

Appendix B

ENVIRONMENTAL SCAN REPORT





ENVIRONMENTAL SCAN

TONGUE RIVER ROAD (S-332) – Corridor Planning Study

FINAL



Prepared by:

Montana Department of Transportation

Helena, Montana

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FINAL

Environmental Scan

Tongue River Road Corridor Study

June 28, 2012

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Abbreviations and Acronyms

BMPs	Best Management Practices
BOR	Bureau of Reclamation
CAA	Clean Air Act
CAPS	Crucial Areas Planning System
CECRA	Comprehensive Environmental Cleanup and Responsibility Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CWA	Clean Water Act
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act
GIS	Geographic Information System
LUST	Leaking Underground Storage Tank
LWCF	Land and Water Conservation Funds
LWQD	Local Water Quality District
MCA	Montana Code Annotated
MDEQ	Montana Department of Environmental Quality
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MFWP	Montana Department of Fish, Wildlife, and Parks
MNHP	Montana Natural Heritage Program
MP	Milepost
MPDES	Montana Pollutant Discharge Elimination System
MSAT	Mobile Source Air Toxics
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NPL	National Priority List
NPS	National Park Service
NRC	National Response Center
NRHP	National Register of Historic Places
NRIS	Natural Resource Information System
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
RCRA	Resource Conservation and Recovery Act

SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
USACOE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
Section 4(f)	Section 4(f) of the 1966 Department of Transportation Act
Section 6(f)	Section 6(f) of the National Land and Water Conservation Funds Act

1.0 Introduction

1.1. Background

The primary objective of this Environmental Scan Report is to determine the potential impacts, constraints, and opportunities within the Tongue River Road Corridor Study. The study area begins on Montana Secondary Highway 332 (S-332) at the junction of MT-59 (NH-23), approximately 11 miles south of Miles City, MT, and ends at the junction of Montana Secondary Highway 447 (S-447), approximately 10 miles north of Ashland, MT. Secondary 332 is currently classified as a rural collector. It is an integral part of the regional rural transportation network connecting local population and commerce to the National Highway System.

As a planning level scan, the information is obtained from various reports, websites and documentation. This scan is not a detailed environmental investigation.

If any improvement option(s) are moved forward from the Study into project development using federal or state funds, a NEPA/MEPA analysis will be completed as part of the normal project development process. The information obtained from the Study may be forwarded into the NEPA/MEPA analysis and does not need to be repeated.

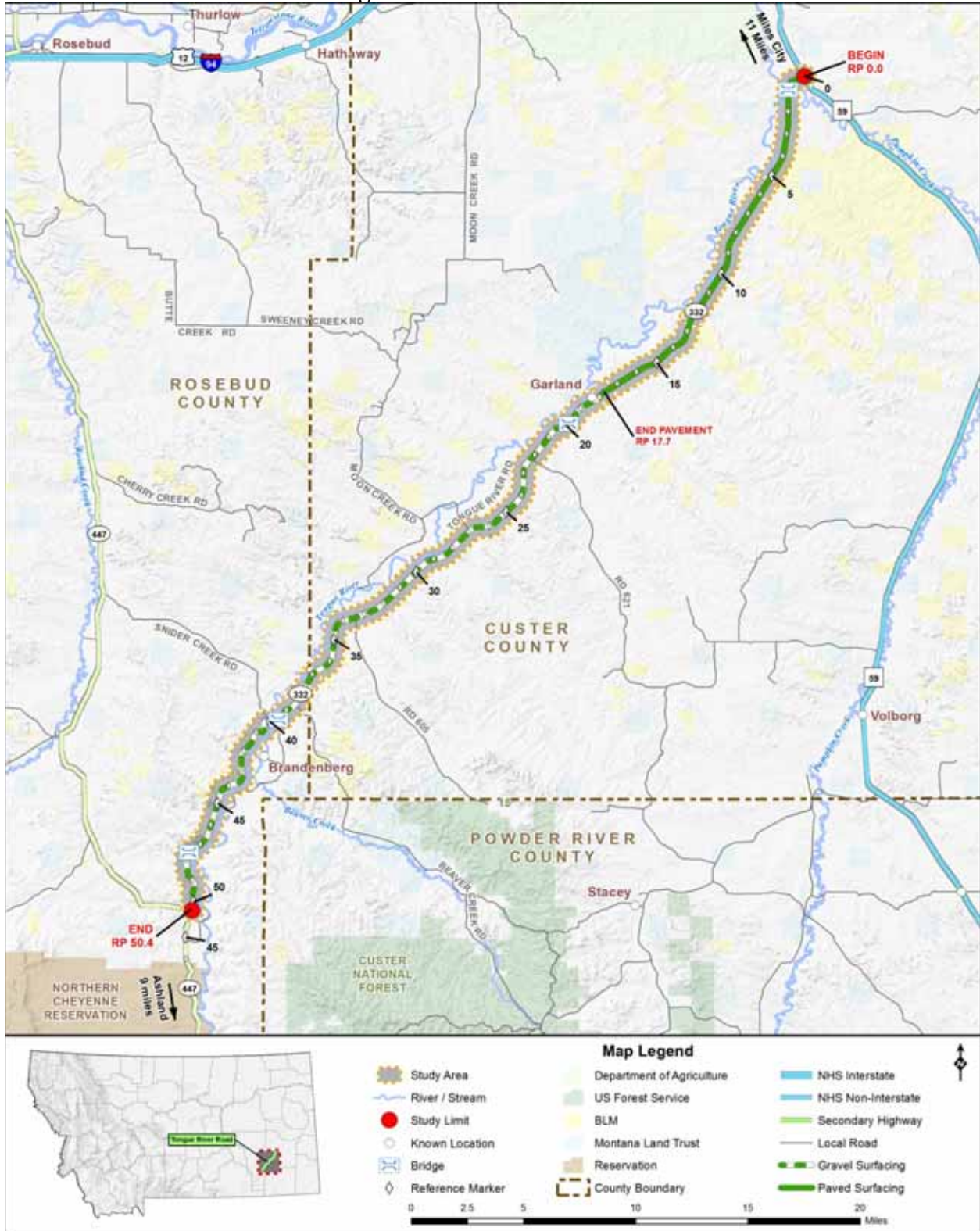
1.2. Organization of Report

This report describes the geographic/environmental setting of the existing Study corridor. The document continues with descriptions of environmental scan methodologies and results for the geographic area for physical resources (Section 2) and water resources (Section 3), visual resources (Section 4), biological resources (Section 5), cultural and archaeological resources (Section 6), and social (Section 7). A list of tables and appendices is on page 3. A list of abbreviations and acronyms is defined on page 4 and page 5. The following sections will describe the Study corridor for the purpose of environmental discussions in this document. They are not necessarily indicative of proposed improvement option(s), but rather a collection of geographic areas by which environmental discussions can be grouped.

2. Geographic Setting

The Study corridor is located in southern eastern Montana. The land use within the corridor is predominantly for agricultural and ranch purposes. The majority of the land within the corridor is undeveloped. The project proceeds through level terrain that is used primarily for dry land farming with some grazing and irrigated farming. Please refer to Figure 1 for the corridor location.

Figure 1 – Corridor Location



3. Physical Resources

3.1. Land Ownership

Geographic Information System (GIS)-based information was reviewed to assess the type and extent of public versus privately owned land in the study corridor.

3.1.1. Custer County/Rosebud County

The land within the Study corridor in Custer County and Rosebud County is predominantly agricultural and ranch land. The majority of the land within the Study corridor is undeveloped. A public land ownership map for the Study corridor is contained in Appendix A.

3.2. Prime Farmland

Information regarding areas of prime farmland in the corridor area was compiled from the US Department of Agriculture, Natural Resource Conservation Service (NRCS).

The Farmland Protection Policy Act of 1981 (Title 7 United States Code, Chapter 73, Sections 4201-4209) has as its purpose “to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland.”

Farmland is defined by the act in Section 4201 as including prime farmland, unique farmland, and farmland, other than prime or unique farmland, that is of statewide or local importance.

Prime farmland soils are those that have the best combination of physical and chemical characteristics for producing food, feed, and forage; the area must also be available for these uses. Prime farmland can be either non-irrigated or lands that would be considered prime if irrigated. Farmland of statewide importance is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

The CPA-106 Farmland Conversion Impact Rating Form for Linear Projects is a way for the NRCS to keep inventory of the Prime and Important farmlands within the state. Soil map units found within the project area have been classified as prime and important farmlands. Project activities associated with the construction of the Tongue River Road Corridor will likely create impacts to the soil map units with prime and important farmland status, thus it is likely required that a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects be completed. The process for completing this form requires mapping of the prime and important farmlands to be converted to non-farmable land, coordination with the NRCS, and final completion of the conversion form.

Appendix B contains maps and descriptions of the farmland classification types found in the Study corridor.

3.3. Geologic Resources

Information was obtained on geology in the corridor Study areas. This geologic information may help determine any potential design and construction issues related to embankments and road design. The following paragraph describes geology present along the Study area.

This alignment traverses the alluvial terraces of the Tongue River, occasionally climbing onto exposed area of the Fort Union Formation. Locally, the Fort Union consists of the Tongue River Member (Tftr) and is described as sandstone with thin interbeds of siltstone, mudstone, and clay. In some areas the rock has been metamorphosed into clinker by the natural burning of coal. The Alluvial Terrace Deposits (Qat) typically consist of gravel, sand, silt, and clay.

Appendix C contains maps and descriptions of geologic resources found in the Study corridor.

3.4. Water Resources

3.4.1. Surface Water

Maps and GIS data were reviewed to identify the location of surface water bodies within the Study area, including rivers, streams, lakes, or reservoirs. Appendix D contains maps and descriptions of named waterways found in the Study corridor.

The Study corridor travels through the Middle Yellowstone Watershed District. Information on the Tongue River and its tributaries within the study area was obtained from MDEQ's website. Section 303, subsection "d" of the Clean Water Act requires the State of Montana to develop a list, subject to USEPA approval, of water bodies that do not meet water quality standards. When water quality fails to meet state water quality standards, MDEQ determines the causes and sources of pollutants in a sub-basin assessment and sets maximum pollutant levels, called total maximum daily loads (TMDL).

A TMDL sets maximum pollutant levels in a watershed. The TMDLs become the basis for implementation plans to restore the water quality to a level that supports its designated beneficial uses. The implementation plans identify and describe pollutant controls and management measures to be undertaken (such as best management practices), the mechanisms by which the selected measures would be put into action, and the individuals and entities responsible for implementation projects.

303(d) listed water bodies that are located in the Study area are summarized in Table 1.

Table 1. 303(d) Listed Water Bodies in Study Area

Water Body	Beneficial Use	Probable Cause of Impairment	Probable Source of Impairment
<p>TONGUE RIVER (Beaver Creek – 12 Mile Dam and (12 mile Dam to Yellowstone River Mouth)</p>	<p>Agriculture, Aquatic Life, Drinking Water, Primary Contact Recreation</p>	Cadmium	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources</p>
		Copper	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources</p>
		Iron	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources</p>
		Lead	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destablization</p>
		Low Flow Alterations	<p>Dam Construction (Other than Upstream Flood Control Projects) Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production</p>
		Nickel	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destablization</p>
		Salinity	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destablization</p>
		Solids(Suspended/Bedload)	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destabilization</p>
Sulfates	<p>Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destablization</p>		

3.4.2. Groundwater

Custer County and Rosebud County have not developed Local Water Quality District's (LWQD). LWQD's are established to protect, preserve, and improve the quality of surface water and groundwater within the district. Currently there are four in Montana. LWQD's are formed pursuant to 701304501 et. Seq., MCA by county governments. MDEQ provides support to LWQD programs, but does not have an active management role in their activities. LWQD serve as local government districts with a governing board of directors, and funding obtained from fees collected annually with county taxes. A significant component of selected district programs is the ability to participate in the enforcement of the Montana Water Quality Act and related rules.

