FEELINGS, AND ARE ALTERNATIVE OPPORTUNITIES AND LOCATIONS AVAILABLE?

Please see the response to question UR(4).

5.15 ROAD-RELATED RECREATION (RR)

(A) *RR (1)* IS THERE NOW OR WILL THERE BE IN THE FUTURE EXCESS SUPPLY OR EXCESS DEMAND FOR ROADED RECREATION OPPORTUNITIES?

On Beartooth District, not necessarily for the ML 3, 4, and 5 roads, but the anticipation is that demand will increase relative to population growth in adjacent urban areas and such use increases. Currently, for the Ashland and Sioux Districts, there appears to be an excess supply of roaded opportunities, and that the Districts will need to consider reducing the number of roads. However, the forest has no plans to decommission objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis.

(B) *RR (2)* IS DEVELOPING NEW ROADS INTO UNROADED AREAS, DECOMMISSIONING EXISTING ROADS, OR CHANGING MAINTENANCE OF EXISTING ROADS CAUSING SIGNIFICANT CHANGES IN THE QUANTITY, QUALITY, OR TYPE OF ROADED RECREATION OPPORTUNITIES?

Maintenance level 3, 4, and 5 roads provide the primary access to areas for roaded recreation activities. There are no known proposals to add or obliterate ML 3, 4, or 5 roads; however, the Forest is planning on maintain these roads.

(C) *RR (3)* WHAT ARE THE ADVERSE EFFECTS OF NOISE AND OTHER DISTURBANCES CAUSED BY CONSTRUCTING, USING, AND MAINTAINING ROADS ON THE QUANTITY, QUALITY, OR TYPE OF ROADED RECREATION OPPORTUNITIES?

Construction/re-construction and maintenance projects within the analysis area will adversely affect the quality, quantity, and type of roaded recreational opportunities anytime that construction/re-construction and maintenance is performed.

Short-term effects related to noise and disturbance will likely occur during construction/re-construction and maintenance activities. Short-term effects are usually limited in time and space to the locale of the work and a few weeks to a summer season in

duration. Long-term effects may consist of increased forest visitation in the areas accessed by ML 3, 4, or 5 roads.

(D) *RR (4)* WHO PARTICIPATES IN ROADED RECREATION IN THE AREAS AFFECTED BY ROAD CONSTRUCTING, MAINTAINING, OR DECOMMISSIONING?

It is anticipated that all road based recreationists will benefit from construction/re-construction and maintenance projects of the main arterial road decommissioning.

On Beartooth District, a collection of forest recreationists participates in roaded recreation in the areas potentially affected by road construction/re-construction, maintenance and decommissioning. This includes developed site (camp grounds, picnic areas, trailheads) recreationists, wilderness users, horseman, fisherman, hikers, and other user groups. They have a strong attachment for places that provide roaded recreation opportunities.

On the Sioux District, there is a small segment of the hunting population and horseback riders that participate in these types of activities. This small segment of users has very strong attachments to areas on public lands since they have to pay to obtain these activities on other non-Federal and private lands.

On the Ashland District horseback riders, hunters, and hikers seek out these kinds of opportunities. There are fewer opportunities on the Ashland District, thus there is a strong attachment for those areas that do provide such opportunities.

(E) *RR (5)* WHAT ARE THESE PARTICIPANTS' ATTACHMENTS TO THE AREA, HOW STRONG ARE THEIR FEELINGS, AND ARE ALTERNATIVE OPPORTUNITIES AND LOCATIONS AVAILABLE?

Please see the response to question RR(5).

(F) *RR(6)* HOW DOES ROAD MANAGEMENT AFFECT WILDERNESS ATTRIBUTES, INCLUDING NATURAL INTEGRITY, NATURAL APPEARANCE, OPPORTUNITIES FOR SOLITUDE, AND OPPORTUNITY FOR PRIMITIVE RECREATION?

A number of roads provide access to the Absaroka-Beartooth Wilderness. Roads that directly access the A-B Wilderness area are essential and greatly enhance the use and enjoyment of this Wilderness resource.

There is some question as to the meaning or road management. Is it recreation management or road management? If roads are improved, it may be probable that more folks may come to use and enjoy the A-B Wilderness. Or is management signing and citing folks for violations (e.g. trailhead use that overflows into the road way). Realistically it is probably of combination of both.

Table RR(6): Maintenance level 3, 4, and 5 roads that lead into a trailhead that leads into the Absaroka-Beartooth Wilderness.

Beartooth Ranger District		
ID	**NAME**	**TRAILHEAD(S)**
2004	HELL ROARING CREEK	HELL ROARING
2071	WEST FORK ROCK CREEK	TIMBERLINE, SENIA, WESTFORK
2072	WEST ROSEBUD	WEST ROSEBUD
2121	BEAR TRACK TRAILHEAD	BEAR TRACK
2141	RED LODGE CREEK	RED LODGE CREEK
2177	EAST ROSEBUD	EAST ROSEBUD, PHANTOM
2346	LAKE FORK	LAKE FORK
2400	STILLWATER TRAILHEAD RD	WOODBINE, STILLWATER
2421	MAIN FK ROCK CREEK	GLACIER LAKE
2846	WEST FK STILLWATER	WEST FORK STILLWATER, RABBIT GULCH
2071H	BASIN TRAILHEAD	BASIN
2177B	EAST ROSEBUD CAMP	SPREAD CREEK

5.16 PASSIVE-USE VALUE (PV)

(A) PV (1) DO AREAS PLANNED FOR ROAD ENTRY, CLOSURE, OR DECOMMISSIONING HAVE UNIQUE PHYSICAL OR BIOLOGICAL CHARACTERISTICS, SUCH AS UNIQUE NATURAL FEATURES AND THREATENED OR ENDANGERED SPECIES?

