ENVIRONMENTAL SCAN

Paradise Valley Corridor Study
US 89 (Gardiner to Livingston)

FINAL

Prepared by:
MONTANA DEPARTMENT OF TRANSPORTATION

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Paradise Valley Corridor Study Environmental Scan

FINAL – 01/24/2014

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Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
BMPs	Best Management Practices
BOR	Bureau of Reclamation
CAA	Clean Air Act
CECRA	Comprehensive Environmental Cleanup and Responsibility Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COE	US Army Corps of Engineers
CWA	Clean Water Act
DEQ	Montana Department of Environmental Quality
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
FWP	Montana Department of Fish, Wildlife, and Parks
GIS	Geographic Information System
LUST	Leaking Underground Storage Tank
LWCF	Land and Water Conservation Funds
LWQD	Local Water Quality District
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MFISH	Montana Fisheries Information System
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
RP	Reference Post
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered Species
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
USEPA	US Environmental Protection Agency
USFWS	US 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 Introduction

1.1 Background

The primary objective of this Environmental Scan Report is to identify resources, and determine potential impacts, constraints, and opportunities for the Paradise Valley Corridor Study (Study). The Study encompasses the United States Highway 89 (US 89) corridor from Gardiner (RP 0.0) to Livingston (RP 52.5). As a planning level scan, the information is obtained from various publicly available reports, websites and documentation. This scan is not a detailed environmental investigation.

If improvement option(s) are moved forward from the Study into project development, an analysis for compliance with the National and Montana Environmental Policy Acts (NEPA and MEPA) 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 at that time.

1.2 Study Area

The Study corridor is located in south central Montana. The land use within the corridor is predominantly grass rangeland. The section of US 89 within the study boundaries is classified as a rural principal arterial – non interstate connecting Yellowstone National Park to Interstate 90 within the town of Livingston. US 89 is part of the United States Highway System and serves as the main north-south corridor between Gardiner and Livingston. The Study area is located within Park County. The over 52-mile Study will cover the paved section from Gardiner (Reference Post (RP) 0.0) to Livingston (RP 52.5). At RP 0.0 is the iconic Roosevelt Arch marking the North entrance to Yellowstone National Park. The corridor consists of paved roadway of varying widths, from 31 feet to 65 feet. The roadway was constructed or improved at various times, as early as 1934 to 2010. A section of this roadway is within Gallatin National Forest, and adjacent to Absaroka-Beartooth Wilderness. This roadway parallels Yellowstone River on one side or the other the entire length of the study.

The Study area includes 0.75 miles on either side of the roadway. Multiple maps have been prepared to illustrate resources present in the Study area. Due to the length of the corridor, each figure is multiple pages long. As a result, for ease of reading, all figures have been included in Appendix E. Please refer to Figure 1.2 for the corridor location. Figure 1.2.1 is a topographic map of the entire corridor area.

2 Physical Environment

2.1 Soil Resources and Prime Farmland

Information was obtained on soils to determine the presence of prime and unique farmland in the Study area to demonstrate compliance with the Farmland Protection Policy Act. The Farmland Protection Policy Act is intended "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 includes prime farmland; some prime if irrigated 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.

Soil surveys of the Study area are available from the US Department of Agriculture, Natural Resource Conservation Service (NRCS). NRCS indicates that the majority of the corridor is not prime farmlands. Prime if irrigated farmlands are found between RP 24 – 25 and 41 – 46. Farmlands of statewide importance are found between RP 25 – 27, 30 – 31, 34 – 37.

If lands are acquired from these areas and the project is funded with federal funds, a CPA-106 Farmland Conversion Impact Rating Form for Linear Projects will be completed by MDT and coordinated with NRCS. The NRCS uses information from that form 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.

Figure 2.1 contains maps and descriptions of the farmland classification types found in the Study corridor.

2.2 Geologic Resources

Information was obtained on geology in the corridor Study areas. Seismic information was reviewed for fault lines and seismic hazard areas. This geologic information can help determine potential design and construction issues related to embankments and road design. The following paragraphs describe the seismicity present in Montana and geology present along the Study area.

Appendix E contains a map showing a belt of seismicity known as the Intermountain Seismic Belt that extends through western Montana, from the Flathead Lake region in the northwest corner of the state through Idaho, Wyoming, Utah, and into southern Nevada. In western Montana, the Intermountain Seismic Belt is up to 100 kilometers (62 miles) wide and parallels the Rocky Mountains. The Centennial Tectonic Belt, a branch of the Intermountain Seismic Belt, includes at least eight major active faults. It has been the site of the two largest historic earthquakes in the northern Rocky Mountains: the Hebgen Lake, Montana, earthquake

(magnitude of 7.5 on the Richter scale) on August 18, 1959; and the Borah Peak, Idaho, earthquake (magnitude of 7.3 on the Richter scale) on October 28, 1983. Small earthquakes are common in the region, occurring at an average rate of seven to ten earthquakes per day (MBMG 2002). The Study area parallels the southeastern edge of the Intermountain Seismic Belt with the beginning of the Study area close to the intersection of the Intermountain Seismic Belt and the Centennial Tectonic Belt. There are three designated faults within the Study area, the Northern Section of the Emigrant fault, the Southern Section of the Emigrant fault, and the East Gallatin – Reese Creek fault system (USGS 2005).

Seismic design of highway infrastructure is done in accordance with American Association of State Highway and Transportation Officials (AASHTO) guidelines. When shaken by an earthquake, certain soils are susceptible to liquefaction; that is, they lose strength and temporarily behave like liquids. The seismically induced loss of strength can result in failure of the ground surface, most typically expressed as lateral spreads, surface cracks, settlement, or sand boils. Structures, including roadways, can sustain substantial damage during a large seismic event if they are supported in or on a soil susceptible to liquefaction. Seismically induced liquefaction typically occurs in loose, saturated, sandy material commonly associated with recent river, lake, and beach sedimentation. In addition, seismically induced liquefaction can be associated with areas of loose, saturated fill (USGS 1992). Several areas along the Study corridor are underlain by alluvium and consequently susceptible to liquefaction. See Figure 2.2 for alluvium geologic maps and descriptions of the geologic maps of the Study area. The area immediately outside of the Yellowstone river bed mainly consists of a volcanic geology. Improvements brought forward from the Study should be prepared to take borings to evaluate the soils at the exact location work is tentatively scheduled to take place to ensure suitable for type of project taking place. If an unsuitable soil is encountered increased costs for excavation, haul off, and import of materials should be expected.

Montana Department of Transportation maintains the Montana Rockfall Hazard Rating System (RHRS) to better manage rock slope assets along Montana highways. An “A” rated site means a high potential rockfall hazard exists. Detailed ratings were completed on approximately 850 “A” rated sites. The top 100 being identified and conceptual designs and construction cost estimates were prepared in the year 2006. The Study contains twelve sites listed in the RHRS, with five of these twelve classified with “A” ratings. Three of the twelve sites are in the top 100 that had cost to cure estimates generated for a conceptual design solution. The estimated cost to cure these three sites in year 2006 dollars was approximately 4 million dollars. Eight of the twelve sites are between RM 12 to RM 16, which is inside the confines of Yankee Jim Canyon. Improvements brought forward that are adjacent to these twelve sites should be prepared to perform an engineering analysis to determine if mitigation of rockfall hazard is possible within project budget.

2.3 Surface Waters

Maps and Geographic Information System (GIS) data were reviewed to identify the location of surface water bodies within the Study area, including rivers, streams, lakes, or reservoirs. The main surface water in the corridor is the Yellowstone River. Additionally, a variety of surface waters including streams, natural drainages, and wetlands are also present in the area. Impacts to these surface waters may occur from project improvements such as culverts under the roadway

or rip rap armoring of banks. These impacts may be regulated by the US Army Corps of Engineers (COE), the Montana Department of Fish, Wildlife and Parks (FWP), Department of Natural Resources and Conservation (DNRC), and the Montana Department of Environmental Quality (DEQ). Impacts should be avoided and minimized to the maximum extent practicable. Stream and wetland impacts may trigger compensatory mitigation requirements of the COE. Encroachment permit may be required from DNRC if impacts occur within the Yellowstone River. Figure 2.3 contains maps depicting the surface waters found in the Study corridor.

2.3.1 Total Maximum Daily Loads (TMDL) Information

The Study corridor travels through the Upper Yellowstone Watershed (Hydrologic Unit Code: 10070002). Information on the Yellowstone River and its tributaries within the Study area was obtained from DEQ'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, DEQ 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.

The Upper Yellowstone watershed is listed in the 2012 Integrated 303(d)/305(b) Water Quality Report for Montana by DEQ. The water bodies within the Upper Yellowstone Watershed that are located in the Study area are Category 5 and Category 4C. Category 5 water bodies are waters where one or more applicable beneficial use has been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat. Category 4C water bodies are waters where TMDLs are not required as no pollutant-related use impairment is identified. TMDLs have not yet been written for water bodies in this watershed. When TMDLs are prepared and implementation plans are in place, any construction practices would have to comply with the requirements set forth in the plan.