If a LWQD is developed for Custer County or Rosebud County, water quality protection measures may have to be addressed at the local level, in addition to the federal level and state level.

3.4.3. Irrigation

Irrigated farmland exists in Custer County and Rosebud County adjacent to the Study corridor. Impacts to irrigation facilities should be avoided to the greatest extent practicable. However, depending on the improvement option(s) proposed during the corridor study, there is a potential to impact lateral and longitudinal irrigation facilities. Operators of irrigation facilities would need to be contacted for flow requirements during project development to minimize impacts to farming operations.

Any potential impacts to irrigation facilities will need to be examined to determine if the irrigation facilities are considered waters of the U.S. and subject to jurisdiction by the U.S. Army Corps of Engineers (USACOE) and if other permits or authorizations are necessary such as SPA or 318.

3.4.4. Other Drainage Considerations

There are four existing bridges within the study corridor. Should a project be identified and advanced, it will be necessary to consider the potential impacts resulting from drainage off the existing or new bridge decks. MDEQ's 401 certification of the general conditions of the USACOE 404 permits requires that bridge deck drainage be directed to the ends of the bridge, rather than directly into the State water they span. Where practicable, this drainage needs to be directed to a detention/retention basin instead of directly discharging into State water.

MDEQ has stated that this same principle is desirable for roadside ditch drainage (i.e. that roadside drainage that is directed to State waters should also be directed to a detention/retention basin prior to discharge into the State water.

Pertinent to drainage culverts, MDEQ and MFWP have both stated that culverts would need to be designed to provide both fish passage and aquatic organism passage (AOP). This would not only be applicable to perennial streams, but also some intermittent streams that may provide only seasonal flows yet still have a benefit for the fisheries system.

Lastly, both MDEQ and MFWP reiterated that culverts cannot be sized smaller to their current size, and that culverts should be sized to at least the appropriate “site specific” bankfull dimension.

3.5. Wetlands (EO 11988)

The USACOE defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

The Study area encompasses portions of the Tongue River, and associated drainages, which have wetland areas associated with them. Formal wetland delineations will need to be conducted according to standard USACOE defined procedures if a project is forwarded from the Study during the project development process. Wetland jurisdictional determinations will also need to be done during the project development process.

Wetland impacts should be avoided to the greatest extent practicable. All unavoidable wetland impacts will be mitigated as required by the USACOE and in accordance with policies.

3.6. Wild and Scenic Rivers

The Wild and Scenic Rivers Act, created by Congress in 1968, provided for the protection of certain selected rivers, and their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The U.S. National Park Service (NPS) website was accessed for information on river segments that may be located within the study area with wild and scenic designation. There are no wild or scenic rivers in the corridor study area..

3.7. Floodplains (EO 11988) and Floodways

Executive Order (EO) 11988, Floodplain Management, requires federal agencies to avoid direct or indirect support of floodplain development whenever a practicable alternative exists. EO 11988 and 23 CFR 650 Part A requires an evaluation of project alternatives to determine the extent of any encroachment into the base floodplain. The base flood (100-year flood) is the regulatory standard used by federal agencies and most states to administer floodplain management programs. A “floodplain” is defined as lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, with a one percent or greater chance of flooding in a given year. As described in FHWA’s floodplain regulation (23 CFR 650 Part A), floodplains provide natural and beneficial values serving as areas for fish, wildlife, plants, open space, natural flood moderation, water quality maintenance, and groundwater recharge.

If an individual project is forwarded from the study, coordination with Custer and Rosebud Counties should be conducted during the project development process to obtain floodplain permits as necessary.

3.8. Hazardous Substances

The Montana Natural Resource Information System (NRIS) database was searched for underground storage tank (UST) sites, leaking underground storage tank (LUST) sites, abandoned mine sites, remediation response sites, landfills, National Priority List (NPL) sites, hazardous waste, crude oil pipelines, and toxic release inventory sites in the vicinity of the Study corridor.

There were no UST sites, LUST sites, remediation response sites, landfills, or NPL sites identified along S-332. There were four abandoned mine sites located south of Brandenburg and one abandoned mine site located south of Garland. All five of these abandoned mine sites appear to be minor coal prospects/explorations. Further evaluations would be needed to determine if any of these abandoned mine sites pose an environmental concern.

Further evaluation may be needed at specific sites to determine if contamination will be encountered during any future construction. This may include reviewing MDEQ files and conducting subsurface investigation activities to determine soil and groundwater contamination. If contaminated soils or groundwater is encountered during construction, handling and disposing of the contaminated material will be conducted in accordance with State, Federal, and local laws and rules.

3.9. Air Quality

EPA designates communities that do not meet National Ambient Air Quality Standards (NAAQS) as “non-attainment areas.” States are then required to develop a plan to control source emissions and ensure future attainment of NAAQS. S-332 is not located in a non-attainment area for PM-2.5, PM-10, or carbon monoxide (CO).

An evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicles and off-road equipment which are known or suspected to cause cancer or other serious health and environmental effects.

3.10. Noise

The majority of S-332 passes through farm and ranch land, therefore it appears unlikely that improving this road would cause any traffic noise impacts. However, a traffic noise study will need to be evaluated for any planned improvements to S-332.

If the improvements planned for this road include a significant shift in the horizontal or vertical alignments or increasing the traffic speed and volume then the project would be considered a Type I project. A detailed noise analysis would be required if any future project is considered a Type I project. A detailed noise analysis includes measuring ambient noise levels at selected receivers and modeling design year noise levels using projected traffic volumes. Noise abatement measures would be considered for the project if noise levels approach or substantially exceed the noise abatement criteria (NAC) listed in MDT’s Noise Policy.

If traffic noise impacts are shown to exist on the project, a number of possible abatement measures may be considered, including but not limited to the following:

- Altering the horizontal or vertical alignments;
- Constructing noise barriers such as sound walls or earthen berms; and/or
- Decreasing traffic speeds.

Any future construction activities along S-332 may cause localized, short-duration noise impacts. These impacts need to be minimized in accordance with MDT's standard specifications for the control of equipment noise during construction.

4. Visual Resources

Visual resources refer to the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness in landscape character), and landscape visibility (relative distance of seen areas) of a geographically defined view shed. The landscape throughout the study corridor contains an array of biological, scientific, historic, wildlife, ecological, and cultural resources mixed with a remote location.

There are no properties or corridors within the study area listed on the Department of Interior's National Landscape Monument System.

5. Biological Resources

Biological resources in the Study corridor were identified using maps, aerial photographs, the endangered, threatened, proposed, and candidate species list for Montana counties (May 2009) from the USFWS, Montana Natural Heritage Program data, and windshield surveys of the project site. This limited survey is in no way intended to be a complete and accurate biological survey of the study area. If a project is forwarded from the improvement option(s), consultations with MFWP and USFWS field biologists on techniques to perpetuate the riparian corridor, promote fish passage, and accommodate wildlife movement and connectivity will occur, and a complete biological survey of the study area will be completed. These activities will yield important wildlife and fisheries information that can be used to evaluate the project and its potential effects and identify appropriate mitigation measures. Due to potentially extensive mitigation measures, project costs may be higher than typically expected and should be budgeted for in the planning process.

Due to the diversity and richness found within the Study corridor pertinent to water quality, aquatic habitats, and wildlife habitats, project sponsors are committed to working with the appropriate agencies if a project is forwarded from the improvement options(s) to identify and mitigate potential impacts directly attributable to the project.

5.1. Fish and Wildlife

General fish and wildlife resources in the Study area will need to be surveyed during any future project development process. FWP should be contacted during the project development process for local expertise of the study area. Riparian and river, stream or creek habitats should be avoided to the greatest extent practicable, including but not limited to, the Tongue River riparian and river habitat. Fish and wildlife species use waterway corridors during all life stages. If a project is forwarded from the improvement option(s),

encroachment into the wetted width and waterway and the associated riparian habitat should be avoided, or minimized, to the maximum extent practicable. It is recommended that a riparian corridor remain on both sides of waterways to facilitate wildlife movement along the river corridor. It is likely that most wildlife/vehicle collisions are unreported within the Study corridor.

5.1.1. Threatened and Endangered Species

The federal list of endangered and threatened species is maintained by the USFWS. Species on this list receive protection under the Endangered Species Act (ESA). An ‘endangered’ species is one that is in danger of extinction throughout all or a significant portion of its range. A ‘threatened’ species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list.

The endangered, threatened, proposed, and candidate species list for Montana counties (August 2011) was obtained from the USFWS website. This list generally identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

There are six endangered, threatened, proposed, or candidate animal species listed for Custer and Rosebud Counties; the Black-footed Ferret (*Mustela nigripes*) (Listed Endangered) (LE), the Pallid Sturgeon (*Scaphirhynchus albus*) (Listed Endangered) (LE), the Piping Plover (*Charadrius melodus*) (Listed Threatened, Critical Habitat) (LT, CH), the Interior Least Tern (*Sterna antillarum athalassos*) (Listed Endangered) (LE), the Whooping Crane (*Grus Americana*) (Listed Endangered) (LE), the Greater Sage Grouse (*Centrocercus urophasianus*) (Candidate) (C), and the Sprague’s Pipit (*Anthus spragueii*) (Candidate) (C). Although the Pallid Sturgeon has not been recorded in the Tongue River in the Study corridor, junior Pallid Sturgeon do use the Tongue River near Miles City, and the Tongue River was historically used by adult Pallid Sturgeons.

If a project is forwarded from the improvement option(s), an evaluation of potential impacts to all endangered, threatened, proposed, or candidate species will need to be completed during the project development process.

5.1.2. Species of Concern

Montana Species of Concern are native animals breeding in the state that are considered to be “at risk” due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana Animal Species of Concern is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (unrankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

Table 2 and Table 3 list the animal species of concern that the Montana Heritage Program has records of in Custer and Rosebud Counties. The results of a data search by the Montana Natural Heritage Program reflect the current status of their data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys. If a project is forwarded from the improvement option(s), on-site surveys will need to be completed during the project development process.