Not applicable. We don't have any plans to conduct these activities for any ML 3, 4, or 5 roads. There may be some recommendations from this analysis that a Responsible Official could consider should they choose to conduct these types of activities in or near these types of areas and/or affect threatened and endangered species.

(B) PV (2) DO AREAS PLANNED FOR ROAD CONSTRUCTION, CLOSURE, OR DECOMMISSIONING HAVE UNIQUE CULTURAL, TRADITIONAL, SYMBOLIC, SACRED, SPIRITUAL, OR RELIGIOUS SIGNIFICANCE?

There are a number of Maintenance Level 3, 4, and 5 roads that facilitate access to areas of unique cultural, traditional, symbolic, sacred, spiritual, or religious significance. Table PV(2)-1 displays those roads that facilitate access to these areas.

Table PV(2)-1: Maintenance Level 3, 4, and 5 roads that facilitate access to unique cultural, traditional, symbolic, sacred, spiritual, or religious significance.

Beartooth Ranger District	
ID	**Name**
2008	Robertson Draw
2071	West Fork Rock Creek
2071S	Rock Creek Ranger Station
2071f	Wild Bill
2072C	Emerald Lake
2072E	Emerald lake
2085	Crooked Creek
2308	Pryor Mtn Road
2849	Dryhead

Sioux Ranger District	
ID	**Name**
3113	S Cave Hills
3114	Fuller
3115	JB Pass
3123	Picnic Spr Rd
3123A	Picnic Spr CG
3132	Devils Canyon
3816	Trenk

Ashland Ranger District	
ID	**Name**
4515	Poker Teechee

Table PV(2)-1: Maintenance Level 3, 4, and 5 roads that facilitate access to unique cultural, traditional, symbolic, sacred, spiritual, or religious significance.

Beartooth Ranger District		Sioux Ranger District	Ashland Ranger District
2849A	Big Ice Cave		

(C) PV (3) WHAT, IF ANY, GROUPS OF PEOPLE (ETHNIC GROUPS, SUBCULTURES, AND SO ON) HOLD CULTURAL, SYMBOLIC, SPIRITUAL, SACRED, TRADITIONAL, OR RELIGIOUS VALUES FOR UNROADED AREAS PLANNED FOR ROAD ENTRY OR ROAD CLOSURE?

Habitation and use of the area that we now describe as the Custer National Forest dates back to prehistoric times and use by people from many different ethnic backgrounds. The following paragraphs offer but a peek into the incredible culturally rich prehistory and history of the area and Forest.

At least four tribes—Arapaho, Shoshone, Crow and ShoBan—have documented historical association with lands administered by the Beartooth District (Deaver and Kooistra-Manning 1995: 4.17). Other tribes inhabiting the area at various times include the Blackfoot, Bannock and Nez Perce tribes who traveled east to this area on hunting trips. Sioux were also coming to the area at least by the 1860's. The Finns are associated with the Camp Senia Historic District, also on the Beartooth District. Homesteaders of a variety of ethnicities came in the 1880's to permanently settle in the vicinity of the Beartooths. The Pryor Mountains are considered the homeland of the Crow who continue to use the area today for plant collecting and fasting.

The Sioux District has been inhabited by multiple ethnic groups, beginning at least as early as 13,000 years ago (11,000 radiocarbon years before present [BP]), who have left an extensive array of archaeological sites. There is evidence of occupation by the Mandan/Hidatsa, the Crow, the Arikara, the Kiowa-Apache (Naishan Dene), the Eastern Shoshone, the Lakota (Teton Sioux), the Cheyenne and Arapaho). What may have attracted people to these isolated islands of rock and pine woodland in the rolling prairies was the diversity of scarce resources that they offered. Five ecozones in the elevated oases offered shelter, water and forage for elk, deer, bison, bighorn sheep, wolves, bear and mountain lions. The majority of sites represent the last one to two thousand years of Native American occupancy, but archaeologists have discovered evidence of a number of earlier occupations as well as sites representing the early period of settlement by non-Indians. In the 1930's two CCC camps were established and many of the roads now in used were built by these men.

Tribal groups known to use the Ashland District prehistorically, historically and currently include the Cheyenne, Crow, Sioux, Mandan, Hidatsa, Assiniboine, Arapahoe, and Shoshone. Portions of the project area were part of the Cheyenne territory when it extended into the Otter Creek drainage. In 1884 this boundary was moved to the west side of the Tongue River when the reservation was established. The Northern Cheyenne continue to have strong historical ties to the District and to places on its landscape. Culturally important plants are still gathered on the District and several graves have been found. Historical use of the area includes cattle, horse, and sheep ranching, logging, mining,

and recreation. From 1936 through 1937 the Civilian Conservation Corps (CCC) were stationed in the area at Twentymile Camp and reconstructed the Cow Creek, Taylor Creek, Tenmile and Fifteen Mile Roads as well as numerous reservoirs and fence lines.