The Yellowstone River is broken down into two sections within the Study area; both are indicated as having an impairment. There are tributaries of the Yellowstone River that have an impairment listed. (See Table 1) The tributaries should not be of a major concern to any possible improvements to US 89, but it should be noted to not create further impacts to these tributaries if a future project is in close proximity. DEQ's 2012 Water Quality Information was gathered from the Clean Water Act Information Center.

Should a project be advanced, it will be necessary to consider the potential impacts resulting from drainage off the existing or new bridge deck. Where practicable, measures to divert runoff from the bridge deck and detain/retain it before discharge may need to be incorporated into the project.

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

Stream	RP	Category	TMDL Required	Possible Impairment	Beneficial Uses
Yellowstone River (From park boundary to Reese Creek)	RP 0 to RP 4.8	5 – One or more uses are impaired	Yes	Ammonia, Arsenic, Copper, Lead, Nitrate/Nitrite, Sedimentation/Siltation	Agriculture, Aquatic Life, Primary Contact Recreation
Yellowstone River (Reese Creek to Livingston)	RP 4.8 to RP 52.5	4C	No	Alteration in stream-side or littoral vegetative covers, Physical substrate habitat alterations	Aquatic Life
Little Trail Creek	4.24	Not Listed in DEQ's Water Quality Database			
Bassett Creek	7.66	Not Listed in DEQ's Water Quality Database			
Unnamed	8.67	Not Listed in DEQ's Water Quality Database			
Cedar Creek	10.05	Not Listed in DEQ's Water Quality Database			
Unnamed	11.45	Not Listed in DEQ's Water Quality Database			
Slip and Slide Creek	11.85	Not Listed in DEQ's Water Quality Database			
Joe Brown Creek	12.10	Not Listed in DEQ's Water Quality Database			
Yellowstone River	20.40	4C – No pollutant-related use impairment identified	No	N/A	Aquatic Life
Donahue Creek	20.92	Not Listed in DEQ's Water Quality Database			
Big Creek	24.07	4C – No pollutant-related use impairment identified.	No	N/A	Aquatic Life, Primary Contact Recreation
Dry Creek	25.27	Not Listed in DEQ's Water Quality Database			
Unnamed	27.28	Not Listed in DEQ's Water Quality Database			
Fridley Creek	28.90	Not Listed in DEQ's Water Quality Database			
Unnamed	30.25	Not Listed in DEQ's Water Quality Database			
Eight Mile Creek	34.23	Not Listed in DEQ's Water Quality Database			
Trail Creek	42.28	Not Listed in DEQ's Water Quality Database			

2.3.2 Upper Yellowstone River Special Area Management Plan (SAMP)

The COE is responsible for issuing permits for work in the upper Yellowstone River in accordance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The Yellowstone River is considered a Section 10 water from Emigrant to its confluence with the Missouri River.

The Upper Yellowstone River Special Area Management Plan (the SAMP) covers the 86 mile stretch from the boundary of Yellowstone National Park to approximately seven river miles upstream of Springdale. The SAMP directs the COE to evaluate how a project may affect the entire watershed, flood plain and valley before approving a permit.

The SAMP process created a Special River Management Zone (SRMZ) which is intended to provide enhanced protection within the 48 mile reach that is most susceptible to forced morphology. The SRMZ extends from approximately four river miles upstream Emigrant (river mile 531.8) to approximately seven river miles upstream of Springdale (river mile 483.6). The width boundaries of the SRMZ are the Channel Migration Zone (CMZ) of the Yellowstone River. (See Figure 2.3.2 for a map of the SRMZ.) As stated above, impacts to Waters of the US associated project developments will require permitting from the COE. Impacts to Waters of the US within the SAMP/SRMZ will require specialized permitting from the COE. Proposed transportation projects and potential impacts will be evaluated by the COE in greater detail, possibly making it more difficult to secure a 404 permit. This difficulty and time increase should be taken into consideration for improvements forwarded from the Study within the SAMP. Future projects in the corridor will need to incorporate project design features to avoid and minimize adverse impacts to Waters of the US to the maximum extent practicable.

2.3.3 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 US 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. At this time neither the Yellowstone River nor any of its tributaries carry the wild and scenic designation.

2.4 Groundwater

There are currently 5444 wells on record in Park County; some of these wells exist within the Study boundaries. The newest well is April 2013 with the oldest well from January 1880. There are 17 State Monitoring Network wells in Park County. The wells in Park County have many different uses with the most common being domestic use. If a project is forwarded from the Study, impacts to existing wells will need to be considered.

Groundwater data, such as well and geologic source information, for Park County are provided in Appendix A.

2.5 Wetlands

The COE 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.

National Wetland Inventory (NWI) mapping data is available for this area and is available from NWI or the Natural Resource Information System (NRIS). (See Figure 2.3.) While some useful information can be ascertained from the NWI maps, it is important to note that NWI maps are based on the US Fish and Wildlife Service (USFWS) definition of wetlands, which does not follow the COE definition that MDT uses in wetland determination and delineation. NWI maps are typically generated based on aerial and satellite imagery, and are not accurate enough or detailed enough for MDT project wetland determination and/or delineation.

The majority of the wetland areas logically occur within the riparian bottomlands associated with the Yellowstone River, its tributaries, and the major draws coming out from the mountains. A notable amount of potential wetland area occurs in the valley adjacent to the current highway alignment. Any project forwarded from this Study has the potential to impact wetland areas, riparian areas, and streams.

If projects are forwarded from the Study that could impact wetlands, formal wetland delineations would need to be completed. Future projects in the corridor would need to incorporate project design features to avoid and minimize adverse impacts to wetlands to the maximum extent practicable. Unavoidable impacts to wetlands would require mitigation in accordance with COE regulatory requirements and Executive Order 11990.

2.6 Floodplains (EO 11988) and Floodways

Executive Order (EO) 11988, Floodplain Management, requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

- acquiring, managing, and disposing of federal lands and facilities;
- providing federally-undertaken, financed, or assisted construction and improvements;
- conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

Federal-Aid Policy Guide, 23 CFR 650, Bridges, Structures, and Hydraulics, provides “policies and procedures for the location and hydraulic design of highway encroachments on flood plains, including direct Federal highway projects administered by the FHWA.” This document defines the “Base Flood” as the “flood or tide having a 1 percent chance of being exceeded in any given year.” and the “Base Flood Plain” as the “area subject to flooding by the base flood.”

Federal Emergency Management Agency (FEMA) Issued Flood Maps for Park County indicate the Zone A and AE 100-Year Flood without base flood elevations and with base flood elevations exist along entire length of Study corridor (Figure 2.6). If improvement options are forwarded from this Study that result in the placement of fill within the regulatory floodplain, impacts to floodplains would need to be identified and evaluated. Project development could require coordination with Park County to minimize floodplain impacts and obtain necessary floodplain permits for project construction.

2.7 Irrigation

Irrigated grazing land exists in Park 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 irrigation facilities. Irrigation canals, ditches or pressurized systems that require modifications to the existing facilities will be redesigned and constructed in consultation with the owners to minimize impacts to agricultural operations. Additional expenses could be created if impacts to irrigation facilities are carried forward from the study.

Irrigation maps of Park County are provided in Figure 2.7.

2.8 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. The Paradise Valley corridor is not located in a non-attainment area for particulate matter (PM-2.5 or PM-10) or carbon monoxide (CO). Additionally, there are no nearby PM-2.5, PM-10, or CO non-attainment areas. As a result, special design considerations will not be required in future project design to accommodate NAAQS non-attainment issues.

Depending on the scope of the project being considered along this corridor, 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. Special design considerations are not expected to be required in future project design to accommodate NAAQS non-attainment issues.

2.9 Hazardous Substances

The NRIS database was searched for underground storage (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. There is a cluster of the before mentioned sites around the City of Livingston and the City of Gardiner. These sites can be found intermittently throughout the entire Study area. The following is a brief synapsis of the three main types of sites along the Study corridor identified with potential contamination impacts, which should be avoided if possible. If UST, LUST, or contaminated soils are encountered removal and cleanup is required which will increase costs.

2.9.1 Underground Storage Tanks (USTs)

Approximately 29 USTs were identified in the Corridor. The majority of the USTs are from agricultural farms with limited site assessment data and imprecise GIS location data. In agricultural situations such as seen in the Study, usually the USTs are located within the farm, near the shop, and away from the highway. Additional investigation to the precise locations of the USTs may be warranted as the project progresses. (See Figure 2.9.)