Table 2. Montana Animal Species of Concern Noted in Custer County

	Scientific Name	Common Name	State Rank	County
Birds	<i>Asio flammeus</i>	Short-eared Owl	S4	Custer
	<i>Lophodytes cucullatus</i>	Hooded Merganser	S4	Custer
	<i>Megascops asio</i>	Eastern Screech-Owl	S3S4	Custer
	<i>Phalaenoptilus nuttallii</i>	Common Poorwill	S4B	Custer
	<i>Seiurus aurocapilla</i>	Ovenbird	S4B	Custer
	<i>Sialia sialis</i>	Eastern Bluebird	S4B	Custer
	<i>Tyrannus vociferans</i>	Cassin's Kingbird	S4B	Custer
	<i>Vireo plumbeus</i>	Plumbeous Vireo	S3S4B	Custer
Fish	<i>Cycleptus elongatus</i>	Blue Sucker	S2S3	Custer
	<i>Macrhybopsis gelida</i>	Sturgeon Chub	S2S3	Custer
	<i>Macrhybopsis meeki</i>	Sicklefin Chub	S1	Custer
	<i>Polyodon spathula</i>	Paddlefish	S1S2	Custer
	<i>Sander canadensis</i>	Sauger	S2	Custer
	<i>Culaea inconstans</i>	Brook Stickleback	S4	Custer
	<i>Hybognathus hankinsoni</i>	Brassy Minnow	S4	Custer
	<i>Hybognathus placitus</i>	Plains Minnow	S4	Custer
	<i>Lota lota</i>	Burbot	S4	Custer
	<i>Semotilus atromaculatus</i>	Creek Chub	S4	Custer
Invertebrates	<i>Polygonia progne</i>	Gray Comma	S2	Custer
	<i>Stylurus intricatus</i>	Brimstone Clubtail	S1	Custer
	<i>Anepeorus rusticus</i>	A Sand-dwelling mayfly	S1	Custer
	<i>Homoeoneuria alleni</i>	A Sand-dwelling mayfly	S2	Custer
	<i>Raptoheptagenia cruentata</i>	A mayfly	S2	Custer
	<i>Argia emma</i>	Emma's Dancer	S3S5	Custer
	<i>Enallagma civile</i>	Familiar Bluet	S2S4	Custer
	<i>Enallagma praevarum</i>	Arroyo Bluet	S3S5	Custer
	<i>Gomphus externus</i>	Plains Clubtail	S2S4	Custer
	<i>Gomphus graslinellus</i>	Pronghorn Clubtail	S3S5	Custer
	<i>Rhionaeschna multicolor</i>	Blue-eyed Darner	S2S4	Custer
Mammals	<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	S2	Custer
	<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	S3	Custer
	<i>Lasiurus borealis</i>	Eastern Red Bat	S2S3	Custer
	<i>Lasiurus cinereus</i>	Hoary Bat	S3	Custer

	Scientific Name	Common Name	State Rank	County
	<i>Sorex merriami</i>	Merriam's Shrew	S2S3	Custer
Reptiles	<i>Apalone spinifera</i>	Spiny Softshell	S3	Custer
	<i>Chelydra serpentina</i>	Snapping Turtle	S3	Custer
	<i>Heterodon nasicus</i>	Western Hog-nosed Snake	S2	Custer
	<i>Lampropeltis triangulum</i>	Milksnake	S2	Custer
	<i>Phrynosoma hernandesi</i>	Greater Short-horned Lizard	S3	Custer

Source: Montana Natural Heritage Program: <http://mtnhp.org/requests/default.asp>

Table 3. Montana Animal Species of Concern Noted in Rosebud County

	Scientific Name	Common Name	State Rank	County
Birds	<i>Asio flammeus</i>	Short-eared Owl	S4	Rosebud
	<i>Buteo swainsoni</i>	Swainson's Hawk	S4B	Rosebud
	<i>Chaetura pelagica</i>	Chimney Swift	S3S4B	Rosebud
	<i>Lophodytes cucullatus</i>	Hooded Merganser	S4	Rosebud
	<i>Megascops asio</i>	Eastern Screech-Owl	S3S4	Rosebud
	<i>Phalaenoptilus nuttallii</i>	Common Poorwill	S4B	Rosebud
	<i>Seiurus aurocapilla</i>	Ovenbird	S4B	Rosebud
	<i>Sialia sialis</i>	Eastern Bluebird	S4B	Rosebud
	<i>Tyrannus vociferans</i>	Cassin's Kingbird	S4B	Rosebud
	<i>Vireo plumbeus</i>	Plumbeous Vireo	S3S4B	Rosebud
	<i>Spiza Americana</i>	Dicksissel	S4B	Rosebud
	<i>Mniotilta varia</i>	Black-and-white Warbler	S4B	Rosebud
Fish	<i>Cycleptus elongatus</i>	Blue Sucker	S2S3	Rosebud
	<i>Macrhybopsis gelida</i>	Sturgeon Chub	S2S3	Rosebud
	<i>Macrhybopsis meeki</i>	Sicklefin Chub	S1	Rosebud
	<i>Oncorhynchus clarkii bouvieri</i>	Yellowstone Cutthroat Trout	S2	Rosebud
	<i>Polyodon spathula</i>	Paddlefish	S1S2	Rosebud
	<i>Sander canadensis</i>	Sauger	S2	Rosebud
	<i>Culaea inconstans</i>	Brook Stickleback	S4	Rosebud
	<i>Hybognathus hankinsoni</i>	Brassy Minnow	S4	Rosebud
	<i>Hybognathus placitus</i>	Plains Minnow	S4	Rosebud
	<i>Lota lota</i>	Burbot	S4	Rosebud
<i>Semotilus atromaculatus</i>	Creek Chub	S4	Rosebud	
Invertebrates	<i>Polygonia progne</i>	Gray Comma	S2	Rosebud
	<i>Stylurus intricatus</i>	Brimstone Clubtail	S1	Rosebud
	<i>Homoeoneuria alleni</i>	A Sand-dwelling Mayfly	S2	Rosebud
	<i>Lachlania saskatchewanensis</i>	A Sand-dwelling Mayfly	S1	Rosebud
	<i>Macdunnoa nipawinia</i>	A Sand-dwelling Mayfly	S2	Rosebud
	<i>Argia emma</i>	Emma's Dancer	S3S5	Rosebud
	<i>Enallagma civile</i>	Familiar Bluet	S2S4	Rosebud
	<i>Enallagma praevarum</i>	Arroyo Bluet	S3S5	Rosebud
<i>Gomphus externus</i>	Plains Clubtail	S2S4	Rosebud	

	Scientific Name	Common Name	State Rank	County
	<i>Argia vivida</i>	Vivid Dancer	S3S5	Rosebud
	<i>Aeshna constricta</i>	Lance-tipped Darner	S1S3	Rosebud
	<i>Sympetrum madidum</i>	Red-veined Meadowhawk	S2S3	Rosebud
Mammals	<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	S2	Rosebud
	<i>Antrozous pallidus</i>	Pallid Bat	S3	Rosebud
	<i>Lasiurus borealis</i>	Eastern Red Bat	S2S3	Rosebud
	<i>Lasiurus cinereus</i>	Hoary Bat	S3	Rosebud
	<i>Sorex merriami</i>	Merriam's Shrew	S3	Rosebud
	<i>Cynomys ludovicianus</i>	Black-tailed Prairie Dog	S3	Rosebud
	Reptiles	<i>Apalone spinifera</i>	Spiny Softshell	S3
<i>Heterodon nasicus</i>		Western Hog-nosed Snake	S2	Rosebud
<i>Phrynosoma hernandesi</i>		Greater Short-horned Lizard	S3	Rosebud
<i>Chelydra serpentina</i>		Snapping Turtle	S3	Rosebud
<i>Sceloporus graciosus</i>		Common Sagebrush Lizard	S3	Rosebud
<i>Lampropeltis triangulum</i>		Milksnake	S2	Rosebud

Source: Montana Natural Heritage Program: <http://mtnhp.org/requests/default.asp>

5.1.3. Crucial Areas Planning System (CAPS) Report

The MFWP recently implemented a web-based tool to help identify and evaluate the fish, wildlife and recreational resources of Montana. The Crucial Areas Planning System (CAPS) is a mapping service intended to provide useful and non-regulatory information about highly valued fish and wildlife resources and recreation areas during the early planning stages of projects. The CAPS can provide information for specific areas of interest.

In May 2012, MFWP Data Services personnel generated a CAPS report for lands within and around the Study corridor. The CAPS summary report is larger than the Study corridor due to the query being limited to the “section only” level, and not being capable of querying partial sections. Accordingly, the CAPS summary report includes information for 213 sections, compared to 117 partial and full sections for the Study corridor. The added sections are commonly those which are immediately adjacent to two sections included in the Study corridor.

The CAPS summary report (found in Appendix E) provides information for both terrestrial and aquatic species/habitats. Notable highlights from the report are provided below:

Terrestrial Species and Habitat

- Highest-value habitat shows up for conservation species, biodiversity (“species richness”), and riparian area.
- Moderate-value habitat shows up for the above, plus game quality. A finer query of the CAPS game quality composite data layer shows highest-value winter range for both mule deer and white-tailed deer, and the presence of sage-grouse leks in the CAPS summary area.

- Twenty-seven (27) conservation species occur, or are predicted to occur, in the CAPS summary area.
- The CAPS summary area contains several ecological systems that contribute significantly to its biodiversity, most notably Great Plains Riparian and Great Plains Floodplain.

Aquatic Species and Habitat

- Highest-value stream habitat shows up for aquatic connectivity and game fish life history.
- Moderate-value stream habitat shows up for all five aquatic composite data layers: aquatic connectivity, Species of Concern, native species richness, game fish life history, and game fish quality.
- Four Species of Concern, 28 native species, and 24 sport fish species occur in the CAPS summary area waters, most notably the Tongue River itself.
- The Tongue River provides critical rearing and spawning area for five warm water sport fish species, important rearing and spawning area for two more warm water sport fish species, and important rearing and/or spawning area for four cold water sport fish species.

MFWP notes that the CAPS information is not a substitute for a site-specific evaluation of fish, wildlife, and recreational resources within the Study corridor and recommends follow-up consultations with MFWP field biologists should a project be advanced.

5.1.4. Wildlife and Traffic Concerns

During the project development process, wildlife crossings and/or wildlife accident cluster areas along the corridor will need to be addressed.

5.2. Vegetation

Native vegetation in the study area generally consists of wetland and riparian areas along the Tongue River and sagebrush/grasslands in the upland areas. The remaining vegetation consists of cultivated crop land.

5.2.1. Threatened and Endangered Plant Species

The federal list of threatened endangered and threatened species is maintained by the USFWS. Species on this list receive protection under the Endangered Species Act (ESA). An 'endangered' species is one that is in danger of extinction throughout all or a significant portion of its range. A 'threatened' species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list.

Information regarding endangered, threatened, proposed, and candidate species list for Montana counties (August 2011) was obtained from the USFWS website. This list identifies the counties where one would reasonably expect the species to occur, not necessarily every county where the species is listed.

This list identified no endangered, threatened, proposed, or candidate plant species listed for Custer or Rosebud Counties, and none are currently expected to occur in the study area. If a project is forwarded from the improvement option(s), an evaluation of all endangered, threatened, proposed, or candidate species will need be done during the project development process.

5.2.2. Species of Concern

Montana Species of Concern are native plants in the state that are considered to be “at risk” due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana Plant Species of Concern is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively. Each species is assigned a state rank that ranges from S1 (greatest concern) to S5 (least concern). Other state ranks include SU (unrankable due to insufficient information), SH (historically occurred), and SX (believed to be extinct). State ranks may be followed by modifiers, such as B (breeding) or N (non-breeding).

Table 4 lists the plant species of concern that the Montana Heritage Program has records of in Custer and Rosebud Counties. The results of a data search by the Montana Natural Heritage Program reflect the current status of their data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys. If a project is forwarded from the improvement option(s), on-site surveys will need to be completed during the project development process.

Custer and Rosebud County both list nine (9) plant species of special concern. Two (2) of these plant species occur in both counties.