In summary, the Forest contains a rich and well-preserved heritage representing numerous ethnic groups. The Forest has no plans to construct or reconstruct any roads in any inventoried roadless areas. Neither does the forest have plans to decommission or close objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis.

(D) *PV (4)* WILL ROAD CONSTRUCTION, CLOSURE, OR DECOMMISSIONING SIGNIFICANTLY AFFECT PASSIVE-USE VALUE?

Road reconstruction may affect the passive-use values of heritage resource by making them more accessible and thus more susceptible to public discovery/disturbance. Road construction, reconstruction, closure or decommissioning may or may not affect, depending on the site-specific circumstances.

5.17 SOCIAL ISSUES (SI)

(A) *SI (1)* WHO ARE THE DIRECT USERS OF THE ROAD SYSTEM AND OF THE SURROUNDING AREAS? WHAT ACTIVITIES ARE THEY DIRECTLY PARTICIPATING IN ON THE FOREST? WHERE ARE THESE ACTIVITIES TAKING PLACE ON FOREST?

Across the Custer National Forest a collection of forest recreationists use the road systems on the Forest, as well as those road systems on other ownerships adjacent to the Forest. These include Wilderness users, horseback riders, anglers, hikers, picnickers, four-wheel drivers, all terrain vehicle users, hunters, sightseers, recreational drivers, and other user groups. The Beartooth District provides a more formal Wilderness experience with the Absaroka-Beartooth Wilderness and offers a number of unroaded opportunities. However, both the Sioux and Ashland District offer opportunities for similar recreational experiences activities as well as other roaded recreational experiences. All of these people seem to have a strong attachment for those places that meet the type of recreation opportunities they desire.

(B) *SI (2)* WHY DO PEOPLE VALUE THEIR SPECIFIC ACCESS TO NATIONAL FOREST AND GRASSLANDS—WHAT OPPORTUNITIES DOES ACCESS PROVIDE?

Access is essential for activities that occur within the Custer National Forest. Access to private in-holdings, recreational opportunities, commodity and amenity resources are provided by the existing transportation system across the Forest. The addition or elimination of roaded access has the potential to affect all of these user groups some will be negatively affected while some user groups would be positively affected.

(C) *SI (3)* WHAT ARE THE BROADER SOCIAL AND ECONOMIC BENEFITS AND COSTS OF THE CURRENT FOREST ROAD SYSTEM AND ITS MANAGEMENT?

All communities within close proximity to the Custer National Forest are economically affected by road management decisions. Sporting goods stores, outfitter/guide businesses,

off-highway vehicle businesses, passenger vehicle dealerships, ranches, and farms are dependent, to some extent, upon road and travel management decisions on the Forest. Smaller communities are likely much more affected by these decisions than larger communities like Billings. The community of Red Lodge is fairly diverse in regards to economic means. The communities of Buffalo and Camp Crook, South Dakota, and Ashland and Ekalaka, Montana are agricultural based and do not have as much economic diversity.

(D) *SI (4)* HOW DOES THE ROAD SYSTEM AND ROAD MANAGEMENT CONTRIBUTE TO OR AFFECT PEOPLE'S SENSE OF PLACE?

Please also refer to the response to question CH(1). Many of the roads within the Custer National Forest were established and used during the early mining, ranching and administrative history of the Custer National Forest, and continue to play the same role today. ML 3, 4, and 5 roads provide and/or facilitate access to areas that offer a sense of place for people. For example, the five South Dakota land units of the Sioux District that rise above the surrounding plains act as visible landmarks, hailing the people that live in Harding County, South Dakota, home from trips to Rapid City, SD.

Table SI(4)-1: ML 3, 4, and 5 roads that provide a sense of place.

Beartooth Ranger District	
ID	**Name**
2004	Hell Roaring
2005	Summer Homes access
2071C	Basin CG
2071f	Wild Bill
2071G	Cascade
2071H	Basin Trail
2072	West Rosebud
2072A	Pinegrove CG
2072A1	Pinegrove CG
2072B	Pinegrove N Loop
2072C	Emerald Lake
2072E	Emerald lake
2083	Sage Creek CG
2085	Crooked Creek
2087	Red Lodge RS
2223	Sage Creek RS
2308	Pryor Mtn Road
2346	Lake Fork
2379	Co Access rd to Ratine, etc
2379	Summer Home Access
2379B	Sheriden CG
2379C	Ratine
2379D	West Minster Spires
2379E	Spring Crk Summer Homes
2379F	Spring Crk Summer Homes

Sioux Ranger District	
ID	**Name**
3049	Wickham
3052	Wickham CG
3086	North Slick
3113	S Cave Hills
3114	Fuller
3115	JB Pass
3116	Capital Rock
3117	Snow Creek
3117A	Lantis Spr
3118	Plum Creek
3123	Picnic Spr Rd
3123A	Picnic Spr CG
3124	Red Cross Rd
3126	Reva Gap CG
3132	Devils Canyon
3812	Ridge Road
3813	Stagville
3813A	Ekalaka Park
3818	Speelmon

Ashland Ranger District	
ID	**Name**
4091	Ashland Compound
4091A	Ashland Compound
4091B	Ashland Compound
4092	Ten Mile
4093	Ft. Howe
40931	Ft. Howe
40931A	Ft. Howe
4094	15 Mile
4095	Cow Creek
4095A	Cow Creek CG
4466	Whitetail
4703	Lemonade
4769	Beaver-Stacy
4777B	Holiday CG
4801	Poker Jim/timber crk
4801A	Poker Jim Access

Table SI(4)-1: ML 3, 4, and 5 roads that provide a sense of place.

