3. AFFECTED ENVIRONMENT

3.0 INTRODUCTION

This section describes the affected environment, including the cultural, historical, social and economic conditions that could be affected by implementation of the alternatives described in Section 2. Aspects of the affected environments described in this section focus on the relevant major issues presented in Section 2. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table 3.0-1.

Table 3.0-1. Critical Elements Requiring Mandatory Evaluation

Mandatory Element	Not Present	No Impact	Potentially Impacted
Threatened and Endangered Species			X
Floodplains		X	
Wilderness Values	X		
ACECs			X
Water Resources			X
Air Quality			X
Cultural or Historical Values			X
Prime or Unique Farmlands	X		
Wild & Scenic Rivers	X		
Wetland/Riparian			X
Native American Religious Concerns			X
Hazardous Wastes or Solids			X
Invasive, Non-native Species			X
Environmental Justice		X	

[1] As listed in BLM *National Environmental Policy Act Handbook H-1790-1* (BLM 1988*b*) and subsequent Executive Orders

3.1 CLIMATE AND AIR QUALITY

The BNGPA is located in north-central Montana in a semi-arid continental climate regime, having a large annual range in temperature and limited precipitation. Representative temperature and precipitation measurements for the project area were collected at the Malta 7E site, Phillips County, Montana, from 1972 to 2007, approximately two miles southwest of the project area at an elevation of 2,250 feet (WRCC 2008). Representative wind data for the project area were collected at the Glasgow International Airport, Glasgow, Montana, for the years 1998 to 2002. The Glasgow International Airport is located approximately 21 miles southeast of the BNGPA.

The annual average total precipitation at Malta is 12.7 inches, ranging from 21.4 inches (1986) to 8.4 inches (1984). Precipitation is greatest from May to September with May and June the wettest months. An average of 26 inches of snow falls during the year (annual high 45.9 inches in 1975), with December through March the snowiest months. **Table 3.1-1** shows the mean monthly temperature ranges and total precipitation amounts.

The region has cool to moderate temperatures. Average daily temperatures in degrees Fahrenheit (°F) range between 5.2 °F (low) and 29.7 °F (high) in mid-winter and between 51.7 °F (low) and 83.1 °F (high) in mid-summer. Extreme temperatures have ranged from -45 °F (1972) to 108 °F (1983). The frost-free period (at 32 °F) generally occurs from mid-May to mid-September.

Table 3.1-1. Mean Monthly Temperature Ranges and Total Precipitation Amounts for Malta, MT

Month	Average Temperature Range (°F)	Total Precipitation (inches)
January	2.1–26.0	0.36
February	7.8–33.0	0.27
March	18.8–45.2	0.56
April	30.6–60.5	0.93
May	41.0–70.4	2.23
June	49.6–78.6	2.66
July	53.9–86.0	1.73
August	51.6–84.8	1.20
September	40.8–73.6	1.17
October	29.9–60.7	0.75
November	15.9–41.4	0.49
December	5.6–30.0	0.38
ANNUAL	43.2 (mean)	12.74 (mean)

Source: (WRCC 2008)

Table 3.1-2 provides the wind direction distribution in a tabular format. From this information, it is evident that the winds originate from the east to southeast approximately 36 percent of the time. The annual mean wind speed is approximately 10.6 mph.

Table 3.1-2. Wind Direction Frequency Distribution for Glasgow, MT

Wind Direction	Percent of Occurrence	Wind Direction	Percent of Occurrence	Wind Direction	Percent of Occurrence
N	3.0	SE	6.1	W	9.6
NNE	2.7	SSE	2.9	WNW	10.8
NE	3.5	S	1.9	NW	11.6
ENE	4.5	SSW	1.4	NNW	5.6
E	14.6	SW	2.0		
ESE	15.1	WSW	4.6		

Source: Glasgow, MT International Airport meteorological data collected 1998–2002.

The frequency and strength of the winds greatly affect the dispersion and transport of air pollutants. Table 3.1-3 shows the wind speed distribution and Table 3.1-4 shows the stability class distribution. The atmospheric stability class is the measure of atmospheric turbulence, which directly affects pollutant dispersion. The stability classes are divided into six categories designated ‘A’ (unstable) through ‘F’ (very stable). The ‘D’ (neutral) stability class, which implies good atmospheric dispersion conditions, occurs approximately 53 percent of the time.