Table 4. Plant State Species of Concern Noted in Custer and Rosebud Counties

Scientific Name	Common Name	State Rank	County
<i>Chenopodium subglabrum</i>	Smooth Goosefoot	S2	Custer
<i>Dalea enneandra</i>	Nine-antler prairie clover	S1S2	Custer
<i>Penstemon grandiflorus</i>	Large Flowered Beardtongue	S1	Custer
<i>Physaria brassicoides</i>	Double Bladderpod	S3	Custer
<i>Plagiobothrys leptocladus</i>	Slender-branched Popcorn-flower	S1	Custer
<i>Cyperus schweinitzii</i>	Schweinitz' Flatsedge	S2	Custer
<i>Sporobolus compositus</i>	Tall Dropseed	SH	Custer
<i>Mentzelia nuda</i>	Bractless blazingstar	S1S2	Custer & Rosebud
<i>Rorippa calycina</i>	Persistent-sepal Yellow-cress	S1	Custer & Rosebud
<i>Amorpha canescens</i>	Lead Plant	SH	Rosebud
<i>Asclepias stenophylla</i>	Narrowleaf Milkweed	S2	Rosebud
<i>Astragalus barrii</i>	Barr's Milkvetch	S3	Rosebud
<i>Ipomoea leptophylla</i>	Bush morning-glory	S1S2	Rosebud
<i>Lomatium nuttallii</i>	Nuttall Desert-parsley	S1S2	Rosebud
<i>Pediomelum hypogaeum</i>	Little Indian Breadroot	S2S3	Rosebud

<i>Phlox andicola</i>	Plains Phlox	S3	Rosebud
<i>Physaria didymocarpa var. lanata</i>	Woolly Twinpod	S1	Rosebud
<i>Carex gravida</i>	Pregnant sedge	S3	Rosebud

Source: Montana Natural Heritage Program: <http://mtnhp.org/requests/default.asp>

5.2.3. Noxious Weeds

Noxious weeds degrade habitat, choke streams, crowd native plants, create fire hazards, poison and injure livestock and humans, and foul recreation sites. Areas with a history of disturbance are at particular risk of weed encroachment. There are 32 noxious weeds in Montana, as designated by the Montana Statewide Noxious Weed List (effective April 15, 2008). If a project is forwarded from the improvement option(s), the study area will need be surveyed for noxious weeds. County Weed Control Supervisors should be contacted regarding specific measures for weed control.

6. Cultural and Archaeological Resources

If projects forwarded from the Study are federally-funded, a cultural resource survey of the Area of Potential Effect for this project as specified in Section 106 of the National Historic Preservation Act (36 CFR 800) would need to be conducted. Section 106 requires Federal agencies to “take into account the effects of their undertakings on historic properties.” The purpose of the Section 106 process is to identify historic properties that could be affected by the undertaking, assess the effects of the project and investigate methods to avoid, minimize or mitigate any adverse effects on historic properties. Special protections to these properties are recognized under Section 4(f) of the Transportation Act.

The Tongue River drains a vast area of north central Wyoming and Southeastern Montana. In the relatively dry grasslands of southeastern Montana the river has always acted as a focus of human activities. The Tongue River Valley and its surrounding breaks have a rich history from early Pre-contact times through the 19th century Indian Wars. The 20th century brought mining, cattle and horse ranching.

A search of existing (known) cultural resources, both archaeological sites and historic properties, was conducted for the full, one mile wide study area. The study area is approximately 33,000 acres in size and within that area 97 separate cultural resources are known to exist. These resources include historic irrigation ditches, residences, and trash deposits, as well as stratified archaeological sites, lithic scatters, lithic quarries, cribbed log structures, stone cairns and rock art. Bison kills, tipi rings and human burials are very likely present in the study area as well.

The Tongue River drainage is full of high quality raw material (known as porcellanite) suitable for making stone tools. For that reason pre-contact lithic scatters are very common in the area. Lithic scatters may account for most of the known sites in the study corridor. Although Secondary 332 does bisect some cultivated ground used for hay production, the vast majority of the land on either side of the existing road is native range. The high concentration of porcellanite lithic scatters coupled with the fact that most of the study corridor has never been subjected to plowing means that there are undoubtedly many hundreds of unidentified and undisturbed lithic scatters in the corridor.

Based on a review of prior cultural resource inventories we know that approximately 7% of the study area has had some past cultural resource survey. Some of these surveys date back to the 1970s when methods and expectations were not what they are today. On the other hand, many of the previous surveys in the study area date from the 2000's and meet present day cultural resource management methods. Approximately 75% of the previous cultural resource inventories in the corridor have been conducted on public land, mostly administered by the Bureau of Land Management. Based on existing data we can estimate that there are well over a thousand cultural resources in the study area. Since the majority of these resources are pre-contact archaeological sites (lithic scatters), archaeological testing may be a key component and expense of projects developed within the Secondary 332 corridor. Compliance with applicable laws such as Section 106 of the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the Montana State Burial Law, etc. will be required if a project is forwarded. Additionally, tribal consultation will be required at an early stage of project development.

Reviews were also conducted to determine the presence of Section 4(f) and Section 6(f) properties along the corridor. Section 4(f) refers to the original section within the Department of Transportation Act of 1966 (49 U.S.C. 303), which set the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. Prior to approving a project that "uses" a Section 4(f) resource, FHWA must find that there is no prudent or feasible alternative that completely avoids 4(f) resources. "Use" can occur when land is permanently incorporated into a transportation facility or when there is a temporary occupancy of the land that is adverse to a 4(f) resource. Constructive "use" can also occur when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under 4(f) are "substantially impacted". Section 4(f) resource information was gathered by field observation and review of the National Register of Historic Places (NRHP) list for Custer County and Rosebud County.

6.1. 4(f) Resources

A file search through the Montana State Historic Preservation Office revealed the presence of many historic and archaeological sites within the general project corridor. Only a single known resource has been formally evaluated for the National Register of Historic Places and found to be significant. That property is 24CR771, the Tongue/Yellowstone River Irrigation District Canal. The other recorded sites in the corridor have never been formally evaluated for the National Register so their significance is unknown at this time. The Tongue River valley is significant for the number of working historic ranches and dude ranches that are located there. None are located adjacent to the roadway, but if alternative alignments are selected for any future project, then it is possible one of those sites will be encountered. There may be sites associated with the US Army's Centennial Campaign of 1876-77. The valley is also significant to the Lakota, Northern Cheyenne, and Crow people, both in regards to archaeological sites and Traditional Cultural Properties. It would be important to keep those groups notified of the progress of a project and solicit their comments. There are undoubtedly additional historic sites located within the corridor. They will be identified if project development moves forward within the corridor and treated under Section 106 of the National Historic Preservation Act and Section 4(f).

NRHP 4(f) resources within the Study corridor are summarized below in Table 5.

Table 5. 4(f) Resources within the Project Area

Name	Type of 4(f) Resource	Location Relative to Corridor
24CR771 - Tongue/Yellowstone River Irrigation District Canal	Historic Canal	Various spot locations length of corridor
Twelve Mile Dam Fishing Access	Recreational Area	On S-332, approximately 1.0 mile southwest of the MT-59 / S-332 Junction
Pumpkin Creek Ranch Recreation Area	Recreational Area	On S-332, approximately 4.0 miles southwest of the MT-59 / S-332 Junction

6.2. 6(f) Resources

6(f) resources within the Study corridor are summarized in Table 6, and Appendix F

Table 6. 6(f) Resources within the Project Area

Name	Type of 6(f) Resource	Location Relative to Corridor
Twelve Mile Dam Fishing Access	Recreational Area	On S-332, approximately 1.0 mile southwest of the MT-59 / S-332 Junction

7. Social

To provide a context in which to evaluate social impacts, characteristics of the existing population are presented in Table 7 and Table 8.

Table 7: Demographic Information

Area	Population (2010)	Population (2000)	Median Household Income (2010)	Persons Below Poverty (2010)	Persons per Square Mile (2009)
Custer County	11,703	11,678	\$39,469	14.9%	3.0
Rosebud County	9,254	9,389	\$44,683	18.8%	1.8
State of Montana	990,898	902,200	\$42,303	15.2%	6.7
USA	311,591,917	308,745,538	\$50,046	15.3%	86.9

As shown in the table, the project area population has generally stayed the same since 2000. Residents in the project area tend to be higher in age and approximately the same in median household income compared to Montana as a whole.

Table 8: Population Data

	Custer County	Rosebud County	State of MT	USA
Total Population ^a	11,703	9,254	990,889	311,591,917
White ^b (%)	95.5	61.3	89.4	72.4
African American ^b (%)	0.3	0.3	0.4	12.6
American Indian/Alaska Native ^b (%)	1.7	34.7	6.3	0.9
Asian ^b (%)	0.3	0.5	0.6	4.8
Native Hawaiian/Pacific Islander ^b (%)	0.1	0.0	0.1	0.2
Hispanic/Latino ^b (%)	2.2	3.4	2.5	16.3
2 or more races ^b (%)	1.6	2.8	1.7	2.9

Source: US Census Bureau

a. 2010 Estimate

b. 2010 Data in Percent (%)

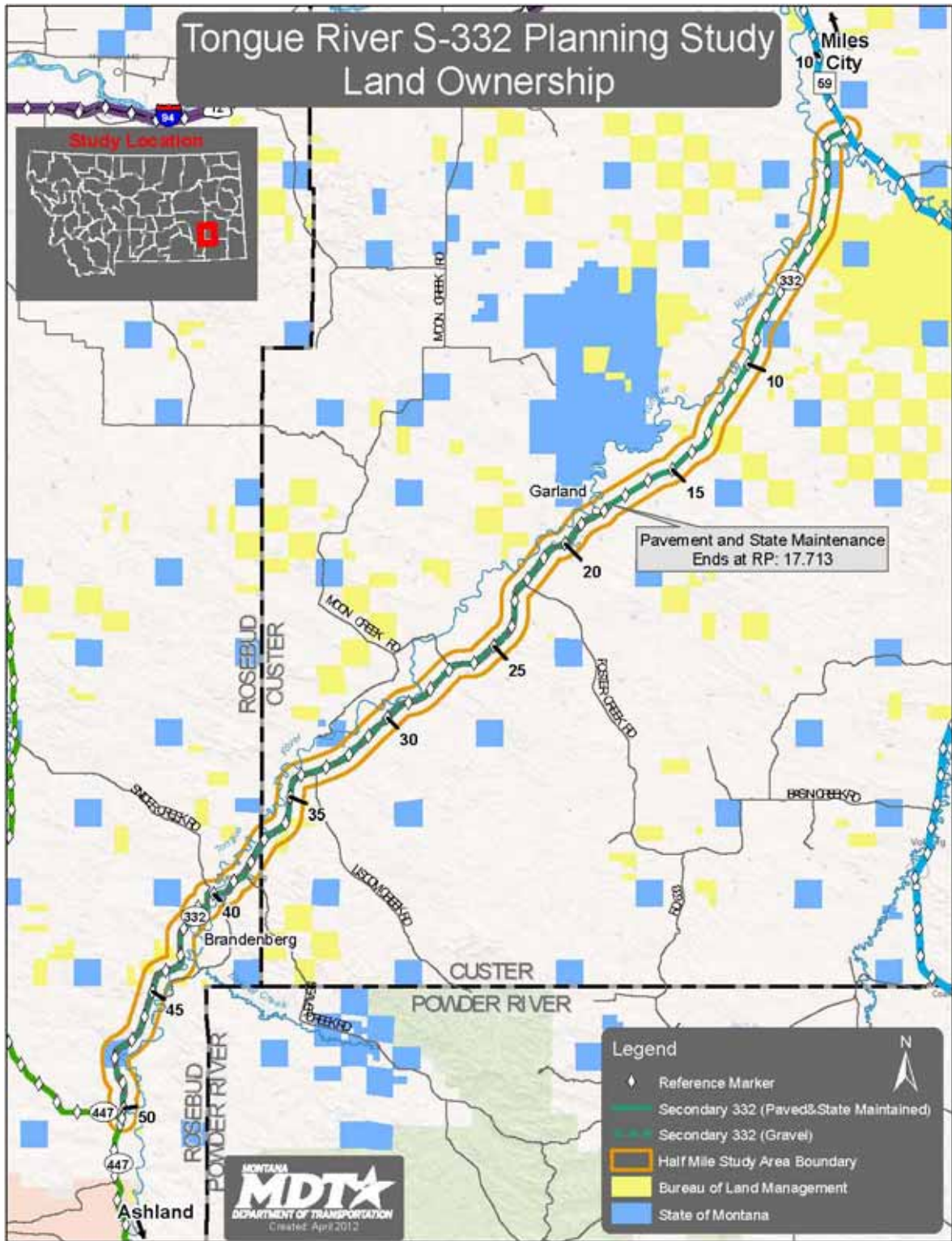
In general the ethnic makeup of the project area is primarily white. Rosebud County has a large Native American population compared to Montana as a whole.