Beartooth Ranger District		Sioux Ranger District	Ashland Ranger District
2379G	Coral Creek Trail		
2379H	Spring Crk Summer Homes		
2379I	Spring Crk Summer Homes		
2400	Stillwater Trailhead Rd		
2400A	Woodbine CG		
2400B	Woodbine CG		
2400C	Woodbine CG		
2400D	Woodbine CG		
2400E	Woodbine CG		
2414	Benbow		
2421	Main Fork Rock Creek		
2421A	Parkside		
2421B	Limber		
2421C			
2421D	Greenough		
2421F	Lower Parkside		
2849	Dryhead		
2849A	Big Ice Cave		

5.18 CULTURAL AND HERITAGE ISSUES (CH)

(A) *CH (1)* DOES THE ROAD SYSTEM AFFECT ACCESS TO PALEONTOLOGICAL, ARCHAEOLOGICAL, AND HISTORICAL SITES AND THE VALUES PEOPLE HOLD FOR THESE SITES?

There are a number of ML 3, 4, and 5 roads that provide vehicle access to a number of known heritage resources. Table CH(1)-1 displays the roads that provide access to paleontological, archaeological, and historical sites.

The effects of this access cannot be fully evaluated because the entire Forest has not been inventoried for heritage resources. Roads bring both positive and negative aspects into consideration. Whereas on one hand, eliminating road access decreases the risk of human caused degradation, vandalism and looting, especially at rock art sites and historic mining ruins. On the flip side, many roads were built during the early mining, ranching and administrative history of the Custer National Forest, and continue to play the same role today. Despite modern improvements, they are, by nature, historic. They often access historic sites and facilities and make possible management and interpretation of these sites. Eliminating access may preclude the opportunities to actively manage these sites and facilities. The effects of any particular project to a specific site or sites would have to be done on a case-by-case basis.

Table CH(1)-1: ML 3, 4, and 5 roads that provide access to paleontological, archaeological, and historical sites

Beartooth Ranger District		Sioux Ranger District		Ashland Ranger District	
ID	**Name**	**ID**	**Name**	**ID**	**Name**
2004	Hell Roaring	**20S3**	State Hwy-to Capital Rock	**4021**	Stock Branch
2005	Summer Homes access	**3042**	Double F	**4091**	Ashland Compound

Table CH(1)-1: ML 3, 4, and 5 roads that provide access to paleontological, archaeological, and historical sites

Beartooth Ranger District		Sioux Ranger District		Ashland Ranger District	
2008	Robertson Draw	**3045**	Foster	**4091A**	Ashland Compound
2010	Palisades Camp	**3049**	Wickham	**4091B**	Ashland Compound
2071	West Fork Rock Creek Rd	**3052**	Wickham CG	**4092**	Ten Mile
2071S	Rock Creek Ranger Station	**3086**	North Slick	**4093**	Ft. Howe
2071C	Basin CG	**3101**	Opeeche	**40931**	Ft. Howe
2071D	Cascade	**3104**	Rimrock Carter	**40931A**	Ft. Howe
2071f	Wild Bill	**3111**	Box Springs	**4427**	Beaver Pumpkin Divide
2071G	Cascade	**3113**	S Cave Hills	**4436**	Taylor Divide
2072C	Emerald Lake	**3114**	Fuller	**4436A**	Taylor Divide
2072E	Emerald lake	**3115**	JB Pass	**4436C**	Taylor Divide
2085	Crooked Creek	**3116**	Capital Rock	**4436D**	Taylor Divide
2223	Sage Creek RS	**3117**	Snow Creek	**4466**	Whitetail
2308	Pryor Mtn Road	**3117A**	Lantis Spr	**4501**	Tooley Crk
2346	Lake Fork	**3118**	Plum Creek	**4515**	Poker Teechee
2379	Co Access rd to Ratine, etc	**3123**	Picnic Spr Rd	**4516**	Drop Tube
2379	Summer Home Access	**3123A**	Picnic Spr CG	**4703**	Lemonade
2379B	Sheriden CG	**3124**	Red Cross Rd	**4777B**	Holiday CG
2379C	Ratine	**3132**	Devils Canyon	**4801A**	Poker Jim Access
2379D	West Minster Spires	**3812**	Ridge Road	**4802**	Hay Stacker
2379E	Spring Crk Summer Homes	**3813**	Stagville		
2379F	Spring Crk Summer Homes	**3813A**	Ekalaka Park		
2379G	Coral Creek Trail	**3816**	Trenk		
2379H	Spring Crk Summer Homes	**3818**	Speelmon		
2379I	Spring Crk Summer Homes	**3819**	Lost Farm		
2414	Benbow				
2421	Main Fork Rock Creek				
2849	Dryhead				
2849A	Big Ice Cave				

(B) *CH (2)* HOW DOES THE ROAD SYSTEM AND ROAD MANAGEMENT AFFECT AMERICAN INDIAN TREATY RIGHTS?

The Forest area is located within the boundaries of the Ft. Laramie Treaties that provide for continued hunting and gathering on unoccupied lands. The road system does not bear on their treaty rights; however, it does facilitate the exercise of their rights.

(C) *CH (3)* HOW DOES ROAD USE AND ROAD MANAGEMENT AFFECT ROADS THAT CONSTITUTE HISTORIC SITES?