2.9.2 Leaking Underground Storage Tanks (LUSTs)

Approximately 29 LUSTs were identified within the Study corridor. (See Table 2.) The majority of the releases from these LUST sites have been resolved or characterized by previous investigations. Only one LUST site is designated as having a high priority ranking assigned by DEQ, and it is not located directly adjacent to the Study corridor. Therefore it is not anticipated that LUST sites would adversely impact future projects that may advance from the Study. However, further review and potential investigation may be necessary if the highway changes alignment as the project progresses. (See Figure 2.9.)

Table 2. LUST Sites in the Study boundaries.

Facility #	Name	Address	Town	Status	Discovery Date	Closure Date
3408249	JAMES HALFPENNY #2498	300 5TH ST W	GARDINER	Release Resolved	12/21/1994	5/3/1995
3410017	MOL HERON CONFERENCE SITE #292	MOL HERON RD	GARDINER	4.0 - Ground Water Management	4/10/1990	
3406321	GARDINER HOUSE INC #2796	US HIGHWAY 89 & MAIN ST	GARDINER	2.0 - Medium Priority Characterization	10/18/1995	
3402125	GARDINER BULK PLANT #419	4TH ST & WATER ST	GARDINER	Release Resolved	7/16/1990	11/29/1990
3408868	GARDINER SERVICE CENTER TWRS #409	US HIGHWAY 89 S	GARDINER	Release Resolved	9/28/1989	10/4/1990
3413376	GARDINER SERVICE CENTER #2506	US HIGHWAY 89 S	GARDINER	Release Resolved	12/15/1994	1/2/1996
3408868	GARDINER SERVICE CENTER TWRS #2815	US HIGHWAY 89 S	GARDINER	Release Resolved	12/6/1995	3/27/1997
3408868	GARDINER SERVICE CENTER TWRS #2887	US HIGHWAY 89 S	GARDINER	Release Resolved	4/2/1996	3/10/1997
3403402	TRESTLE RANCH #642	558 OLD YELLOWSTON E TRAIL SOUTH	GARDINER	Release Resolved	2/27/1991	4/4/1991
3408873	GARDINER LAUNDRY AMFAC #3353	E PARK ST	GARDINER	Release Resolved	1/6/1998	2/23/1998
3403402	CHURCH UNIVERSAL & TRIUMPHANT INC CORWIN SPRINGS	558 OLD YELLOWSTON E TRAIL SOUTH	GARDINER	Release Resolved	9/10/1998	12/3/1999

Facility #	Name	Address	Town	Status	Discovery Date	Closure Date
	#3521					
3410017	CORWIN SPRINGS LUST TRUST #3708	MOL HERON RD	GARDINER	Release Resolved	4/10/1990	8/30/1991
3402285	SINCLAIR STATION #3986	220 PARK ST	GARDINER	Release Resolved	12/14/2000	4/9/2001
3406531	GARDINER EXXON #4096	401 SCOTT ST W	GARDINER	Release Resolved	4/24/2002	8/14/2002
3406531	GARDINER EXXON #4172	401 SCOTT ST W	GARDINER	Release Resolved	4/7/2003	5/9/2007
3403890	GARDINER CHEVRON BLOMQUIST OIL #1528	STONE ST & US HIGHWAY 89	GARDINER	Release Resolved	12/17/1992	11/8/1993
3412073	RIGLER OIL BULK PLANT #2688	Between Spring & Water Sts	GARDINER	Release Resolved	8/14/1995	11/22/2011
3410973	JOHN WAID #2500	US HIGHWAY 89 S	EMIGRANT	Release Resolved	4/20/1990	5/24/1995
3406713	EMIGRANT GENERAL STORE #3099	3 MURPHY LN	EMIGRANT	Release Resolved	1/7/1997	5/12/1997
3400721	MOUNTAIN SKY GUEST RANCH #4006	DRY CREEK ROAD 10 MI S	EMIGRANT	Release Resolved	3/20/2001	1/29/2002
3410935	INNER EXPERIENCE #993		EMIGRANT	Release Resolved	10/23/1991	4/17/1997
3403040	INTERSTATE SINCLAIR STATION #1313	1629 W PARK ST	LIVINGSTON	Release Resolved	7/1/1992	4/5/2006
3407598	INTERSTATE CONOCO #2604	1617 W PARK ST	LIVINGSTON	Release Resolved	5/26/1995	11/13/2008
3407598	INTERSTATE CONOCO LIVINGSTON #1150	1617 W PARK ST	LIVINGSTON	Release Resolved	4/15/1992	11/24/2008
3407598	INTERSTATE CONOCO LIVINGSTON #2175	1617 W PARK ST	LIVINGSTON	Release Resolved	3/29/1994	11/13/2008
3407598	INTERSTATE CONOCO LIVINGSTON #856	1617 W PARK ST	LIVINGSTON	Release Resolved	8/19/1991	11/13/2008
3403037	EGGARS INC CEMENT CONTRACTO R #1326	9TH ST & ISLAND PARK DR	LIVINGSTON	Release Resolved	8/4/1992	5/7/1996
3406641	BRAND S LUMBER CO LIVINGSTON #3135	US HIGHWAY 89 S	LIVINGSTON	Release Resolved	3/25/1997	4/16/1997
3411741	KUM AND GO STORE 830 #4471	101 CENTENNIAL DR	LIVINGSTON	1.4 - High Priority Characterization	2/23/2006	

2.9.3 Abandoned and Inactive Mine Sites

Abandoned and inactive mine sites were identified within the corridor. The majority of the mine sites are underground mines, and could cause subsidence issues underneath or on the embankment above the highway if the horizontal alignment shifts considerably. Some of the mines have been reclaimed by the DEQ Abandon Mine Section. It is not anticipated that mines identified during the environmental scan will adversely impact highway expansion, but additional investigation may be necessary as the project progresses. (See Figure 2.9.)

3 Biological Resources

The following information applies to natural resources within the designated project study area boundary for the Study corridor. The information reflects a baseline natural resource condition of the Study area. Depending on the level of detail available through the high-level baseline scan, some of the information has been provided at the county level, some at the entire corridor study area level (RP 0.0 to 52.5), and some, where available, within the Study corridor area.

3.1 Biological Community

3.1.1 Mammals

The project corridor is home to a variety of mammal species including white-tail deer, mule deer, elk, moose, bison, bighorn sheep, black bear, mountain lion, gray wolf, mountain lion, and coyote. A herd of bighorn sheep occupy habitat in and around Corwin Springs and are frequently observed on or adjacent to US 89 in this area, especially during winter. Other common mammals potentially occurring in the project area include; porcupine, raccoon, striped skunk, badger, bobcat, red fox, beaver, muskrat, Richardson's ground squirrel, deer mouse, vole species, and a variety of bat species. The distributions of the larger mammals Elk, Mule and White Tail Deer, and Moose are depicted in Figures 3.1, 3.1.1, and 3.1.2.

There is a migratory population of bison that resides within Yellowstone National Park during summer months, which migrates to lower elevation wintering range within and adjacent to the Park during winter. Bison have a tendency to use road systems for travel, and during winter months are very frequently observed on or immediately adjacent to highway 89 throughout the corridor south of Yankee Jim Canyon which is in the Study area. In order to limit bison movements to the area south of Yankee Jim Canyon, bison guards have been installed in the Highway 89 roadway as well as the county road on the west side of the Yellowstone River. Fencing was constructed adjacent to the bison guards, with gates that can be opened when bison are not present in Gardiner Basin. Currently the bison guards are installed and adjacent gates are closed from November through May, however FWP has an EA currently in progress to allow bison to roam freely year-round. If a project is forwarded from this Study future coordination with FWP should take place to determine the outcome of the EA and possible changes if any to bison presence within the Study area.

A bighorn sheep herd exists in the Study area. These bighorn sheep are part of the Upper Yellowstone sheep management complex located within FWP Hunting Districts 300, 303, 304, 305, and the Mill Creek non-hunted population (FWP 2010). This sheep management complex is spread over approximately 1,350 square miles in the Upper Yellowstone and Upper Gallatin

River drainages north of Yellowstone Park; however, bighorn sheep currently only occupy 10% of this area. Most of the sheep are in small scattered subpopulations and migrate considerable distances between summer and winter ranges. A map showing the bighorn sheep distribution near the Study area is provided in Figure 3.1-3. This figure shows the difference between the general bighorn sheep distribution and the distribution specific to winter.

Bighorn sheep can be found on both sides of US 89 from RP 4.0 to RP 23.0, but especially during the winter months in three areas; 1) from RP 0.0 to RP 2.0 (Gardiner area), 2) RP 4.0 to RP 9.0 (Corwin Springs area), and 3) between RP 14.0 and RP 21.0 (Tom Miner Basin area). Bighorn sheep are attracted to the salt in de-icing material used on highways. The use of de-icing material may cause bighorn sheep to concentrate on and adjacent to the roadway. In the last 10 years, six bighorn sheep carcasses have been collected. All six have been collected between November and July near RPs 1.8, 4.8, 6.7, 12.8, and 14.2.