7.1. Environmental Justice

Title VI of the US Civil Rights Act of 1964, as amended (USC 2000(d)) and Executive Order (EO) 12898 require that no minority, or, by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaced, or otherwise subjected to adverse effects.

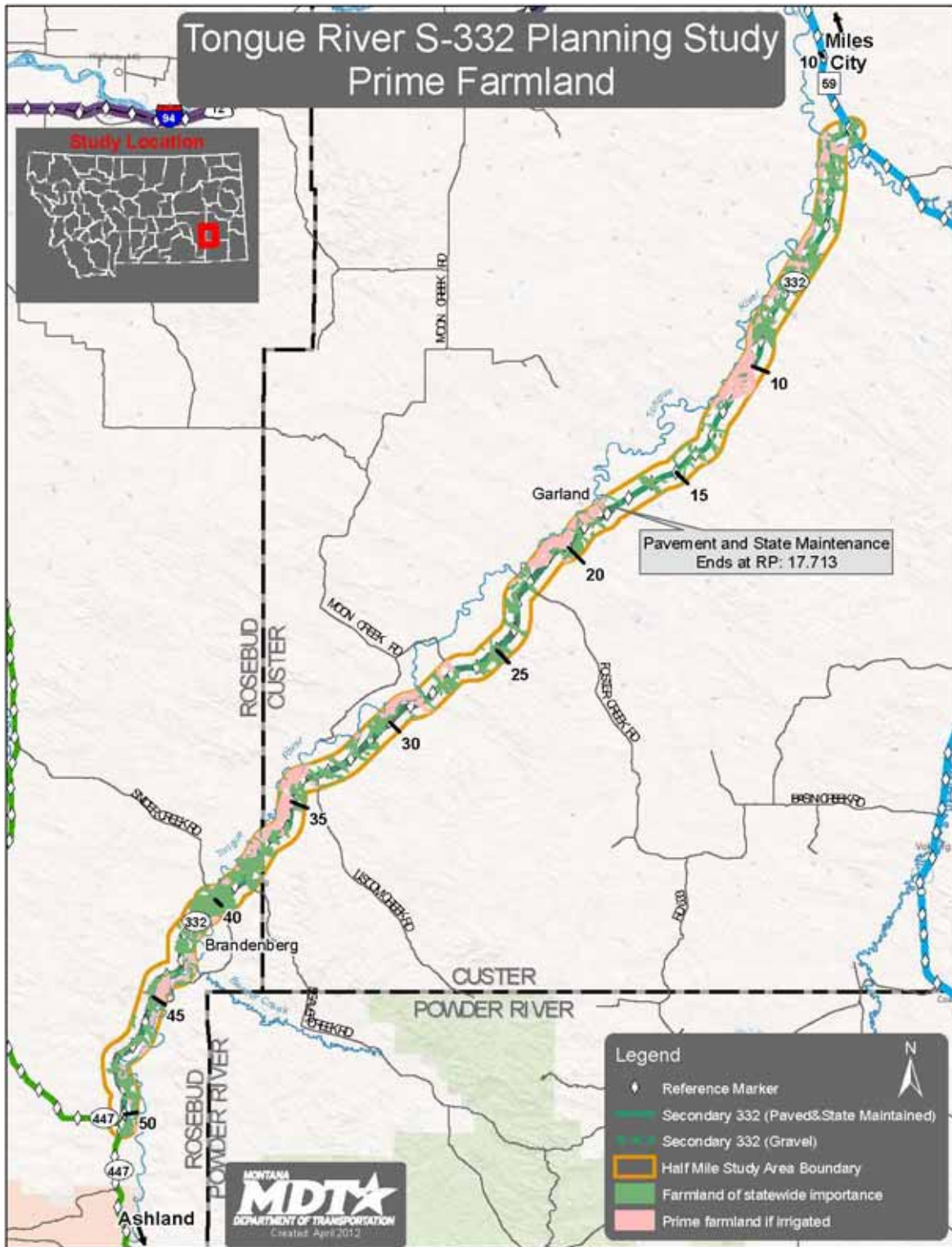
If a project is forwarded from the improvement option(s), Environmental Justice will need to be further evaluated during the project development process.

Appendix A – Public Lands Ownership Map



Source: MSDI Framework GIS Data - County Cadastral/CAMA
 Data Download: <ftp://ftp.gis.mt.gov/cadastralframework/>
 Metadata: <http://giscoordination.mt.gov/cadastral/Cadastral040109.xml>

Appendix B – Farmlands



Source: NRCS SSURGO GIS data from Natural Resource Information System of the Montana State Library
 Data Download: <http://www.nris.mt.gov/nrcs/soils/datapage.asp>

Metadata:

<http://soildatamart.nrcs.usda.gov/SDM%20Web%20Application/SSURGOMetadata.aspx>

FINAL

Appendix C – Geology

**GEOLOGIC MAP OF THE MILES CITY 30' x 60' QUADRANGLE,
EASTERN MONTANA**

Compiled and mapped by Susan M. Vuke,
Stanley J. Luft, Roger B. Colton, and Edward L. Heffern

Montana Bureau of Mines and Geology
Open File Report MBMG 426

2001

This report has had preliminary reviews for conformity with Montana Bureau of Mines and Geology technical and editorial standards.

Partial support has been provided by the STATEMAP component of the National Cooperative Geologic Mapping Program of the U.S. Geological Survey under contract Number 00HQAG0115.

DESCRIPTION OF MAP UNITS
MILES CITY 30' x 60' QUADRANGLE

Note: Thicknesses are given in feet because original field maps were on 7.5' quadrangles with contour intervals in feet. To convert feet to meters (the contour interval unit on this map) multiply feet x 0.3048.)

- Qal Alluvium (Holocene)**—Light-brown and gray gravel, sand, silt, and clay deposited in stream and river channels and on flood plains. Clasts are poorly to well sorted, and most are well rounded. Deposits are poorly to well stratified. Thickness as much as 50 ft under flood plains of Yellowstone and Tongue Rivers (Lewis and Roberts, 1978) and less than 25 ft under flood plains of tributaries.
- Qat Alluvial terrace deposit (Holocene and Pleistocene)**—Light-gray to light-brown gravel, sand, silt, and clay in terrace remnants at elevations from 2 to 260 ft above rivers and streams. Clasts are well rounded to subangular. Deposits are poorly to well stratified and poorly to well sorted. Along the Yellowstone and Tongue Rivers includes significant colluvium, a few small alluvial fan deposits and eolium. Thickness as much as 50 ft.
- QTcl Clinker (Holocene, Pleistocene, and Pliocene?)**—Red, pink, orange, black, and yellow, very resistant metamorphosed sandstone, siltstone, and shale of the Fort Union Formation. Bedrock was baked by natural burning of underlying coal, and collapsed into voids created by burning. Locally, baked rock was melted and fused to form buchite, a black, glassy, vesicular or scoriaceous rock. Thickness generally about 20 ft, but locally as much as 50 ft.
- Fort Union Formation (Paleocene)**
- Tftr Tongue River Member**—Yellow, orange, or tan, fine-grained sandstone with thinner interbeds of yellowish brown, orange, or tan siltstone, and light-colored mudstone and clay. Clay dominantly non-swelling. The Dominy is the most prominent coal zone and has produced much of the clinker in the member. In part of the map area (shown with hachure pattern) the lower part of the member contains a paleosol unit characterized by thin, orange, silty limestone beds that form caprocks, and light-colored siltstone and mudstone beds that may contain white- or light-gray-weathered silcrete and other paleosols. The silcrete and other paleosols characteristically contain molds of plant stems and roots, and range from 1 to 6 inches thick. The upper part of the member was removed by erosion in the map area. Thickness as much as 350 ft exposed in map area.

- Tfd** Ludlow Member—Gray and grayish brown fine-grained sandstone, siltstone, smectitic mudstone, and carbonaceous shale interbedded with thinner yellow or orange fine-grained sandstone beds. In part of the map area (shown with hachure pattern) the paleosol unit described above in the lower Tongue River Member extends into the upper Ludlow Member. Facies change from Lebo and Tullock Members of the Fort Union Formation to the Ludlow Member is indicated in the eastern part of the map area. Four or five thin, lenticular lignite beds are present in the member and have produced clinker in some areas. Thickness of member about 460 ft.
- Tflc** Lebo Member—Dark- to light-gray smectitic shale and mudstone interbedded with less dominant lenticular to tabular beds of yellow, brown, and gray sandstone, gray siltstone, carbonaceous shale and ironstone concretion zones. Locally sandstone channels are present. In part of the map area (shown with hachure pattern), the paleosol unit described above in the lower Tongue River Member extends into the upper Lebo Member. Two to four thin lignite beds are present in the member and have produced clinker in some areas. Thickness of member 175–225 ft.
- Tft** Tullock Member—Light-yellow and light-brown, planar-bedded, very fine- to medium-grained sandstone interbedded with less dominant gray shale and mudstone, and locally, with brownish gray well-indurated argillaceous limestone beds that may contain plant fragment molds. Locally lower part contains narrow, sinuous, steep-walled channel deposits less than 50 ft wide composed of brownish yellow, cross-bedded sandstone. Thickness of member 150 ft.
- Khc** Hell Creek Formation (Upper Cretaceous)—Gray and grayish brown sandstone, smectitic, silty, greenish brown, gray, or reddish-brown shale and mudstone, and dark gray or black carbonaceous shale. Sandstone is fine- or medium-grained, and calcium carbonate-cemented concretions are typical in the fine-grained sandstone. Base of formation not exposed. Exposed thickness about 160 ft.

**GEOLOGIC MAP OF THE LAME DEER 30' x 60' QUADRANGLE,
EASTERN MONTANA**

Compiled and mapped by Susan M. Vuke, Edward L. Heffern,
Robert N. Bergantino, and Roger B. Colton

Montana Bureau of Mines and Geology
Open File Report MBMG 428

2001

Map revised: 11/07

This report has had preliminary reviews for conformity with Montana Bureau of Mines and Geology's technical and editorial standards.