Table CH(3)-1 displays those roads built by the Civilian Conservation Corps. Table CH(3)-2 displays roads that are considered to be historic properties.

Table CH(3)-1: ML 3, 4, and 5 roads built by the Civilian Conservation Corps.

Beartooth Ranger District	
ID	**Name**
2010	Palisades Camp
2010A	Palisades CG
2071	West Fork Rock Creek Rd
2071S	Rock Creek Ranger Station
2071C	Basin CG
2071D	Cascade
2071G	Cascade
2085	Crooked Creek
2177	East Rosebud Rd
2177d	Jimmy Joe CG
2346	Lake Fork
2379B	Sheriden CG
2379C	Ratine
2421	Main Fork Rock Creek

Sioux Ranger District	
ID	**Name**
3049	Wickham
3052	Wickham CG
3105	Camp Needmore
3116	Capital Rock
3117	Snow Creek
3117A	Lantis Spr
3118	Plum Creek
3119	Exie
3123	Picnic Spr Rd
3123A	Picnic Spr CG
3818	Speelmon

Ashland Ranger District	
ID	**Name**
4091	Ashland Compound
4091A	Ashland Compound
4091B	Ashland Compound
4092	Ten Mile
4093	Ft. Howe
40931	Ft. Howe
40931A	Ft. Howe
4094	15 Mile
4095	Cow Creek
4127	Taylor Creek
4131	O'dell Creek
4466	Whitetail
4769	Beaver-Stacy
4777B	Holiday CG
4801A	Poker Jim Access

Table CH(3)-2: ML 3, 4, and 5 roads considered to be historic property.

Beartooth Ranger District	
ID	**Name**
2004	Hell Roaring
2010	Palisades Camp
2071	West Fork Rock Creek Rd
2071S	Rock Creek Ranger Station
2071f	Wild Bill
2085	Crooked Creek
2177	East Rosebud Rd
2177d	Jimmy Joe CG
2223	Sage Creek RS
2346	Lake Fork
2379B	Sheriden CG
2379C	Ratine
2379D	West Minster Spires
2379G	Coral Creek Trail
2414	Benbow
2421	Main Fork Rock Creek
2421A	Parkside
2421B	Limber
2421C	
2421D	Greenough
2421F	Lower Parkside

Sioux Ranger District	
ID	**Name**
20S3	State Hwy-to Capital Rock
3049	Wickham
3052	Wickham CG
3116	Capital Rock
3117	Snow Creek
3117A	Lantis Spr
3118	Plum Creek
3123	Picnic Spr Rd
3123A	Picnic Spr CG
3818	Speelmon

Ashland Ranger District	
ID	**Name**
4091	Ashland Compound
4091A	Ashland Compound
4091B	Ashland Compound
4092	Ten Mile
4093	Ft. Howe
40931	Ft. Howe
40931A	Ft. Howe
4094	15 Mile
4095	Cow Creek
4127	Taylor Creek
4131	O'dell Creek
4466	Whitetail
4769	Beaver-Stacy
4777B	Holiday CG
4801A	Poker Jim Access

5.19 CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE (CR)

(A) *CR (1)* IS THE ROAD SYSTEM USED OR VALUED DIFFERENTLY BY MINORITY, LOW-INCOME, OR DISABLED POLULATIONS THAN BY THE GENERAL POPULATION? WOULD POTENTIAL CHANGES TO THE ROAD SYSTEM OR ITS MANAGEMENT HAVE DISPROPORTIONATE NEGATIVE IMPACTS ON MINORITY, LOW-INCOME, OR DISABLED POPULATIONS?

Most user groups depend heavily on the existing transportation systems for the enjoyment of their National Forest and the resources contained within the National Forest. Alteration of the road system by constructing/reconstructing, decommissioning, or closing roads would have a variety of effects to the all the different user groups. When roads and/or areas are closed on the Beartooth District, disabled users are negatively affected when they are denied access to areas to which they have grown accustomed to using. On the Sioux and Ashland Districts, these are the populations that use the National Forest System roads. Site-specific impacts of a project would have to be completed to determine whether, in fact, there would be disproportionate effects to these populations.

6. KEY FINDINGS

The current maintenance level 3, 4, and 5 roads provide the minimum road system needed for safe and efficient travel for the administration, utilization and protection of National Forest System lands. Thus, the Forest has no plans to decommission or close objective maintenance level 3, 4, 5 roads which have been inventoried and studied in this analysis.

Road densities were calculated considering unclassified through Maintenance Level 5 roads. Tables TW(1)-1 through 3 and the spreadsheet in Appendix A display road densities by watershed It appears that road densities are highest on the Sioux District, less dense on the Ashland District, with the lowest densities on the Beartooth District. Densities do not appear to be unnecessarily high, when compared to other Forests, such as the Gallatin. However, watersheds with moderate or high road densities and/or low percentages of available security habitat are good indicators of fragmented habitats and areas of excessive human access. Roads in these watersheds may hinder wildlife movement and habitat use. These areas may indicate a need for road management modifications; site-specific analysis would be necessary.

The higher the density of roads in a stream corridor, the more likely an influence to the water quality and quantity in the area. Based on an analysis of the amount of road in the stream corridor by 5th code HUC, in which at least 20% of the stream corridor is in close proximity to a road (150 feet) only two areas on the Custer NF exceed this level. These include the southeast corner of the Ekalaka Hills (10110201170) on the Sioux Ranger District and the Crooked Creek Area (10080010030) on the

Beartooth Ranger District. These areas may indicate a need for road management modifications; site-specific analysis would be necessary.