If a project is forwarded from the Study, mitigation measures should be explored during the project development process. Additional coordination with FWP's area wildlife biologist should be undertaken for local expertise on the bighorn sheep herd in the study area.

A review of the MDT Maintenance Animal Incident Database between January 2002 and December 2012 indicates that a minimum of 1659 animal carcasses were collected in that period on US 89 throughout the length of the Study corridor. (RP 0.0 to RP 52.5). Table 3 summarizes the large mammal species involved in the animal carcass collections between the dates of January 1, 2002 and December 31, 2012. To view the carcass clusters please see Figure 3.1.4.

Table 3. Large Mammal Carcasses.

Animal	# of carcasses collected	% by Species
Antelope	1	0.06 %
Bighorn Sheep	6	0.36 %
Bison	2	0.12 %
Black Bear	1	0.06 %
Elk	94	5.67 %
Moose	1	0.06 %
Deer (unknown species)	21	1.27 %
Mule Deer	1116	67.27 %
White-tailed Deer	417	25.13 %
TOTAL	**1659**	**100%**

Deer accounted for the vast majority (92.52%) of the carcasses collected along this section of US 89, with mule deer being the most common species involved. Peaks in recorded carcasses occur near RP 10, between RP 15 and 16, and between RP 27 and 28. (See Figure 3.1.5.)

3.1.2 Amphibians and Reptiles

According to the Montana Natural Heritage Program - Natural Heritage Tracker database, which records and maps documented observations of species in a known location, amphibian species known to occur in Park County and potentially occurring in the Study area include but are not limited to the Columbia spotted frog western toad, boreal chorus frog, northern leopard frog, barred tiger salamander, and plains spadefoot. Over a dozen invertebrate species, some listed as Montana Species of Concern (SOC) also have been observed in the Study area.

3.1.3 Birds

According to the Montana Natural Heritage Program - Natural Heritage database, there are a few hundred different species of birds documented in Park County, with the potential to occur and nest in the Study area. These species include representative songbirds, birds of prey, waterfowl, owls, and shorebirds, including several state species of concern. Most avian observations occur in the riparian draws and hillsides associated with the numerous drainages along the Study corridor.

Migratory birds are protected under the Migratory Bird Treaty Act. The Migratory Bird Treaty Act is a strict liability law that provides it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Direct disturbance of an occupied (with birds or eggs) nest is prohibited under the law. The destruction of unoccupied nests of eagles; colonial nesters such as cormorants, herons, and pelicans; and some ground/cavity nesters such as burrowing owls or bank swallows may be prohibited under the Migratory Bird Treaty Act.

There are multiple bald and golden eagle nests located in the vicinity of the Study corridor. (See Figure 3.1.6.) Bald and golden eagles are protected by the Migratory Birds Treaty Act and managed under the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle or golden eagle, alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

Any improvements forwarded from this study should consider potential constraints that may result from nesting times of migratory birds and presence of bald and golden eagles nests.

3.2 Threatened and Endangered Species

The federal list of T&E 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. According to the USFWS, six threatened, endangered or candidate species are listed as occurring in Park County. (See Table 4.)

Table 4. Threatened and Endangered Species in Park County.

Common Name	Status
Canada Lynx	Listed Threatened, Critical Habitat
Grizzly Bear	Listed Threatened
Greater Sage-Grouse	Candidate
Sprague's Pipit	Candidate
Wolverine	Proposed
Whitebark Pine	Candidate

A search of the Montana Natural Heritage Program's NH Tracker database revealed that three of the six T&E species potentially in Park County have occurrence buffers overlapping the Study area are listed in Table 5. Possible locations can be seen in Figure 3.2.

Table 5. Threatened and Endangered Species within Study Area.

Common Name	Status
Canada Lynx	Listed Threatened, Critical Habitat
Grizzly Bear	Listed Threatened
Wolverine	Proposed

If a project is forwarded from the Study, an evaluation of potential effects to T&E species will need to be completed during the project development process. As federal status of protected species changes over time, reevaluation of the listed status and afforded protection to each species should be completed prior to issuing a determination of effect relative to potential project impacts.

3.3 Species of Concern

Montana SOC 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 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).

A search of the Montana Natural Heritage Program species of special concern database on March 14, 2013 revealed the following information for SOC in Park County with potential to occur in Study area based on presence of suitable habitat (Appendix B). Table 6 lists the SOC that have occurrence buffers which overlap the Study area.

Table 6. Species of Concern Overlapping the Study Area.

Animal SubGroup	Common Name	State Rank	Short Habitat Description
Mammals	Bison	S2	Grasslands
	Hoary Bat	S3	Riparian and forest
Birds	Great Blue Heron	S3	Riparian forest
	Trumpeter Swan	S3	Lakes, ponds, reservoirs
	Peregrine Falcon	S3	Cliffs / canyons
	Pinyon Jay	S3	Open conifer forest
	Cassin's Finch	S3	Drier conifer forest
	Harlequin Duck	S2B	Mountain streams
	Clark's Nutcracker	S3	Conifer forest
	Brewer's Sparrow	S3B	Sagebrush
Reptiles	Common Sagebrush Lizard	S3	Rock outcrops
Fish	Yellowstone Cutthroat Trout	S2	Mountain streams, rivers, lakes
Plants	Spiny Hopsage	S2	Shrublands (Dry)
	Spiny Skeleton Weed	S2	Lower Elev. Grasslands
	Wedge-leaf Saltbush	S2	Wetland/Riparian

As mentioned in the sections above, there are other sensitive species, including eagles, which are not listed here that also have the potential to occur within the Study area. A thorough field investigation for the presence and extent of these species should be conducted during the project design phase. If present, special conditions to the project design or construction should be considered to avoid or minimize impacts to these species.

3.4 Vegetation

In the vicinity of the Study, a combination of conifer dominated forests and sagebrush steppe habitat dominate the hillsides and foothills. Riparian woodland and shrubland line the riparian corridors of the drainages, especially the Yellowstone River. If a project is forwarded from the Study, practices outlined in both Standard Specification 201, and any related Supplemental Specifications should be followed to minimize adverse impacts to vegetation.

Table 7. Land Cover Report for Park County.

System/%	Sub-System/%
Forest and Woodland/42%	Conifer-dominated forest and woodland (xeric-mesic)/37%
	Deciduous dominated forest and woodland/3%
	Conifer-dominated forest and woodland (mesic-wet)/2%
	Mixed deciduous/coniferous forest and woodland/<1%
Shrubland, Steppe and Savanna/ 21%	Sagebrush Steppe/ 20%
	Deciduous Shrubland 1%
Grassland/16%	Montane Grassland/ 16%
	Lowland/Prairie Grassland/<1%
Alpine/9%	Alpine Grassland and Shrubland/5%
	Alpine Sparse and Barren/3%

System/%	Sub-System/%
Human Land Use/6%	Agriculture/5%
	Developed/1%
	Mining/<1%
Wetland and Riparian/4%	Floodplain and Riparian/3%
	Wet Meadow/<1%
	Open Water/<1%
	Depressional Wetland/<1%
	Herbaceous Marsh/<1%
	Forested Marsh/<1%
	Bog or Fen/<1%
Recently Disturbed or Modified/2%	Recently Burned/2%
	Harvested Forest/<1%
	Introduced Vegetation/<1%
Sparse and Barren/<1%	Cliff, Canyon and Talus/ <1%; Bluff, Badland and Dune/<1%

3.5 Fisheries Information

The Yellowstone River is the major water body which parallels and is crossed by the highway within the Study area. Multiple tributaries to the Yellowstone River also are crossed by the highway within the project area. (Figure 2.3.) The following table depicts the natural streams crossed by the highway and any fisheries information currently available from the Montana Fisheries Information System (MFISH) database.

Table 8. Fisheries Data.