Partial support has been provided by the STATEMAP component of the National Cooperative Geologic Mapping Program of the U.S. Geological Survey under contract Number 00-HQ-AG-0115.

DESCRIPTION OF MAP UNITS
LAME DEER 30' x 60' QUADRANGLE

Note: Thicknesses are given in feet because original field maps were on 7.5' quadrangles with contour intervals in feet. To convert feet to meters (the contour interval unit on this map), multiply feet x 0.3048.

- Qal Alluvium (Holocene)**—Light-gray and light-brown gravel, sand, silt, and clay deposited in stream and river channels and on their flood plains. Clasts are poorly to well sorted, and most are well rounded. Deposits are poorly to well stratified. Thickness as much as 35 ft under larger floodplains, but generally less than 15 ft.
- Qat Alluvial terrace deposit (Holocene and Pleistocene)**—Light-gray to light-brown gravel, sand, silt, and clay in terrace remnants at elevations from 30–200 ft above Rosebud Creek, Tongue River, and their tributaries. Clasts are generally well rounded. Deposits are poorly to well stratified and poorly to well sorted. Clasts are composed of Fort Union Formation sandstone and clinker; brown quartzite; and gray chert. Thickness generally less than 15 ft, but locally as much as 50 ft.
- QTat Alluvial terrace deposit (Pleistocene and/or Pliocene)**—Light-brown and light-gray gravel and sand at an elevation of about 3,400–3,700 ft. Clasts are generally well sorted and most are well rounded, and dominantly pebble and cobble size, but also boulders greater than a foot in diameter. Deposits are moderately to well sorted, and well cemented at the base into a conglomerate. Clasts are composed of igneous rocks including granite, basalt and andesite porphyry; agate; silicified wood; and Fort Union Formation clinker (Dobbin, 1930). Thickness about 60 ft.
- QTcl Clinker (Holocene, Pleistocene, and Pliocene? [Coates and Heffern, 2000])**—Red, pink, orange, black, and yellow, very resistant metamorphosed sandstone, siltstone, and shale of the Fort Union Formation. Bedrock was baked by natural burning of underlying coal, and collapsed into voids created by burning. Locally, baked rock was melted and fused to form buchite, a black, glassy, vesicular or scoriaceous rock. Thickness 10–230 ft.
- Tw Wasatch Formation (Eocene)**—Yellowish gray to light gray siltstone and medium- to coarse-grained, massive, or cross-bedded sandstone interbedded with medium gray and brown carbonaceous shale and coal. Local basal coal and clinker. Formation typically weathers light gray to tan, and has a distinct heavy-mineral suite (Connor and others, 1976; Denson and others, 1990). At least four different stratigraphic criteria have been used previously to define the Wasatch-Tongue River contact (Seeland and others, 1993). The contact on this map follows that of Heffern and others (1993). Only basal part of formation exposed. Exposed thickness about 100 ft.

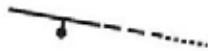
Fort Union Formation (Paleocene)

- Tfir** Tongue River Member—Yellow, orange, or tan, fine-grained sandstone with thinner interbeds of yellowish brown, orange, or tan siltstone; light-colored mudstone, and clay; and coal beds. The most prominent coal beds in the map area are the Robinson, McKay, Rosebud, Knobloch, and Sawyer (Derkey, 1986). Clay dominantly non-swelling. Sandstone massive or crossbedded. Thickness of as much as 640 ft exposed in map area.
- Tfle** Lebo Member—Gray, smectitic shale and mudstone that contain lenses of gray and yellow, very fine- to medium-grained sandstone, ironstone concretion zones from 1 to 12 inches thick, and a few thin coal beds. Thickness of member 95–200 ft.
- Tft** Tullock Member—Light-yellow and light-brown, planar-bedded, very fine- to medium-grained sandstone and minor amounts of gray shale. Two or three coal beds in the upper 110 ft of member, and in many places, a coal bed at the base. Thickness of member 240–260 ft.

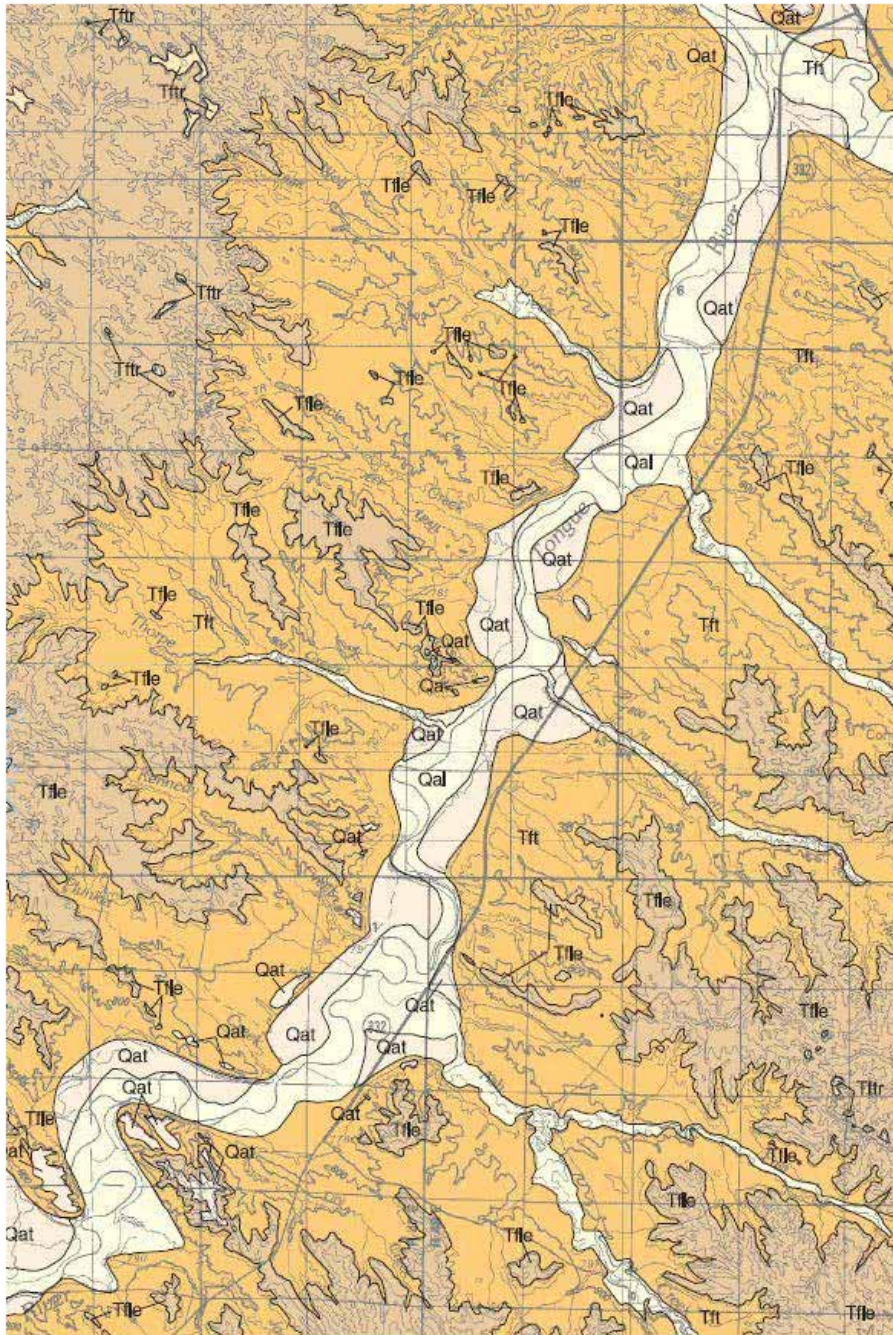
MAP SYMBOLS

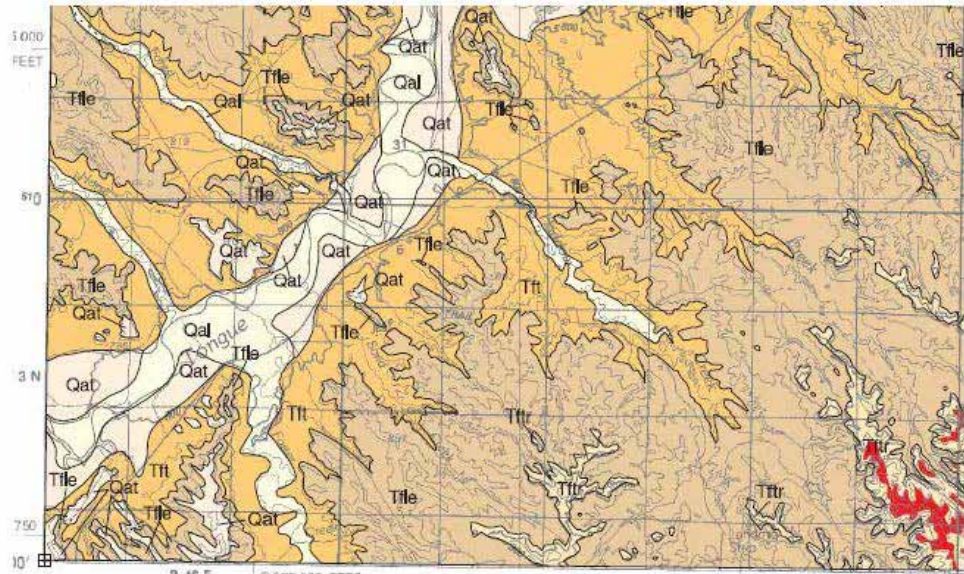


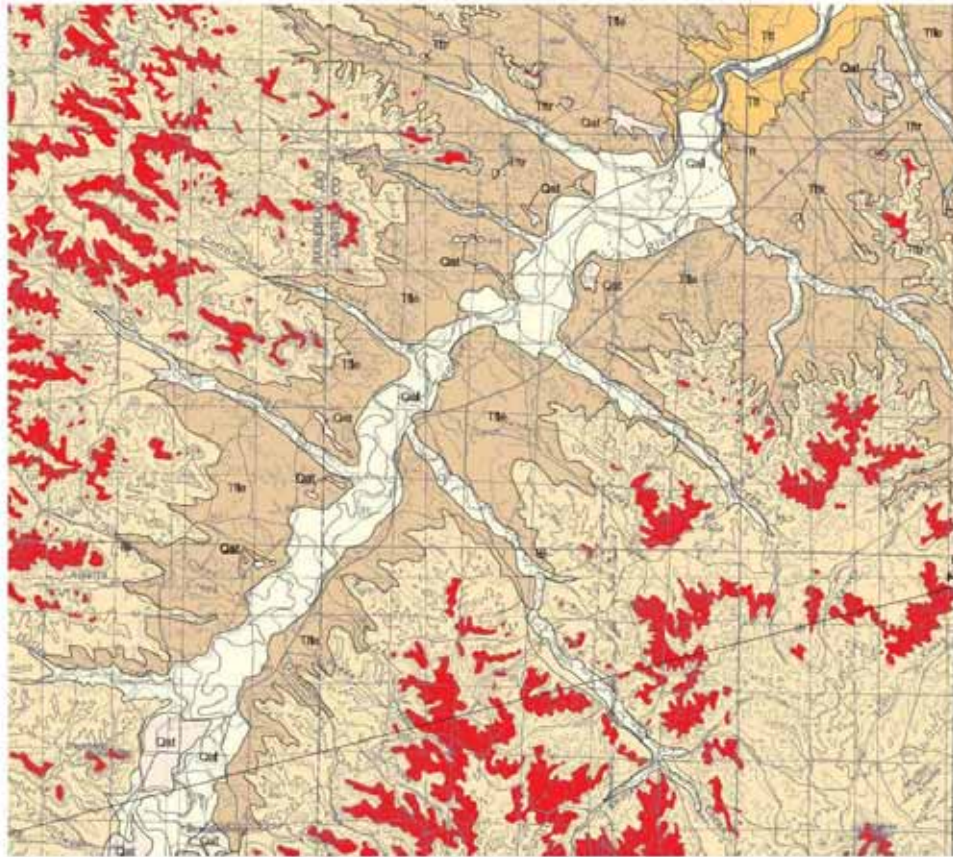
Contact—Dotted where concealed.