The Forest, all three ranger districts, has a number of roads for which Right-of-Way is a need. Access to National Forest System lands is limited because of adjacent private land and in-holdings across which a right-of-way needs to be obtained. Table GT(3)-1 displays these roads. These ROW needs are identified on the Forest's ROW acquisition plan and will be pursued with willing landowners.

There are a number of Maintenance Level 3, 4, and 5 roads that facilitate access to areas of unique cultural, traditional, symbolic, sacred, spiritual, or religious significance. Table PV(2)-1 displays those roads that facilitate access to these areas. These areas may indicate a need for road management modifications; site-specific analysis would be necessary.

Review of ML 3, 4, and 5 roads across the Forest shows that the Forest should consider changing the objective maintenance level for some roads on each district. These recommended objective maintenance level changes are listed in Table GT(4)-1. The Forest Supervisor with each respective District Ranger and the Forest Engineer should consider making these changes.

Deferred maintenance condition surveys done on all Maintenance Level 3, 4, and 5 roads since 1999 provide information on critical health and safety needs. These surveys estimated the cost to address these needs. Again, adequate funding is necessary to address these needs. Emphasis would be to address these needs on those roads that receive the most public travel.

The present ML 3, 4, and 5 road system adequately provides for firefighter and public safety. However, there are a number of one-way roads, usually Maintenance Level 3 routes and/or areas that the Forest has identified for development of evacuation plans in the event of a large wildfire fire evacuation process. The Beartooth Ranger District has already prepared an evacuation plan for the West Fork of Rock Creek road to address this need. Table PT(3) displays the routes that should be included in these evacuation plans.

7. OPTIONS AND PRIORITIES

Roads analysis at the forest scale will generally provide the context for informing road management decisions and activities at the watershed, area, and project level. Where a forest-scale roads analysis has been conducted, the Responsible Official must consider the decision(s) to be made and determine how to apply the results of the forest-scale roads analysis to best inform management decisions. However, it is generally expected that road inventories and road condition assessments as identified in FSM 7712.14 would be completed at the watershed or project scale.

Roads analysis below the forest scale is not automatically required, but may be undertaken at the discretion of the Responsible Official. When the Responsible Official determines that the additional analysis is not needed for a project, the Responsible Official must document the basis for that conclusion. When needed at the watershed, area, or project level, roads analysis will follow the direction provided in FS-643 and document the results consistent with FSH 7712.13c.

8. GLOSSARY

Basin - The third level (6-digit) of the hydrologic unit hierarchy. Basins are nested within or are sometimes equivalent to sub-regions. Basins were formerly named "accounting units."

Classified Road – Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads

Hydrologic Unit (HU) - A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, non-contributing, and diversions to form a drainage area with single or multiple outlet points. Hydrologic units are only synonymous with classic watersheds when their boundaries include all the source area contributing surface water to a single defined outlet point authorized by the Forest Service.

Maintenance Level Descriptions. Maintenance levels 1-5 (operational and objective) are described in the following paragraphs:

Roads assigned to maintenance levels 2-5 are either constant service roads or intermittent service roads during the time they are open to traffic. See exhibit 01 for the relationship between maintenance levels.

a. Level 1. Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate."

Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for nonmotorized uses.

b. Level 2. Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high clearance vehicles.

c. Level 3. Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept." "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

d. Level 4. Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage." However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

e. Level 5. Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage."

Road Decommissioning – Activities that result in the stabilization and restoration of unneeded roads to a more natural state.

Road Maintenance – The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective (FSM 7712.3).

Road Reconstruction – Activities that result in improvement or realignment of an existing classified road as defined below:

a. **Road Improvement** – Activity that results in an increase of an existing road's traffic service level, expansion of its capacity, or a change in its original design function.

b. **Road Realignment** – Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway.

Temporary Roads – Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management.

Unclassified Roads – Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization.

Watershed – Subdivisions within a sub-basin. The 5th level (10-digit)(Fifth Code) in the hydrologic unit hierarchy. Watersheds range in size from 40,000 to 250,000 acres.

Subwatershed- Subdivisions within watersheds. Subwatershed is the sixth level (12-digit)(Sixth Code) in the hydrologic unit hierarchy. Subwatersheds generally range in size from 10,000 to 40,000 acres.

9. REFERENCES

Ashton., W. S. and R. F. Carlson. Determination of seasonal, frequency and durational aspects of streamflow with regard to fish passage through roadway drainage structures. Fairbanks AK: Institute of Water Resources, Univ of Alaska, Fairbanks, 99701. AK-RD-85-06:1-51

Auerbach., N. A., M. D. Walker, and D. A. Walker. 1997. Effects of roadside disturbance on substrate and vegetation prosperities in arctic tundra. Ecological Applications 7:218-235.

Baxter, C. V., C. A. Frissell, and F. R. Hauer. 1999. Geomorphology, logging roads, and the distribution of bull trout (Salvelinus confluents) spawning in a forest river basin: implications for management and conservation. Transactions of the American Fisheries Society 128:854-867.

Bell., M. C. 1986 Fisheries handbook for engineering requirements and biological criteria. Pages in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Special publications 19 American Fisheries Society, Bethesda, Maryland.