Table 3.1-3. Wind Speed Distribution

Wind Speed (miles/hour)	Percent of Occurrence
0–4.0	5.2
4.0–7.5	25.0
7.5–12.1	33.6
12.1–19.0	26.1
19.0–24.7	6.4
Greater than 24.7	3.7

Table 3.1-4. Stability Class Distribution

Stability Class	Percent of Occurrence
A (unstable)	0.5
B	4.9
C	12.0
D (neutral)	53.3
E	17.6
F (very stable)	11.8

Source: Glasgow, MT meteorological data collected 1998-2002

As indicated by these data, atmospheric dispersion conditions in the BNGPA are good (although nighttime cooling will enhance stable air, inhibiting air pollutant mixing and transport). In addition dispersion conditions will be enhanced along ridges, plateaus, and on hilltops.

The Montana Ambient Air Quality Standards (MAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based criteria for the maximum acceptable concentrations of air pollutants at all locations to which the public has access. Although specific air quality monitoring has not been conducted near the project area, the overall ambient air quality in the area is good, given there is very limited industrial activity in and surrounding the project area. The Montana Department of Environmental Quality—Air Resources Management Bureau (MDEQ-ARMB) has suggested representative background values to be used for this area. These values can be found in MDEQ-ARMB guidance document "Requirement for Submitting Air Dispersion Modeling Analysis." This document contains values for carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 microns in effective diameter (PM_{10}), and sulfur dioxide (SO_2). Background values for Ozone (O_3) were taken from the CASTNET site located in Glacier National Park for the year 2006. This is the closest site to the project area for which ozone data has been collected recently. Particulate matter less than 2.5 microns in effective diameter ($PM_{2.5}$) background data was taken from a monitor located at the west entrance to Yellowstone National Park for the year 2006. This is believed to be the only rural $PM_{2.5}$ data collected in Montana for the year 2006. Background pollutant concentrations for these pollutants are compared to the MAAQS and NAAQS in Table 3.1-5.

As shown in Table 3.1-5, regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. Background air quality concentrations are combined with modeled project-related air quality impacts of the same averaging time periods, and the total predicted impacts are compared to applicable air quality standards. These background values will be used in the modeling completed for the analysis of air quality impacts in this EA.

Federal air quality regulations adopted and enforced by the MDEQ-ARMB limit incremental emissions increases to specific levels defined by the classification of air quality in an area. The Prevention of Significant Deterioration (PSD) Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict. The project area and surrounding areas are classified as PSD Class II. The only mandatory federal PSD Class I areas located within 100 miles of the project area is the U.L. Bend Wilderness Area (approx. 50 miles SSW). The Fort Peck Indian Reservation (approx. 25 miles ESE) is also classified as a Class I area. However, it is protected as a Class I area under the MDEQ-ARMB. These sensitive areas have the potential to be impacted by cumulative project source emissions. Regional background pollutant concentrations, as well as NAAQS, MAAQS, and PSD Class I and II Increments, are presented in Table 3.1-5.

All NEPA analysis comparisons to the PSD Class I and II increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD Increment Consumption Analysis. The determination of PSD increment consumption is an air-quality regulatory agency responsibility. Such an analysis would be conducted as part of the New Source Review process for a major source, as would an evaluation of potential impacts to Air Quality Related Values (AQRV) such as visibility, aquatic ecosystems, flora, fauna, etc. performed under the direction of the MDEQ-ARMB in consultation with federal land managers, or would be conducted to determine minor source increment consumption.

Table 3.1-5. Air Pollutant Background Concentrations, Montana and National Ambient Air Quality Standards, and Prevention of Significant Deterioration (PSD) Increments (μg/m^3)

Pollutant/ Averaging Time	Measured Background Concentration	Montana and National Ambient Air Quality Standards	Incremental Increase Above Legal Baseline PSD Class I	PSD Class II
Carbon Monoxide (CO) [1]				
1-hour (NAAQS)	1,725	40,000	n/a	n/a
1-hour (MAAQS)	1,725	26,450	n/a	n/a
8-hour	1,150	10,000	n/a	n/a
			n/a	n/a
Nitrogen dioxide (NO_2) [1]				
1-hour (MAAQS)	75	564	n/a	n/a
Annual (NAAQS)	6	100	2.5	25
Annual (MAAQS)	6	94	2.5	25
Ozone [2]				
1-hour (MAAQS)	124	196	n/a	n/a
8-hour (NAAQS)	116	157	n/a	n/a
Particulate Matter (PM_{10}) [1]				
24-Hour	30	150	8	30
Annual (MAAQS)	8	50	4	17
Particulate Matter ($PM_{2.5}$) [3]				
24-Hour (NAAQS)	11	35	n/a	n/a
Annual (NAAQS)	4.3	15	n/a	n/a
Sulfur dioxide (SO_2) [1]				
1-hour (MAAQS)	35	1,300	n/a	n/a
3-hour (NAAQS)	26	1,300	25	512
24-hour (NAAQS)	11	365	5	91
24-hour (MAAQS)	11	262	5	91
Annual (NAAQS)	3	80	2	20
Annual (MAAQS)	3	52	2	20