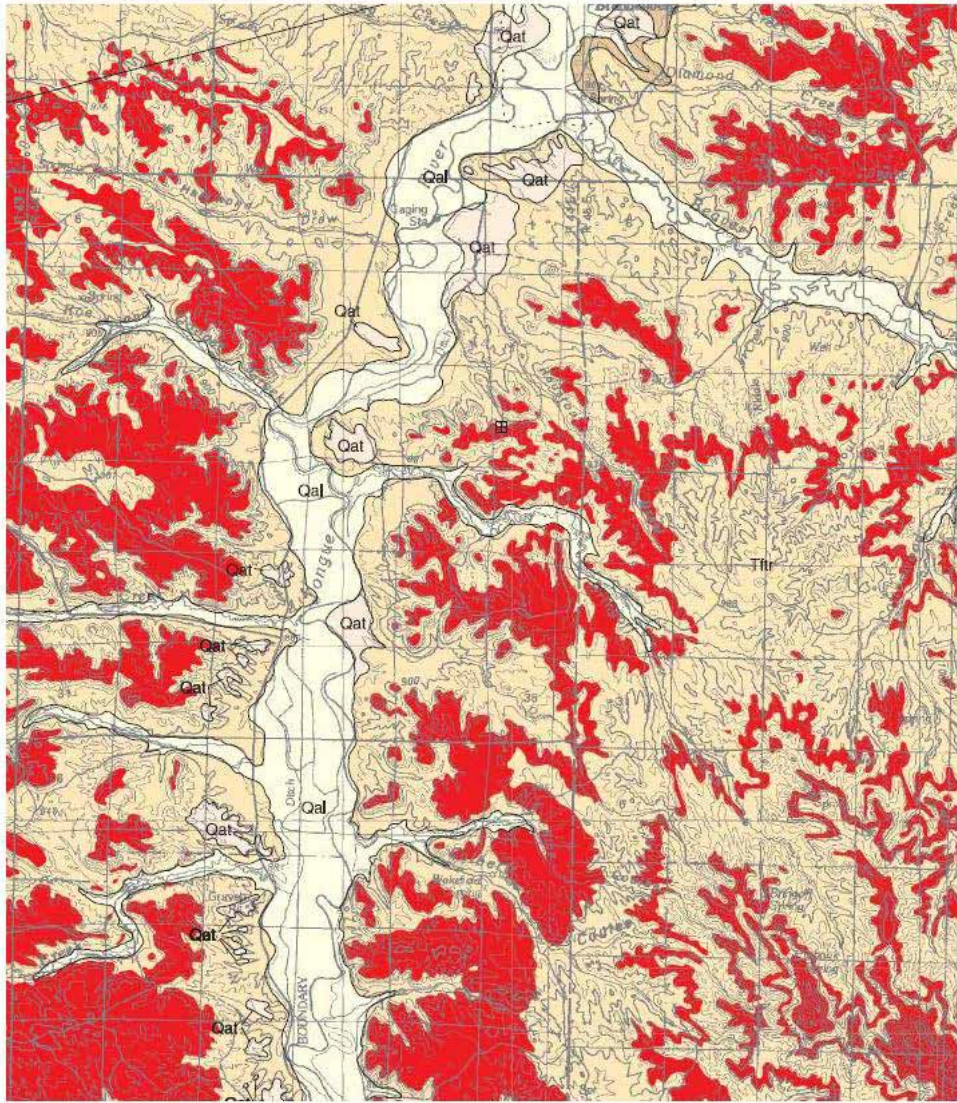


Fault—Ball and bar on downthrown side, dashed where inferred, dotted where concealed.

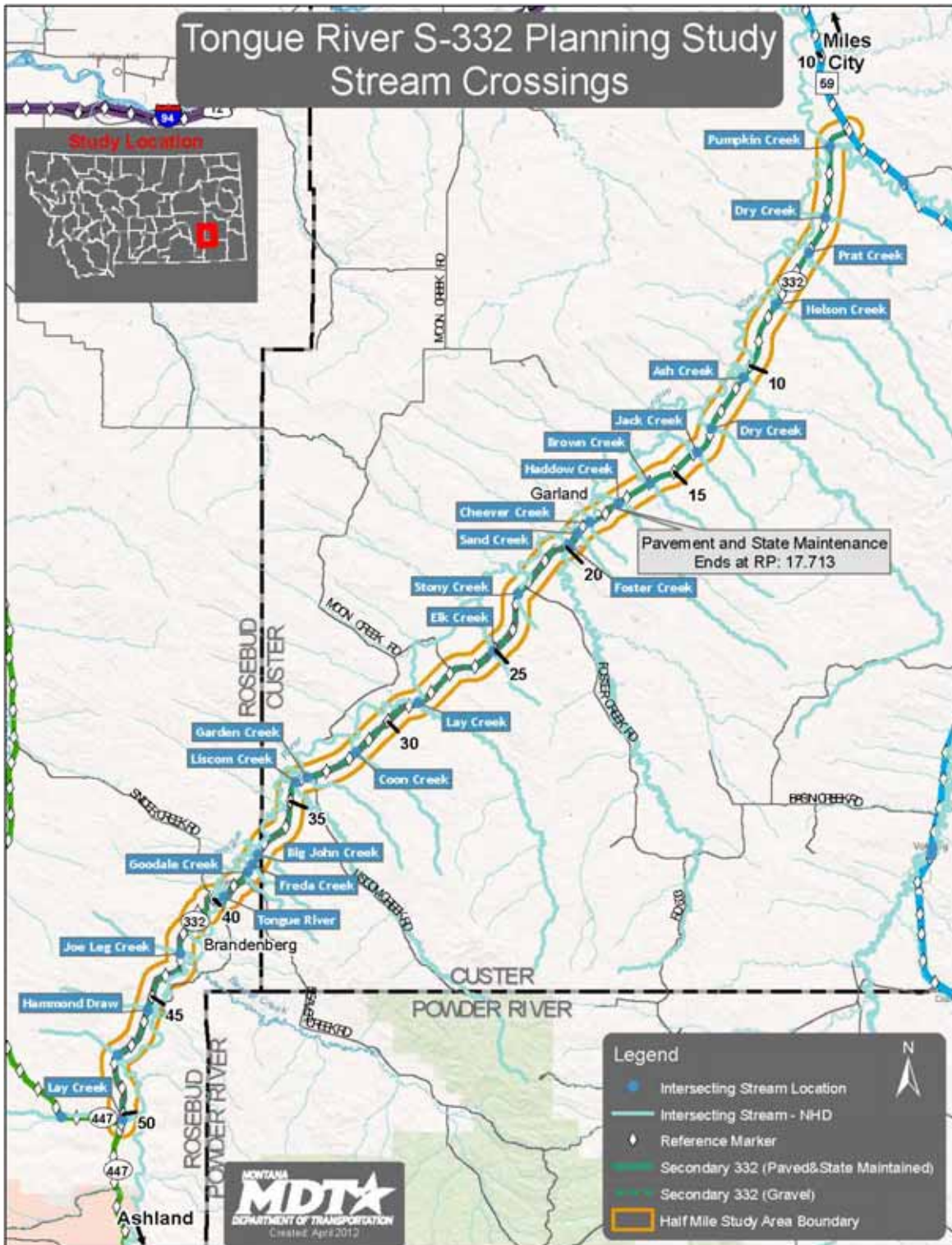








Appendix D – Named Stream Crossings



Source: USGS and NRIS (supplied data are in Montana State Plane Coordinates).

Data Download: <http://nris.mt.gov/nsdi/nhd/hires.asp>.

Metadata: <http://nris.state.mt.us/nsdi/nhd/>.

Appendix E – CAPS Summary Report



**Montana Fish,
Wildlife & Parks**

CRUCIAL AREAS SUPPORTING LAYERS DATA DOWNLOAD AND REPORT – April 2011

The data and report you are receiving represent a subset of information publicly available online as part of the **Crucial Areas Planning System (CAPS)** at <http://fwp.mt.gov/wildthings/conservationInAction/crucialAreas.html>. Although the data are being provided to you in either a report and/or shapefile, the intended and appropriate use of the data are the same as if using the online application. **Please read the following thoroughly:**

- CAPS data are intended to provide information during the planning stages of development projects; it is not intended for final decision making nor are the data intended to replace consultation with Montana Fish, Wildlife & Parks (FWP) staff.
- The finest data resolution is at the square mile section scale; use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations.
- The data have been provided to you at the section level even if your project covers only part of a section.
- If your project is within an Indian Reservation, no data will be provided for that area.
- Much of the data are based on expert knowledge, predicted habitat suitability and/or extrapolation. It is your responsibility to confirm a species presence or absence based on field sampling methods following FWP protocols.
- All overall values are scaled from 1 (highest) to 4 (lowest) EXCEPT for the Terrestrial Game Quality Contributing Data Layers which reflect a summary of points where the higher the number, the greater the value.
- An overall "Crucial Area" value has not been completed at this time.
- FWP requests that you acknowledge the agency as the source whenever you use FWP data in reports, papers, publications or in maps.

THE LAYERS

In addition to the metadata provide with the shapefile download, we encourage you to download and read the Crucial Areas Assessment Layer Documentation Summary from <http://fwpiis.mt.gov/content/getItem.aspx?id=42958> for additional information about the creation of the data.

AQUATIC SPECIES LAYERS

Aquatic Connectivity

Important stream corridors for fish species that require connected habitats to complete all/portion of their life history.

Game Fish Quality

44 Species

Areas recognized as important to fish species regulated by harvest. Valued for: species abundance, size and sport fish tier; other unique angling opportunities.

The data used in the Crucial Areas Planning System (CAPS) <http://fwp.mt.gov/wildthings/conservationInAction/crucialAreas.html> report is being provided to you by Montana Fish, Wildlife & Parks for the sole purpose of the requested analysis. April 2011

Game Fish Life History 44 Species

Areas depicting habitats that support a game fish species spawning, rearing or thermal refuge areas.

Species of Concern 19 Species

Montana's Fish Species of Concern (SOC); ranked according SOC status.

Native Fish Species Richness 85 Species

Areas recognized as important to native fish assemblages.

TERRESTRIAL SPECIES LAYERS

Conservation Species 85 Species

Conservation species were ranked based on the Species of Concern State Rank/Global Rank and their ESA status. Most species occurrences were based on a predictive habitat suitability model using a threshold rule that can be automatically generated from MaxEnt and used to convert continuous model output into two classes. The threshold that was used balances training omission, fractional predicted area, and the cumulative threshold value. The resulting output is a species distribution which is relatively "liberal" relative to other possible thresholds.

Species Richness 366 Species

Species Richness represents the average number of species associated with each ecological systems in a square mile section.