Chapman., D. W. and K. P. McLeod. 1987. Development of criteria for fine sediment in the northern Rockies ecoregion. Battelle Columbus Laboratories, EPA contract No 68-01-6986.

Copp. G. H. 1989. The habitat diversity and fish reproductive function of floodplain ecosystems. Environmental Biology of Fishes 26: 1-27.

Custer National Forest Management Plan. October 1986.

Farmer., A. M. 1993. The effects of dust on vegetation-a review. Environmental Pollution 19:63-75.

Findlay S. C. and J. Bourdages. 1999. Response Time of Wetlands Biodiversity to Road Construction on Adjacent Lands. Conservation Biology 14(1)86-94.

Furniss., M. J., T. D. Roeloffs, and C. S. Yee. 1991. Road construction and maintenance. Pages 297-323 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Special publications 19 American Fisheries Society, Bethesda, Maryland.

Greenburg, C. H., S. H. Crownove, and D. R. Gorgon. 1997. Roadside soil: a corridor for invasion of xeric scrub by nonindigenous plants. Natural Areas Journal 17:99-109.

Hagans, D. K., W. E. Weaver, and M. A. Madej. 1986. Long-term on site and off site effects of logging and erosion in the Redwood Creek Basin, northern California. Pages 38-65 in papers at the

American Geophysical Union meeting on cumulative effects. Technical bulletin 490. National Council for air and stream Improvement, New York.

Hicks, B. J., J. D. Hall, P. A. Bisson, and J. R. Sedell. 1991. Response of salmonids to habitat change. Pages 483-518 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Special publications 19 American Fisheries Society, Bethesda, Maryland.

Jones, J. A., and G. E. Grant. 1996. Cumulative effects of forest harvest on peak streamflows in the western Cascades of Oregon. Water Resources Research 32:959-974. As cited in Trombulak, S. C. and C. A. Frissell. 2000.

Jones , J. A., F. J. Swenson., B. C. Wemple., and K. U. Snyder. 2000. Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. Conservation Biology 14(1):76-85.

Meehan., W. R. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. U.S.D.A. Forest Service, Pacification Northwest Research Station. American Fisheries Society Special Publication 19 Pg 43, 44

Megahan, W. F. 1972. Subsurface flow interception by logging roads in mountains of central Idaho. Pages 350-356 in Proceeding of a national symposium on watersheds in transition. American Water Resources Association, Bethesda, Maryland. As cited in Trombulak, S. C. and C. A. Frissell. 2000.

Pearce, A. J., and A. Wastson. 1983. Medium-term effects of two landslide episodes on channel storage of sediment. Pages 297-323 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Special publications 19 American Fisheries Society, Bethesda, Maryland.

Piegay, H., and N. Landon. 1997. Promoting ecological management of riparian on the Drome River, France. As cited in Trombulak, S. C. and C. A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1):18-30.

Newcombe, C. P., and J. O. T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis foe quantitative assessment of risk. North American Journal Management 16:693-727.

Quigley 1997

Richardson, E. V., B. Simons, S. Karaki, M. Mahmood, and M. A. Stevens. 1975. Highways in the river environment: hydraulic and environmental design considerations training and design manual. U.S. Dept of Transportation, Federal Highway Administration, Washington, DC. As cited in Trombulak, S. C. and C. A. Frissell. 2000.

Rieman, B. E., D. C. Lee, and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River Basins. North American Journal of Fisheries Management 17:1111-1125.

Rosgen, D. L. 1994. Applied river morphology. Cantena. 8-1 8-43.

Seyedbagheri, K. A. 1996. Idaho forestry best management practices: compilation of research on their effectiveness. General technical report INT-GTR-339. U.S. Forest Service, Intermountain Research Station, Ogden UT. As cited in Trombulak, S. C. and C. A. Frissell. 2000.

Shortreed, K. S. and J. G. Stocker. 1983. Periphyton biomass and species composition in a costal rainforest stream in British Columbia: effects of environmental changes caused by logging. Canada Journal of Fisheries an d Aquatic Sciences 40: 1887-1895.

Stuart, T. A. 1962. The leaping behavior of salmon and trout at falls and obstructions.

Pages 312-323 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Special publications 19 American Fisheries Society, Bethesda, Maryland.

Trombulak, S. C. and C. A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1):18-30.

Vannote, R. L., G. W. Minshall, K. W. Cummins, J. R. Sedell, and C. E. Cushing. 1980. The river continuum concept. Canadian Journal of Fisheries and Aquatic Sciences 37:130-137.

Wemple, B. C., J. A. Jones and G. E. Grant 1996. Channel network extension by logging roads in two basins, western Cascades, Oregon. Water Resources Bulletin 32:1195-1207. As cited in Trombulak, S. C. and C. A. Frissell. 2000.

10. APPENDICES

APPENDIX A – Forest Scale Roads Analysis Summary – List of all roads studied during the analysis with a summary of information about each road. (Excel spreadsheet format)

Forest_Scale_Roads
_Analysis_Summary.xls

APPENDIX B – A diagram displaying the different levels of watersheds.

watershed_definition
s.doc

APPENDIX C – Map Packet

- *Roads Studied in this analysis – Base Maps*

- Map 1 – Beartooth Mountains

  Map1.pdf

- Map 2 – Pryor Mountains

  Map2.pdf

- Map 3 – Chalk Buttes, Ekalaka Hills, Long Pines

  Map3.pdf

- Map 4 – East & West Short Pines, North & South Cave Hills, Slim Buttes.