Stream	RP*	RM*	Existing Structure	Fish Species Present
Yellowstone River	0.16	558.50	Bridge	Brook Trout, Brown Trout, Rainbow Trout, Mottled Sculpin, Mountain Whitefish, Yellowstone Cutthroat Trout
Little Trail Creek	4.24	0.20	Culvert	Mottled Sculpin, Yellowstone Cutthroat Trout
Bassett Creek	7.66	0.15	Culvert	Mottled Sculpin
Unnamed	8.67	N/A	Culvert	Unk??
Cedar Creek	10.05	0.12	Culvert	Brook Trout, Brown Trout, Mottled Sculpin, Rainbow Trout, Yellowstone Cutthroat Trout
Unnamed	11.45	N/A	No Info	No Info
Slip and Slide Creek	11.85	0.06	Culvert	*Surveyed (2011) = no fish captured*
Joe Brown Creek	12.10	0.06	Culvert	*Surveyed (2011) = no fish captured*
Yellowstone River	20.40	537.1	Bridge	Brook Trout, Brown Trout, Rainbow Trout, Mottled Sculpin, Longnose Dace, Longnose Sucker,

Stream	RP*	RM*	Existing Structure	Fish Species Present
				Mountain Whitefish, White Sucker, Yellowstone Cutthroat Trout, Rainbow Trout
Donahue Creek	20.92	0.26	Culvert	Yellowstone Cutthroat Trout
Big Creek	24.07	0.22	Bridge	Brook Trout, Brown Trout, Mottled Sculpin, Mountain Whitefish, Rainbow Trout, Yellowstone Cutthroat Trout
Dry Creek	25.27	0.07	Culvert	*Surveyed (2004) = no fish captured*
Unnamed	27.28	N/A	Culvert	No Info
Fridley Creek	28.90	0.19	Culvert	Brook Trout, Mottled Sculpin, Mountain Whitefish, Rainbow Trout, Yellowstone Cutthroat Trout
Unnamed	30.25	N/A	Culvert	No Info
Eight Mile Creek	34.23	0.07	Culvert	Brook Trout, Mountain Whitefish, Rainbow Trout, Yellowstone Cutthroat Trout
Trail Creek	42.28	6.05	Culvert	Brown Trout, Mottled Sculpin, Rainbow Trout,

*RP = Highway Reference Marker at which the highway crossed the stream
**RM = River Mile at which the highway crossed the stream

Other natural stream crossings may exist that could support fish species within this Study area. Fish passage and/or barrier opportunities should be considered at affected drainages if a project is forwarded from this Study. Permitting from regulatory and resource agencies will likely require incorporation of design measures to facilitate aquatic species passage.

3.6 Noxious Weeds

Noxious weeds can degrade native vegetative communities, choke streams, compete with native plants, create fire hazards, degrade agricultural and recreational lands, and pose threats to the viability of livestock, humans and wildlife. Areas with a history of disturbance, like highway rights-of-way, are at particular risk of weed encroachment. The Invaders Database System lists 114 exotic plant species and 15 noxious weed species documented in Park County, some may be present in the Study corridor. (Appendix C.)

To reduce the spread and establishment of noxious weeds and to re-establish permanent vegetation, disturbed areas should be seeded with desirable plant species. If a project is forwarded from the Study, field surveys for noxious weeds should commence prior to any ground disturbance.

3.7 Crucial Areas Planning System

The Crucial Areas Planning System (CAPS) is a resource intended to provide useful and non-regulatory information during the early planning stages of development projects, conservation opportunities, and environmental review. The finest data resolution within CAPS is at the square mile section scale or waterbody, and use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations since the classification may or may not apply to the entire square mile section. The CAPS system was consulted to provide a general overview of the Study area. The CAPS results are presented in Appendix D.

CAPS provides MFWP General Recommendations and Recommendations Specific to Transportation Projects for both terrestrial and aquatic species and habitat. These recommendations can be applied generically to possible project locations carried forward from the Study

4 Social and Cultural Resources

4.1 Demographic and Economic Conditions

Under NEPA/MEPA and associated implementing regulations, state and federal agencies are required to assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts to neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and development that may be induced by transportation improvements. Demographic and economic information presented in this section is intended to assist in identifying human populations that might be affected by improvements within the Study area.

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. To provide a context in which to evaluate social impacts, characteristics of the existing population are presented in Table 9 and Table 10.

Table 9. Demographic Information.

Area	Population (2012 Estimate)	Population % Change (4/1/10 thru 7/1/12)	Median Household Income (2007 - 11)	Persons Below Poverty (2007 - 11)	Persons per Square Mile (2010)
Park County	15,567	-0.4%	$41,232	11.3%	5.6
State of Montana	1,005,141	1.6%	$45,324	14.6%	6.8
USA	313,914,040	1.7%	$52,762	14.3%	87.4

As shown in the table, generally the project area population has declined overall since 2010. Residents in the project area tend to be higher in age and lower in median household income compared to Montana as a whole. These differences can be generally attributed to the rural nature and relatively low population of the area.

Table 10. Population Data.

	Park County	State of MT	USA
Total Population [a]	15,567	1,005,141	313,914,040
White [b] (%)	96.7	89.9	78.1
African American [b] (%)	0.2	0.5	13.1
American Indian/Alaska Native [b] (%)	1.0	6.4	1.2
Asian [b] (%)	0.4	0.7	5.0
Native Hawaiian/Pacific Islander [b] (%)	0.0	0.1	0.2
Hispanic/Latino [b] (%)	2.3	3.1	16.7
2 or more races [b] (%)	1.6	2.4	2.3

Source: US Census Bureau

a. 2012 Estimate

b. 2011 Data in Percent (%)

In general, the ethnic makeup of the project area is primarily white, which is consistent with the state as a whole.

4.2 Land Ownership and Land Use

Geographic Information System (GIS)-based information was reviewed to assess the amount of area in the Study corridor that is public versus privately owned. Ownership of the land in the corridor is a mix of private and public. Public land is held by a variety of state and federal entities. There are also many areas held in easement for nongovernmental conservation groups such as Gallatin Valley Land Trust, Montana Land Reliance, Rocky Mountain Elk Foundation, and the Nature Conservancy. Montana Fish Wildlife and Parks also holds land in easement along the corridor. Additional research and coordination will be required to ascertain the specific encumbrances that are attached to each parcel of land. Adjacent to the highway, much of the land is in private ownership with low to moderate intensity development. Public land ownership maps for the Study area are contained in Figure 4.2.

A mixed land use arises from the varied land ownership throughout the Study corridor. These land uses include commercial, industrial, crop/pasture, mine/quarry, mixed urban, and recreational. Land uses can be seen on Figure 4.2.1. If a project is forwarded from this Study, land use adjacent to possible projects will need to be considered during design.

4.3 Recreational Resources

Table 11 summarizes some of the recreational resources identified in the Study area. The Yellowstone River and its tributaries provide a variety of recreational opportunities for floaters and fishers. These recreational areas may be protected under federal law.

Section 4(f) of the U.S. Department of Transportation Act of 1966 was enacted to protect publically owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Federally-funded transportation projects cannot impact these properties unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred. 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 the 4(f) resource. "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 review of both Montana Fish Wildlife and Parks resources list for Park County. There are possible 4(f) resources throughout the Study corridor. These will need to be evaluated more in depth if improvements will affect these locations. Some of these are camping and picnic sites listed here in Table 11.

Table 11. Possible 4(f) Campgrounds and Picnic Areas.

Name	Location
Yankee Jim Picnic Area	Latitude : 45.16795 Longitude : -110.85282
La Duke Picnic Area	Latitude : 45.09302 Longitude : -110.77864
Cinnabar Picnic Area	Latitude : 45.10867 Longitude : -110.79007
Sphinx Creek Picnic Area	Latitude : 45.17041 Longitude : -110.87321
Canyon Campground	Latitude : 45.18262 Longitude : -110.88701
Gardiner Community Park	Latitude: 45.0299357 Longitude: -110.7090997

The National Land and Water Conservation Fund Act (LWCFA), or Section 6(f), was enacted to preserve, develop, and assure the quality and quantity of outdoor recreation resources. Section 6(f) protection applies to all projects that impact recreational lands purchased or improved with land and water conservation funds. The Secretary of the Interior must approve any conversion of LWCF encumbered property to a use other than public, outdoor recreation. At this time, there are Section 6(f) resources identified in the Study corridor, with the majority being fishing accesses. (See Figure 4.3.) Impact to the 6(f) resources should be avoided; 6(f) use is a lengthy process involving rigorous mitigation requirements and approvals from several resource agencies.

4.4 Cultural Resources

If MDT projects forwarded from the Study are federally-funded, MDT would need to conduct 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). 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 and archaeological 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 also afforded protection under Section 4(f) of the Transportation Act.

The Study corridor contains several cultural resources, some of which consist of historic sites. Cultural resources within this Study corridor will not likely be a substantial issue, but it is one that is important to address as planning progresses on this Study.

A file search of the proposed Study area through the Montana State Historic Preservation Office revealed eight historic properties located within the Study boundaries. The table below lists the properties, their approximate locations and National Register of Historic Places (NRHP) eligibility. All of the sites have been previously recorded and their NRHP status established. There are also thirteen NRHP historic and archaeological properties located within a mile of the existing US 89 alignment in the survey area, but are outside the impact area for this Study. (See Figure 4.4.)

Table 12. Historic Properties.