μg/m3 = micrograms per cubic meter

[1] Background data taken from MDEQ-ARMB, “Requirements for Submitting Air Dispersion Modeling Analyses,” based on phone call with John Coefield of MDEQ-ARMB, 5-11-06.

[2] Background data taken from 2006 monitoring data collected at the CASTNET site located in Glacier National Park, MT (EPA/AIRS Database 2007).

[3] Background data taken from 2006 monitoring data collected in Yellowstone National Park, West Entrance (EPA/AIRS Database 2007).

Continuous visibility-related optical background data have been collected at the MDEQ-ARMB Class I Fort Peck Indian Reservation and the PSD Class I U.L. Bend Wilderness Area, as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. Visual range, referred to as standard visual range (SVR), is the farthest distance at which an observer can just see a black object viewed against the horizon sky; the larger the SVR, the cleaner the air. Visibility for the region is considered very good with an average SVR of over 150 km (Malm, 2000).

The MDEQ-ARMB, under its EPA-approved State Implementation Plan, is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made. Those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. Therefore, the MDEQ-ARMB has the ultimate responsibility for reviewing and permitting the project prior to its operation. Unlike the conceptual ‘reasonable, but conservative’ engineering designs used in NEPA analyses, any MDEQ-ARMB air quality preconstruction permitting demonstrations required would be based on very site-specific, detailed engineering values, which would be assessed in the permit application review. Any Proposed Action meeting the requirements set forth under the Administrative Rules of Montana (Chapter 8, Air Quality, Subchapter 7 – Permit, Construction and Operation of Air Contaminant Sources) will be subject to the MDEQ-ARMB permitting and compliance processes.

3.2 CULTURAL RESOURCES

Cultural resources are the physical evidence of past human activities. Generally 50 years or older, they can include sites, districts, or landscapes. Previous investigations indicate the study area has been occupied for at least 5,000 years. A variety of laws and mandates require federal regulators to take into consideration the impact of undertakings upon cultural resources.

The National Historic Preservation Act of 1966 established the National Register of Historic Properties (NRHP). Sites, objects, districts, and landscapes can be nominated to the NRHP on the basis of association with events that have made a significant contribution to the broad patterns of history (Criterion A), association with a culturally significant individual (Criterion B), embodiment of the distinctive characteristics of a type or period in method of construction (Criterion C), or the potential to yield important information about the history or prehistory of the area (Criterion D). Until recently, prehistoric sites have been considered only under Criterion D, and this is still the case for most prehistoric sites in the Bowdoin area.

In 1990 the National Park Service issued Bulletin No. 38 which gives guidelines for evaluating sites under Criteria A, B, and C in terms of the cultures that generated these sites. In practice, this means that the National Park Service is now directing cultural resource managers to evaluate prehistoric sites from the perspectives of the tribal history and culture in Montana. Sites, artifacts, landscapes, or districts that qualify under Criteria A, B, or C from the perspective of Native American history and culture are called Traditional Cultural Properties (TCPs).

The usefulness, appropriateness, and relevance of the guidelines continue to be a subject of debate among archaeologists, ethnographers, and federal and state cultural resource managers with regulatory responsibilities under Section 106 of the NHPA and various state and federal advisory bodies, including SHPOs and the Advisory Council. The BLM has sought to clarify its position by issuing According to Information Bulletin No. 92-177 on January 9, 1992 by the

Washington, DC Office of the BLM. The BLM is not required to follow Bulletin 38 (Bulletin 1992:2); however, BLM Manual 8100 states the term ‘cultural resources’ includes properties (sites or places but not practices or beliefs) of traditional cultural or religious importance to specified social and/or cultural groups. These properties must be related to a group’s cultural practices, beliefs, or values that are widely shared, have been passed on through generations, and serve a recognized role in the maintenance of the group’s identity.