  Map4.pdf

- Map 5 – Ashland

  Map5.pdf

- *Right-of-Way Concerns*
  - Table GT(3)
    - Map 1 – Beartooth Mountains

      GT(3)Map1.pdf

    - Map 2 – Pryor Mountains

      GT(3)Map2.pdf

    - Map 3 – Chalk Buttes, Ekalaka Hills, Long Pines

      GT(3)Map3.pdf

- Map 4 – East & West Short Pines, North & South Cave Hills, Slim Buttes.

  No Road within these units to display

- Map 5 – Ashland

GT(3)Map5.pdf

- *Wildlife Road Density Rating by Watershed*
  - Table TW(1)
    - Map 1 – Beartooth Mountains

      TW(1)Map1.pdf

    - Map 2 – Pryor Mountains

      TW(1)Map2.pdf

    - Map 3 – Chalk Buttes, Ekalaka Hills, Long Pines

      TW(1)Map3.pdf

    - Map 4 – East & West Short Pines, North & South Cave Hills, Slim Buttes.

      TW(1)Map4.pdf

    - Map 5 – Ashland

      TW(1)Map5.pdf

- *Road and Stream Crossings*
  - Table AQ(1)

- Map 1 – Beartooth Mountains

  AQ(1)Map1.pdf

- Map 2 – Pryor Mountains

  AQ(1)Map2.pdf

- Map 3 – Chalk Buttes, Ekalaka Hills, Long Pines

  AQ(1)Map3.pdf

- Map 4 – East & West Short Pines, North & South Cave Hills, Slim Buttes.

  AQ(1)Map4.pdf

- Map 5 – Ashland

  AQ(1)Map5.pdf

- *Recommended for Objective Maintenance Level Changes*
  - Table GT(4)
    - Map 1 – Beartooth Mountains

      No Road within these units to display
    - Map 2 – Pryor Mountains

      GT(4)Map2.pdf

    - Map 3 – Chalk Buttes, Ekalaka Hills, Long Pines

      GT(4)Map3.pdf

    - Map 4 – East & West Short Pines, North & South Cave Hills, Slim Buttes.

GT(4)Map4.pdf

- Map 5 – Ashland

GT(4)Map5.pdf

- *Soils/Landtype Associations*
  - Table AQ(2)
    - Map 1 – Beartooth Mountains

AQ(2)Map1.pdf

    - Map 2 – Pryor Mountains

AQ(2)Map2.pdf

    - Map 3 – Chalk Buttes, Ekalaka Hills, Long Pines

AQ(2)Map3.pdf

    - Map 4 – East & West Short Pines, North & South Cave Hills, Slim Buttes.

AQ(2)Map4.pdf

    - Map 5 – Ashland

AQ(2)Map5.pdf

11. INDEX

Aquatic Organisms, 37
Aquatic Species, 37, 38, 40, 41
Channel Dynamics, 36, 37, 39
Cultural, 7, 16, 81, 82, 89
Erosion, 24, 34, 36, 37, 92
Fire, 8, 14, 15, 33, 75, 89
Fish, 34, 35, 37, 38, 39, 40, 41, 92
Fuels Treatments, 15, 75
Grazing, 10, 16, 68
Habitat, 7, 14, 15, 16, 34, 35, 37, 39, 40, 41, 88, 92, 93
Heritage, 83, 85
Hydrology, 16, 36, 93
Jurisdiction, 11, 69
Lands, 7, 9, 12, 24, 36, 62, 63, 65, 69, 78, 80, 82, 86, 88, 89, 90, 91
Legal, 69, 70, 71
Legal Access, 9, 68
Mass Wasting, 33
Minerals, 63, 65
Municipal Watershed, 67
Ownership, 11, 68, 69
Plant Communities, 38, 39
Range, 12, 24, 40, 65, 73, 91, 92
Recreation, 10, 12, 13, 15, 67, 68, 77, 78, 79, 80, 83, 90
Recreational, 15, 34, 35, 36, 40, 74, 78, 79, 83
Riparian, 16, 36, 38, 39, 93
RNA, 14
Road(s), 1, 7, 8, 9, 10, 11, 14, 15, 16, 24, 33, 34, 35, 36, 37, 38, 39, 40, 41, 57, 62, 63, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94
  county, 10, 11, 66, 69, 90
  Density, 15
  Federal, 68
  state, 10, 68, 69, 90
  system, 8, 9, 10, 11, 14, 15, 16, 24, 33, 34, 35, 36, 37, 38, 39, 40, 41, 57, 62, 63, 65, 67, 68, 69, 73, 74, 75, 77, 78, 83, 84, 85, 86, 88, 89, 91
Security Habitat, 7, 88
Sedimentation, 24
Soils, 24, 36
Special Use, 63, 67, 68
Stream crossings, 33, 36
Stream(s), 16, 24, 36, 37, 38, 39
Timber, 10, 15, 63, 84
Transportation, 8, 9, 10, 11, 15, 40, 63, 68, 69, 78, 83, 88, 91, 93
Unroaded, 13, 14, 15, 63, 77, 78, 79, 82, 83
Vegetation, 15, 33, 36, 38, 39, 63, 92
Water Quality, 7, 33, 34, 35, 37, 67, 88
Wetlands, 36, 92
Wilderness, 10, 14, 63, 67, 78, 80, 83
Wildlife, 15