Site	Site No.	Section	Township	Range	NRHP Eligibility	RP±
Roosevelt Arch	24PA0765	23	9S	8E	Listed	N/A
Yellowstone R. Bridge at Gardiner	24PA0790	23	9S	8E	Yes	0.1
Electric Mines/Electric HD	24PA0483	6, 7, 8	9S	8E	Yes	7±
OTO Homestead and Dude Ranch	24PA1227	7	8S	8E	Listed	15±
Carbella Bridge	24PA1237	20	7S	7E	Listed	15±
Emigrant Crossroad Arch.	24PA0969	27	5S	8E	Yes	
Park Branch Canal	24PA1114	4 and 9	4S	9E	Yes	40±
Carter Bridge	24PA0817	12	3S	9E	Listed	S-540

If a project is forwarded from the Study, a cultural resource survey for unrecorded historic and archaeological properties within the Area of Potential Effect will need to be completed during the project development process. Flexibility in design will be key to avoiding and/or minimizing impact to historically significant sites in the Study corridor.

4.5 Noise

Traffic noise may need to be evaluated for planned improvements to the Paradise Valley corridor. Noise analysis is necessary for "Type I" projects. If the roadway improvements are limited (e.g. the horizontal and vertical alignments are not changed and the highway remains a 2-lane facility) then the project would not be considered a Type I project. If the improvements planned for the road include a substantial shift in the horizontal or vertical alignments, increasing

the number of thru-lanes, passing lanes, or turning lanes, 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 the 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. The noise abatement measures must be considered reasonable and feasible prior to implementation.

4.6 Visual Resources

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on 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. The Roosevelt Arch marks the entrance to Yellowstone National Park at Study mile 0.0. Yellowstone National Park creates a large draw for many visitors to travel US 89 along the edge of the scenic Yellowstone River. The area along the Study corridor is a blended landscape that has been mildly developed still allowing the natural beauty to persevere.

Evaluation of the potential effects on visual resources would need to be conducted if improvement options are forwarded from this Study.

5 Conclusion

This environmental scan identifies physical, biological, social and cultural features within the Study area that may be affected by potential improvements to US 89.

Project-level environmental analysis would be required for any improvements forwarded from this Study. Information contained in this report may be used to support future NEPA/MEPA environmental documentation.

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Appendix A: Groundwater Data

Groundwater Informat on Center
Montana Bureau of Mines and Geology
Montana Tech of The University of Montana
1300 West Park Street - Natural Resources Building Room 329
Butte Montana 59701-8997
Ph: (406) 496-4336 Fx: (406) 496-4343

4/18/2013

Overview of PARK county

BEAVERHEAD • get data

At-A-Glance

Number of wells in County	5444
Deepest well on record (feet)	1307
Shallowest well on record (feet)	5
Most recent well on record	4/1/2013
Oldest well on record	1/1/1880
Number of water quality samples	598
Number of measured water levels	308213
Statewide Monitoring Network wells	17

Other Reports

Use By Year View this report to see the number of wells and their reported water uses by year

Histograms for PARK county

Wells by Year

The table below shows the breakdown of wells reportedly drilled in the county during the last 20 years. Click the "show all" link to display all data available.

2013	19
2012	70
2011	64
2010	64
2009	93
2008	118
2007	214
2006	224
2005	169
2004	194
2003	165
2002	178
2001	218
2000	137
1999	196
1998	123
1997	132
1996	130
1995	197
1994	201

Show all years

Wells by Depth

The table below shows the number of wells that fall between the depth ranges in the left hand column. All depths are listed in feet below ground surface.

0 - 99	2737
100 - 199	1422
200 - 299	775
300 - 399	297
400 - 499	126
500 - 599	43
600 - 699	23
700 - 799	11
800 - 899	7
900 - 999	0
> 1000	3

Reported Water Use

The table below shows the number of each type of water use that has been reported for wells in this county.

UNKNOWN	155
RECREATION	1
INJECTION	1
INDUSTRIAL	23
OTHER	54
PUBLIC WATER SUPPLY	144
TEST WELL	70
UNUSED	59
WILDLIFE	1
FIRE PROTECTION	17
MEDICAL	5
MONITORING	321
COMMERCIAL	17
IRRIGATION	345
RESEARCH	1
GEOTHERMAL-EXTRACTION	4
GEOTECH	82
GEOTHERMAL-INJECTION	5
STOCKWATER	506
DOMESTIC	4282
* Total	6187

* Number may differ from county total since one well may have several reported water uses.

Geologic Source

The table below shows the breakdown

of geologic sources for wells in this county. Note that not all wells in a county necessarily have had the geologic source code assigned.

ALLUVIUM (QUATERNARY) (110ALVM)	316
ALLUVIUM (HOLOCENE) (111ALVM)	298
GLACIAL DRIFT (112DRFT)	281
UPPER CRETACEOUS LIVINGSTON GROUP (211LVGS)	263
FORT UNION FORMATION (125FRUN)	243
VOLCANICS (TERTIARY) (120VLCC)	138
BILLMAN CREEK FORMATION (OF LIVINGSTON GROUP) (211BMCK)	86
ALLUVIUM (PLEISTOCENE) (112ALVM)	74
SEDIMENTS (TERTIARY) (120SDMS)	50
TERRACE DEPOSITS (QUATERNARY) (110TRRC)	43
COLORADO SHALE OR FM. (OF COLORADO GROUP) (211CLRD)	43
LIVINGSTON FORMATION (EOCENE -CRETACEOUS) (124LVGS)	29
MINER CREEK FORMATION (OF LIVINGSTON GROUP) (211MRCK)	29
HOPPERS FORMATION (OF LIVINGSTON GROUP) (211HPRS)	21
TERRACE DEPOSITS (PLEISTOCENE) (112TRRC)	19
PLUTONIC ROCKS (TERTIARY - CRETACEOUS) (120PLNC)	15
COKEDALE FORMATION (OF LIVINGSTON GROUP) (211CKDL)	14
SAND AND GRAVEL (PLEISTOCENE) (112SNGR)	12
CODY SHALE (211CODY)	10
MINE DUMPS (111MDMP)	10
MADISON GROUP OR LIMESTONE (330MDSN)	9
SNOWY RANGE FORMATION (OF GALLATIN GROUP) (371SNRG)	8
ALLUVIAL FAN DEPOSITS (QUATERNARY) (110ALVF)	7
COLLUVIUM (QUATERNARY) (110CLVM)	7

PRECAMBRIAN (EARLY PROTEROZOIC OR ARCHEAN) (500PCMB)	6
KOOTENAI FORMATION (217KOTN)	5
GNEISS AND SCHIST (EARLY PROTEROZOIC OR ARCHEAN) (500GNSC)	5
MINE TAILINGS (111MTLG)	4
MEAGHER LIMESTONE (374MGHR)	3
COLLUVIUM (HOLOCENE) (111CLVM)	3
EAGLE SANDSTONE (211EGLE)	3
FRONTIER FORMATION (211FRNR)	3
SAND AND GRAVEL (QUATERNARY) (110SNGR)	3
SAND AND GRAVEL (TERTIARY) (120SNGR)	3
MISSION CANYON LIMESTONE (OF MADISON GROUP) (337MSNC)	3
TERRACE DEPOSITS (HOLOCENE) (111TRRC)	3
TELEGRAPH CREEK FORMATION (OF MONTANA GROUP) (211TPCK)	2
VOLCANICS (PLEISTOCENE) (112VLCC)	2
QUADRANT QUARTZITE (320QDRN)	2
SAND AND GRAVEL (HOLOCENE) (111SNGR)	2
WOLSEY SHALE OR FORMATION (374WLSY)	2
BIGHORN DOLOMITE (361BGRN)	2
MORRISON FORMATION (221MRSN)	2
PARK SHALE OR ARGILLITE (374PARK)	2
LENNEP SANDSTONE (OF MONTANA GROUP) (211LNNP)	2
GLACIAL OUTWASH (PLEISTOCENE) (112OTSH)	1
LAKOTA SANDSTONE (OF INYAN KARA GROUP) (217LKOT)	1
LANCE-HELL CREEK UNDIFFERENTIATED (211LHUD)	1
PEDIMENT DEPOSITS (QUATERNARY) (110PDMN)	1
PILGRIM LIMESTONE OR DOLOMITE (371PLGM)	1

ELLIS GROUP (221ELLS)	1
ALLUVIAL FAN DEPOSITS (HOLOCENE) (111ALVF)	1
AMSDEN GROUP (320AMSD)	1
MONTANA GROUP (211MNTN)	1
STILLWATER COMPLEX (ARCHEAN) (500STLR)	1