Game Quality 12 Species

Areas recognized as important to species with regulated harvest including: big game winter range, forest carnivores, prairie grouse, and Bighorn Sheep/Mountain Goat. Data based on expert knowledge.

HABITAT

Riparian Areas and Wetland Areas

Habitat areas considered separately based upon their uniqueness, complexity and the diversity of species they support.

CONTACT INFORMATION

Data Services

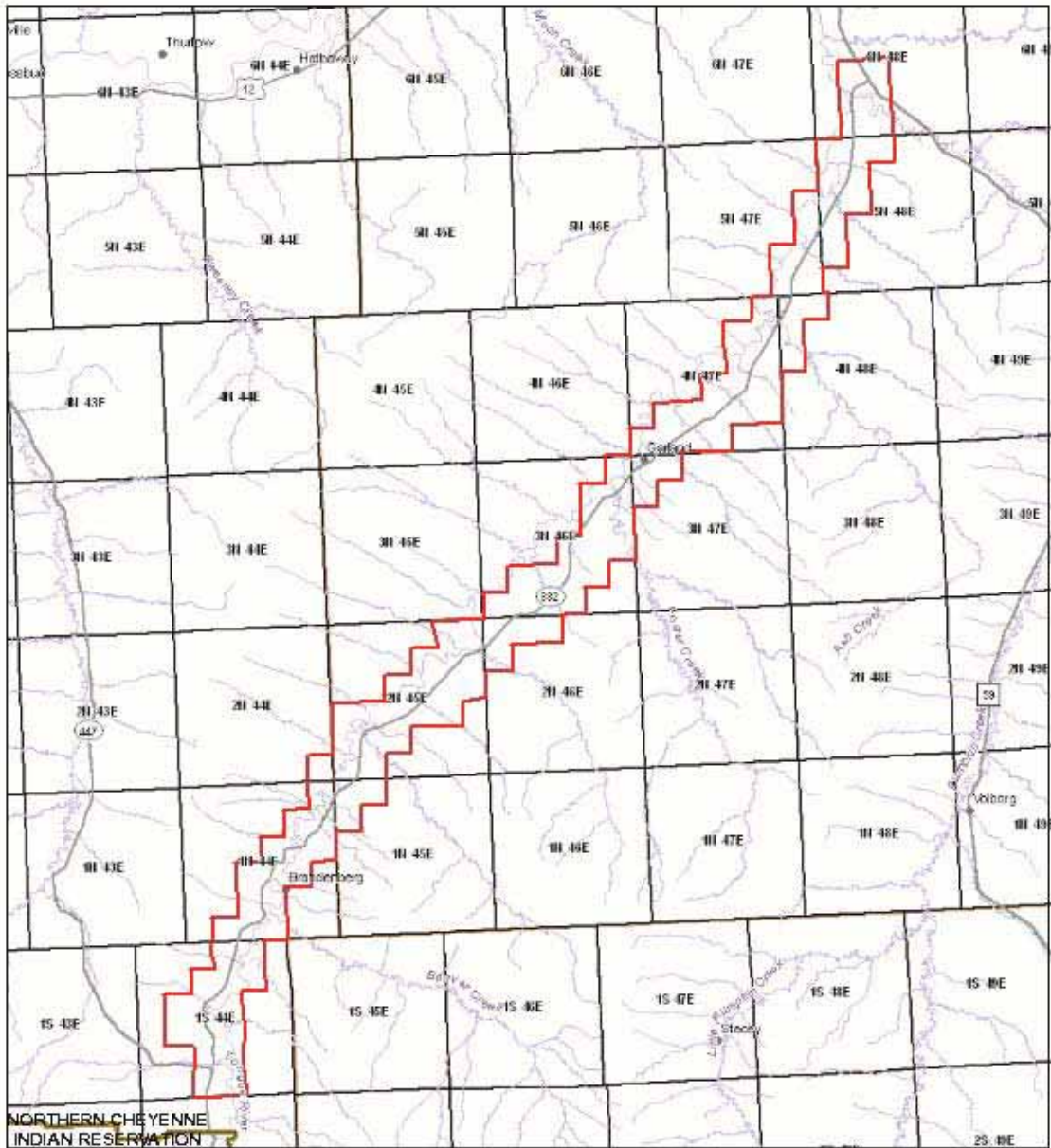
Lydia Bailey, Data Services GIS Manager (406) 444-5365 lbailey@mt.gov

Planning Services

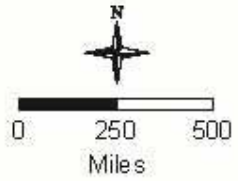
Rob Brooks, Supervisor/Energy Coordination (406) 444-5786 rob Brooks@mt.gov

Doris Fischer, Land use Planning Specialist (406) 842-7467 dofischer@mt.gov

The data used in the Crucial Areas Planning System (CAPS) <http://www.mt.gov/in/withings/en/ncscvst/inn/Action/kruc/old/areas.html> report is being provided to you by Montana Fish, Wildlife & Parks for the sole purpose of the requested analysis. April 2011



Tongue River Road Study Area



W:\reportMap.mxd

Tongue River Road - Crucial Areas Planning System Analysis Report Terrestrial Summary

Number of sections in study area: 213

05/30/12

<http://fwp.mt.gov/gis/maps/caps/>

Summary of CAPS Terrestrial Values within Project Area				
CAPS Category	Count of Section Classes			
	1	2	3	4
Terrestrial Conservation Species	97	95	21	0
Terrestrial Species Richness	105	96	12	0
Terrestrial Game Quality	0	86	119	8
Riparian Area	77	35	33	8
Wetland Area	0	0	0	50
Class Values: Highest = 1, Lowest = 4				

Summary of Conservation Species within Project Area			
Species	State and Global Rank	ESA Status	Count of Sections
Great Plains Toad	S2G5		144
Bald Eagle	S3G5		113
Northern Goshawk	S3G5		5
Ferruginous Hawk	S3BG4		91
Golden Eagle	S3G5		213
Peregrine Falcon	S3G4		4
Burrowing Owl	S3BG4		136
Lewis's Woodpecker	S2BG4		1
Pinyon Jay	S3G5		134
Sage Thrasher	S3BG5		132
Loggerhead Shrike	S3BG4		213
Brewer's Sparrow	S3BG5		213
Baird's Sparrow	S3BG4		140
Grasshopper Sparrow	S3BG5		207
Chestnut-collared Longspur	S2BG5		2
Merriam's Shrew	S3G5		157
Townsend's Big-eared Bat	S2G4		211
Pallid Bat	S2G5		24
Black-tailed Prairie Dog	S3G4		213
Meadow Jumping Mouse	S2G5		117
Swift Fox	S3G3		43
Snapping Turtle	S3G5		66
Spiny Softshell	S3G5		50
Greater Short-horned Lizard	S3G5		100
Common Sagebrush Lizard	S3G5		41
Western Hog-nosed Snake	S2G5		108
Milksnake	S2G5		120

This report is being provided to you by Montana Fish, Wildlife & Parks (FWP) for the sole purpose of the requested analysis. Data included in the Crucial Areas Planning System (CAPS) are intended to provide useful and non-regulatory information during the early planning stages of development projects, conservation opportunities, and environmental review. CAPS is not intended to replace consultation with FWP staff.

Summary Page 1 of 2

Summary of Species Richness within Project Area		
Ecological System	# of Species	Aproximate Acres
Great Plains Badlands	73	11084.4
Rocky Mountain Foothill Limber Pine - Juniper Woodland	120	10.9
Great Plains Ponderosa Pine Woodland and Savanna	164	9028.7
Great Plains Wooded Draw and Ravine	159	375.0
Rocky Mountain Lower Montane-Foothill Shrubland	62	3.7
Big Sagebrush Steppe	153	37408.2
Great Plains Mixedgrass Prairie	153	48615.4
Great Plains Sand Prairie	104	1600.8
Greasewood Flat	132	266.8
Great Plains Floodplain	219	5708.3
Emergent Marsh	165	19.1
Great Plains Riparian	255	5832.8

Summary of Terrestrial Game Quality Values within Project Area							
Terrestrial Game Contributing Category	Count of Section Values						Highest Possible Value
	1	2	3	4	5	6	
Big Game Winter Range Habitat	119	86	0	0	0	0	2
Prairie Grouse Habitat	73	0	140	0	0	0	5

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Tongue River Road - Crucial Areas Planning System Analysis Report Aquatic Summary

05/30/12

fwp.mt.gov/gis/maps/caps/

Summary of CAPS Stream Values within Project Area				
CAPS Category	Miles of Values			
	1	2	3	4
Aquatic Connectivity	70.1	0	25.6	0
Species of Concern	0.5	0	69.7	0
Native Species Richness	0.5	65.2	4.5	7.3
Game Fish Life History	65.7	4.5	0	0
Game Fish Quality	0	0.5	65.2	5.4
Class Values: Highest = 1, Lowest = 4				

Summary of CAPS Lake Values within Project Area				
CAPS Category	Count of Lake Values			
	1	2	3	4
Aquatic Connectivity	0	0	0	0
Species of Concern	0	0	0	0
Native Species Richness	0	0	0	0
Game Fish Life History	0	0	0	0
Game Fish Quality	0	0	0	0
Class Values: Highest = 1, Lowest = 4				

Summary of Fish Species of Concern within Project Area		
Species	State Rank	Threatened or Endangered
Blue Sucker	S2S3	
Paddlefish	S1S2	
Sauger	S2	
Sturgeon Chub	S2	

Summary of Fish Native Species Richness within Project Area
Species
Bigmouth Buffalo, Blue Sucker, Brassy Minnow, Burbot, Channel Catfish, Creek Chub, Emerald Shiner, Fathead Minnow, Flathead Chub, Freshwater Drum, Goldeye, Lake Chub, Longnose Dace, Longnose Sucker, Mountain Sucker, Paddlefish, Plains Minnow, River Carpsucker, Sand Shiner, Sauger, Shorthead Redhorse, Shovelnose Sturgeon, Smallmouth Buffalo, Stonecat, Sturgeon Chub, Western Silvery Minnow, Western Silvery/Plains Minnow, White Sucker

Summary of Game Fish Life History within Project Area	
Life History	Species
Critical rearing area for Warm Water Sport Fish	Black Crappie, Northern Pike, Paddlefish, Sauger X Walleye Hybrid, Walleye
Critical spawning area for Warm Water Sport Fish	Black Crappie, Northern Pike, Paddlefish, Sauger X Walleye Hybrid, Walleye
Important rearing area for Cold Water Sport Fish	Brown Trout, Mountain Whitefish, Rainbow Trout
Important rearing area for Warm Water Sport Fish	Channel Catfish, Sauger
Important spawning area for Cold Water Sport Fish	Brown Trout, Burbot, Mountain Whitefish, Rainbow Trout
Important spawning area for Warm Water Sport Fish	Channel Catfish, Sauger

Summary of Game Fish Quality within Project Area
Species
Bigmouth Buffalo, Black Bullhead, Black Crappie, Brown Trout, Burbot, Channel Catfish, Common Carp, Freshwater Drum, Goldeye, Green Sunfish, Northern Pike, Paddlefish, Pumpkinseed, Rainbow Trout, Rock Bass, Sauger, Shorthead Redhorse, Shovelnose Sturgeon, Smallmouth Bass, Smallmouth Buffalo, Walleye, White Crappie, Yellow Bullhead, Yellow Perch

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Appendix F – 4(f) / 6(f) Properties