Appendix B: Species of Concern within Park County

Animal SubGroup	Scientific Name	Common Name	Global Rank	State Rank	Short Habitat Description
Mammals	*Bos bison*	Bison	G4	S2	Grasslands
	Lasiurus cinereus	Hoary Bat	G5	S3	Riparian and forest
	Tamias umbrinus	Uinta Chipmunk	G5	S3	High elevation conifer forest
Birds	*Accipiter gentilis*	Northern Goshawk	G5	S3	Mixed conifer forests
	Ardea herodias	Great Blue Heron	G5	S3	Riparian forest
	Buteo regalis	Ferruginous Hawk	G4	S3B	Sagebrush grassland
	Catharus fuscescens	Veery	G5	S3B	Riparian forest
	Certhia americana	Brown Creeper	G5	S3	Moist conifer forests
	Cygnus buccinator	Trumpeter Swan	G4	S3	Lakes, ponds, reservoirs
	Dolichonyx oryzivorus	Bobolink	G5	S3B	Moist grasslands
	Dryocopus pileatus	Pileated Woodpecker	G5	S3	Moist conifer forests
	Falco peregrinus	Peregrine Falcon	G4	S3	Cliffs / canyons
	Gymnorhinus cyanocephalus	Pinyon Jay	G5	S3	Open conifer forest
	Haemorhous cassinii	Cassin's Finch	G5	S3	Drier conifer forest
	Histrionicus histrionicus	Harlequin Duck	G4	S2B	Mountain streams
	Leucosticte atrata	Black Rosy-Finch	G4	S2	Alpine
	Nucifraga columbiana	Clark's Nutcracker	G5	S3	Conifer forest
	Oreoscoptes montanus	Sage Thrasher	G5	S3B	Sagebrush
	Spizella breweri	Brewer's Sparrow	G5	S3B	Sagebrush
	Strix nebulosa	Great Gray Owl	G5	S3	Conifer forest
	Troglodytes pacificus	Pacific Wren	G5	S3	Moist conifer forests

Animal SubGroup	Scientific Name	Common Name	Global Rank	State Rank	Short Habitat Description
Reptiles	*Sceloporus graciosus*	Common Sagebrush Lizard	G5	S3	Rock outcrops
Amphibians	*Anaxyrus boreas*	Western Toad	G4	S2	Wetlands, floodplain pools
Fish	*Oncorhynchus clarkii bouvieri*	Yellowstone Cutthroat Trout	G4T2	S2	Mountain streams, rivers, lakes
	Oncorhynchus clarkii lewisi	Westslope Cutthroat Trout	G4T3	S2	Mountain streams, rivers, lakes
	Salvelinus namaycush	Lake Trout	G5	S2	Deep mountain lakes
Invertebrates	*Rhyacophila alexanderi*	Alexander's Rhyacophilan Caddisfly	G2	S2	Mountain / alpine streams
	Discus shimekii	Striate Disc	G5	S1	Aspen
	Oreohelix strigosa berryi	Berry's Mountainsnail	G5T2	S1S2	Limestone talus
Plants	*Botrychium sp. (SOC)*	Moonworts	G1G3	S1S3	
	Adoxa moschatellina	Musk-root	G5	S3	Rock/Talus
	Atriplex truncata	Wedge-leaf Saltbush	G5	S2	Wetland/Riparian
	Brickellia oblongifolia	Mojave Brickellbush	G5	S1S2	Rock/Talus
Plants	*Castilleja exilis*	Annual Indian Paintbrush	G5	S2	Wetland/Riparian
	Castilleja gracillima	Slender Indian Paintbrush	G3G4Q	S2	Wetland/Riparian
	Castilleja nivea	Snow Indian Paintbrush	G3	S3	Alpine
	Draba crassa	Thick-leaf Whitlow-grass	G3G4	S3	Alpine
	Draba densifolia	Dense-leaf Draba	G5	S2	Alpine
	Drosera anglica	English Sundew	G5	S3	Fens
	Erigeron flabellifolius	Fan-leaved Fleabane	G3	S3	Alpine
	Erigeron	Beautiful	G5	S1S3	Meadows

Animal SubGroup	Scientific Name	Common Name	Global Rank	State Rank	Short Habitat Description
	formosissimus	Fleabane			(Montane/subalpine)
	Erigeron linearis	Linear-leaf Fleabane	G5	S2	Sagebrush/Grasslands (Foothills to Montane)
	Grayia spinosa	Spiny Hopsage	G5	S2	Shrublands (Dry)
	Noccaea parviflora	Small-flowered Pennycress	G3	S2S3	Meadows (Moist, Montane to alpine)
	Pleiacanthus spinosus	Spiny Skeletonweed	G4	S2	Arid Grasslands

Appendix C: Noxious Weeds in Park County

Exotic Plants of Park County

Common Name	Genus	Species	Noxious in MT
alfalfa	Medicago	sativa	
alsike clover	Trifolium	hybridum	
annual bluegrass	Poa	annua	
annual wheatgrass	Agropyron	triticeum	
Austrian fieldcress	Rorippa	austriaca	
birdsfoot trefoil	Lotus	corniculatus	
birdsrape mustard	Brassica	campestris	
bittersweet nightshade	Solanum	dulcamara	
black bindweed	Polygonum	convolvulus	
black henbane	Hyoscyamus	niger	
black medic	Medicago	lupulina	
blue mustard	Chorispora	tenella	
bluebuttons	Knautia	arvensis	
bulbous bluegrass	Poa	bulbosa	
bull thistle	Cirsium	vulgare	
bushy wallflower	Erysimum	repandum	
Canada bluegrass	Poa	compressa	
Canada thistle	Cirsium	arvense	✓
canarygrass	Phalaris	canariensis	
cardoon	Cynara	cardunculus	
catchweed	Asperugo	procumbens	
chalapa hoarycress	Cardaria	chalapensis	
chickweed	Stellaria	media	
clasping pepperweed	Lepidium	perfoliatum	
clover dodder	Cuscuta	epithymum	
clustered bellflower	Campanula	glomerata	
common burdock	Arctium	minus	
common caraway	Carum	carvi	
common lambsquarters	Chenopodium	album	
common mullein	Verbascum	thapsus	
common speedwell	Veronica	officinalis	
common tansy	Tanacetum	vulgare	✓
common teasel	Dipsacus	fullonum	
corn gromwell	Lithospermum	arvense	
cowcockle	Vaccaria	pyramidata	
crack willow	Salix	fragilis	
creeping bellflower	Campanula	rapunculoides	
creeping bentgrass	Agrostis	stolonifera	
creeping buttercup	Ranunculus	repens	
crested wheatgrass	Agropyron	cristatum	
curly dock	Rumex	crispus	

Common Name	Genus	Species	Noxious in MT
dalmatian toadflax	Linaria	dalmatica	✓
dandelion	Taraxacum	officinale	
downy brome	Bromus	tectorum	
dwarf alyssum	Alyssum	desertorum	
dyer's woad	Isatis	tinctoria	✓
earth nut peavine	Lathyrus	tuberosus	
European barberry	Berberis	vulgaris	
European sticktight	Lappula	echinata	
feverfew	Chrysanthemum	parthenium	
field bindweed	Convolvulus	arvensis	✓
field pennycress	Thlaspi	arvense	
field pepperweed	Lepidium	campestre	
flixweed	Descurainia	sophia	
fowl bluegrass	Poa	palustris	
garden orach	Atriplex	hortensis	
giant knotweed	Polygonum	sachalinense	
globe candytuft	Iberis	umbellata	
great burdock	Arctium	lappa	
green foxtail	Setaria	viridis	
ground ivy	Glecoma	hederacea	
hairy catchfly	Silene	dichotoma	
hairy chess	Bromus	commutatus	
hairy whitetop	Cardaria	pubescens	
hare's ear mustard	Conringia	orientalis	
henbit	Lamium	amplexicaule	
Himalayan balsam	Impatiens	glandulifera	
hoary alyssum	Berteroa	incana	✓
hoary cress	Cardaria	draba	
houndstongue	Cynoglossum	officinale	✓
Japanese brome	Bromus	japonicus	
Kentucky bluegrass	Poa	pratensis	
kochia	Kochia	scoparia	
large barnyard grass	Echinochloa	crusgalli	
largeseed falseflax	Camelina	sativa	
leafy spurge	Euphorbia	esula	✓
little mallow	Malva	parviflora	
madwort	Alyssum	sp.	
matrimonyvine	Lycium	halimifolium	
mayweed chamomile	Anthemis	cotula	
meadow fescue	Festuca	pratensis	
meadow salsify	Tragopogon	pratensis	
mouseear chickweed	Cerastium	vulgatum	
musk thistle	Carduus	nutans	

Common Name	Genus	Species	Noxious in MT
oakleaf goosefoot	Chenopodium	glaucum	
orchardgrass	Dactylis	glomerata	
oxeye daisy	Chrysanthemum	leucanthemum	✓
perennial pepperweed	Lepidium	latifolium	✓
perennial ryegrass	Lolium	perenne	
perennial sowthistle	Sonchus	arvensis	
Persian darnel	Lolium	persicum	
pineapple weed	Matricaria	matricarioides	
poison hemlock	Conium	maculatum	
prostrate knotweed	Polygonum	aviculare	
puncturevine	Tribulus	terrestris	
quackgrass	Agropyron	repens	
rattlesnake brome	Bromus	briziformis	
red clover	Trifolium	pratense	
red fescue	Festuca	rubra	
red orach	Atriplex	rosea	
red sandspurry	Spergularia	rubra	
red seeded dandelion	Taraxacum	laevigatum	
red sorrel	Rumex	acetosella	
redstem filaree	Erodium	cicutarium	
reed canarygrass	Phalaris	arundinacea	
Russian knapweed	Centaurea	repens	✓
Russian olive	Elaeagnus	angustifolia	✓
Russian thistle	Salsola	iberica	
sainfoin	Onobrychis	viciifolia	
shepherd's purse	Capsella	bursa-pastoris	
sickle medic	Medicago	falcata	
smallflower geranium	Geranium	pusillum	
smallseed false flax	Camelina	microcarpa	
smooth brome	Bromus	inermis	
smooth catchfly	Silene	csereii	
spiny cocklebur	Xanthium	spinosum	
spotted knapweed	Centaurea	maculosa	✓
St. Johnswort	Hypericum	perforatum	✓
sulfur cinquefoil	Potentilla	recta	✓
sun spurge	Euphorbia	helioscopia	
tall oatgrass	Arrhenatherum	elatius	
tall tumblemustard	Sisymbrium	altissimum	
timothy	Phleum	pratense	
tower mustard	Arabis	glabra	
violet sage	Salvia	nemorosa	
wallflower mustard	Erysimum	cheiranthoides	
watercress	Nasturtium	officinale	

Common Name	Genus	Species	Noxious in MT
weeping alkaligrass	Puccinellia	distans	
western salsify	Tragopogon	dubius	
white bryony	Bryonia	alba	
white catchfly	Silene	latifolia	
white clover	Trifolium	repens	
white horehound	Marrubium	vulgare	
white mulberry	Morus	alba	
white mustard	Brassica	hirta	
whitetop	Cardaria	sp.	
wild mustard	Brassica	kaber	
wild parsnip	Pastinaca	sativa	
yellow alyssum	Alyssum	alyssoides	
yellow bedstraw	Galium	verum	
yellow mignonette	Reseda	lutea	
yellow rocket	Barbarea	vulgaris	
yellow sweetclover	Melilotus	officinalis	
yellow toadflax	Linaria	vulgaris	✓

Appendix D: Crucial Area Planning System (CAPS)

The following data is provided through use of Montana Department of Fish Wildlife and Parks Crucial Areas Planning System (CAPS) program on the Study area.

Terrestrial:

The corridor study area contains Class I, II, III, and IV ranked areas for Terrestrial Conservation Species. Terrestrial conservation species depicts the cumulative expected occurrence of 85 of Montana's vertebrate species of concern. For more detailed information see: (http://fwpiis.mt.gov/content/getitem.aspx?id=41536)

The corridor study area contains Class I, II, III, IV ranked areas for Terrestrial Species Richness. Terrestrial species richness depicts all native land-based species in Montana, including amphibians, reptiles, birds, and mammals. Species included are found year round or breed in the state. For more detailed information see: (http://fwpiis.mt.gov/content/getitem.aspx?id=41535)

The corridor study area contains Class I, II, III, IV ranked areas for Terrestrial Species Game Quality. Terrestrial game quality depicts areas considered valuable to 12 native game species and their specific habitat requirements. For more detailed information see: (http://fwpiis.mt.gov/content/getitem.aspx?id=41531)

Aquatic:

The corridor study area contains Class I, II, III ranked drainages for Aquatic Connectivity. The Yellowstone River is ranked I under this category. Aquatic connectivity depicts stream corridors for fish species that require connected habitats to complete all or a portion of their life history. For more detailed information see: (http://fwpiis.mt.gov/content/getitem.aspx?id=41523)

The corridor study area contains Class II, III, IV ranked drainages for Fish Native Species Richness. The Yellowstone River is ranked II under this category. Fish native species richness depicts native biodiversity using counts of native fishes present in waterbodies and streams. For more detailed information see: (http://fwpiis.mt.gov/content/getitem.aspx?id=42834)

The corridor study area contains Class III ranked drainages for Fish Species of Concern, reflecting the presence of Yellowstone Cutthroat Trout. The Yellowstone River and its main tributaries are ranked III under this category. Aquatic species of concern highlights areas with rare, declining or Federally Listed Threatened or Endangered fish species present as recognized by the joint Montana Fish, Wildlife & Parks and Montana Natural Heritage Program (MTNHP) Species of Concern (SOC) Report. Species were ranked by their Endangered Species Act (ESA) status or SOC status. This layer only includes fish species, not aquatic invertebrates or plants. For more detailed information see: (http://fwpiis.mt.gov/content/getitem.aspx?id=41486)

The corridor study area contains Class I, II, III, IV ranked drainages for Game Fish Quality. The Yellowstone River is ranked I under this category. Game fish quality depicts the relative quality of cold and warm water game fish populations available to anglers in Montana. For more detailed information see:
(http://fwpiis.mt.gov/content/getitem.aspx?id=41529)

The corridor study area contains Class I, and II ranked drainages for Game Fish Life History. The Yellowstone River is ranked I under this category. Game fish life history depicts habitats that support at least one of 43 recognized game fish species during life history stages (spawning areas, rearing areas, and thermal refuge). For more detailed information see:
(http://fwpiis.mt.gov/content/getitem.aspx?id=41530)

The following is a summary of example General Recommendations and Recommendations Specific to Transportation Projects for both terrestrial and aquatic species and habitat provided by MFWP through the CAPS program. If a project is forwarded from this study, these recommendations should be evaluated for potential applicability to the proposed project.

Terrestrial

- Avoid or minimize the loss of winter range.
- Focus wildlife impact mitigation efforts on maintaining landscape permeability, the ability for species to move freely across the landscape.
- Conduct pre-construction and post-construction monitoring to evaluate effectiveness of impact mitigation efforts, and apply adaptive management techniques to increase effectiveness over time.
- Minimize development footprint by limiting the total area dedicated to houses, roads, and other infrastructure.
- Provide open space for animal movement, including travel between winter and summer ranges.
- A combination of methods may be necessary to provide safe and efficient wildlife passage (e.g., crossings, fences, escape ramps).
- Roadside gates: Locate gates on both sides of a highway where known migration routes occur. Leave gates open during the winter months to facilitate movements of ungulates across the highway and to minimize trapping animals between fences and next to the highway.
- Locate new roads and existing road realignments outside of important wildlife habitat.
- Wildlife Crossing Structures over or under highways. Identify the wildlife species the structure is intended to serve. Locate structure near animals' natural travel routes. One crossing may not suffice for the full suite of species moving across a large landscape. Keep in mind that the largest crossing structures are suitable for the greatest diversity of wildlife. Design structures as flat and straight as the terrain permits, so that animals can

see through the structure to suitable habitat on the other side. The land adjacent to the right-of-way at a crossing location should ideally be owned and managed in a manner that is compatible with wildlife activity.

- Roadside fencing: Build fence either to hold livestock in or keep livestock out, while allowing for as much free movement by wildlife as possible, as well as easy passage for recreationists at stream crossings. Attempt to balance the needs of wildlife with the landowner's liability (81-4-101, Montana Code Annotated defines legal fences).
- Raptors: Time road construction projects to avoid spring nesting periods.
- Songbirds (Passerines): Time road construction projects to avoid spring nesting periods.

Aquatic

- Maintain or restore natural vegetative buffer from water bodies, and provide an additional building setback. Tailor to type of waterbody. For example. Rivers: 250' buffer + 50' setback = 300' total (from ordinary high-water mark); Other Perennial Streams: 150' buffer + 50' setback = 200' total (from ordinary high-water mark); Other Water Bodies, including wetlands: 100' buffer + 30' setback = 130' total (from the defined boundary of a wetland or the high-water mark of intermittent streams, lakes, ponds, and reservoirs).
- Limit the number of stream crossings.
- Locate crossings in stable reaches of streams; position them perpendicular to the direction of stream flow.
- Bridge construction: Design bridge to maintain a constant grade, avoid large drops above or below the structure, accommodate both juvenile and adult fish, maintain water depth similar to the natural stream, minimize turbulence and flow contraction, and allow upstream fish passage. Bridge should be wide enough to exceed the 100-year floodplain and allow flood flows to spread onto the floodplain. Allow for some dry ground or an artificial ledge beneath the bridge on one or both sides, to accommodate both aquatic and terrestrial wildlife passage.
- Culverts: Maintain or improve stream grade to accommodate fish movement. Consider various culvert types to accommodate passage for the weakest fish in the assemblage. Keep culvert length to the minimum needed to ensure side slope stability. Ideally, inspect culverts annually following spring runoff.

Appendix E: Figures