The American Indian Religious Freedom Act (AIRFA) protects the rights of living peoples to the “access of sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.” Unlike the NRHP, sites associated with AIRFA are often less than 50 years in age. Locations that have associated intangible spiritual values may or may not have archaeological materials present. The integrity of setting is often crucial for AIRFA-related issues. The immediate surroundings, including the viewshed, can be critical to religious practices (prayer, fasting, making offerings, etc.).

Executive Order 13007 directs federal managing agencies to accommodate access to sacred sites by traditional Indian practitioners and to protect those sites from impacts. Executive Order 13007 is applicable only on federal lands.

The Native American Graves Protection and Repatriation Act (NAGPRA) protects marked and unmarked Indian graves on public lands. This protection extends to associated and unassociated grave goods and items of cultural importance belonging to the tribe as a whole.

Results of the Inventory

From 1973 to 2005, 1,016 projects were conducted that included at least a portion of the study area (on file at the BLM Great Falls Field Station). These investigations examined approximately 78,000 acres. The exact number of acres is unknown because some acres were surveyed more than once, and other surveys extended outside the study area. Over 70 percent of the inventory reports are related to the construction of gas wells and associated structures such as pipelines and access roads. Wildlife habitat or livestock improvement projects and reservoir construction are the next-most common activities to require cultural resource investigations making up seven and four percent of the projects, respectively. Other activities involving cultural resource investigations include land development and exchanges; borrow and gravel pit excavations; bridge construction, repair, or replacement; buried cable or fiber-optic line installations; cemetery expansion; dam and dike construction, inspection, or repair; farming or range chiseling; highway/road construction or repair; irrigation, construction or improvement of recreational facilities; and railroad improvements. The inventoried acres are highest in the townships along Whitewater Creek, Nelson Reservoir, and the Milk River.

There are 1,420 recorded sites in the study area. This provides a site density of 18 sites per 1,000 acres investigated. Of the total sites, 1,220 are prehistoric and 200 are historic in age. Of these, one site is listed and 45 sites are eligible for listing on the NRHP.

The site listed on the NRHP includes the H. Earl Clack Service Station in Saco, Montana. The Clack Station was nominated for its architectural style and because it is an example of a former chain of regional gas stations in northern Montana.

The BNGPA contains an Area of Critical Environmental Concern (ACEC) named the Big Bend of the Milk River ACEC. This area contains two sites that are eligible for listing on the NRHP: the Beaucoup Site Complex (24PH188 and 24PH189) and the Henry Smith Buffalo Jump Site (24PH794). The Beaucoup Site Complex consists of two Besant and Avonlea sites that are in excellent condition. The Henry Smith site is an NRHP-eligible Avonlea bison-kill site containing a variety of features, including bison-kill areas, drivelines, meat-processing areas, effigies, and stone rings. The site has been developed for interpretation and public education.

Prehistoric Sites

The prehistoric site types include 897 stone rings, 158 cairns, 50 other stone features, 12 bison kills, three cultural-material scatters, and 100 lithic scatters. The majority of the stone feature sites (stone rings, cairns, etc.) have not been recorded to current standards. The following provides a brief discussion of the feature/site types and their likely location within the study area.

Stone ring sites are defined by the presence of stone ring features. At least 7,227 stone rings are reported for the study area. This provides an average of 93 rings for every 1,000 acres inventoried. This is one of the highest densities observed in Montana. Based on the available evidence, the stone rings average 4.7 meters in diameter. This is interesting because it is 0.2 meters smaller than stone rings observed in central Montana (Deaver and Peterson 1999) and 0.4 meters smaller than in central North Dakota (Peterson et al. 2001). The reason for this is unknown, but it could represent a difference in family size or length of occupation. The rings in the study area average 5.1 rocks per circumference meter. This is slightly higher than that observed for the rest of the state, but is likely the result of smaller ring size (it is easier to form a heavy small ring than a heavy large ring). A number of studies have found that stone rings tend to be found in upland settings, especially along the edges of ridges (Deaver and Morter 1981; Deaver and Peterson 1999). A recent GIS study of stone rings in central North Dakota found that stone rings tend to be located within 100 meters of 9- to12-degree slopes. It has been speculated that the placement of these rings reflects the desire to be located near a variety of resources, as represented by xeric environments. However, a study by Peterson and others (2001) suggests that access to ring rock may have also been an important factor in ring placement. Although archaeologists tend to believe stone rings are associated with habitation structures, other tribes may disagree with this assessment and argue that stone rings can be the result of vision quest features. The Crow believe that some stone rings may be associated with human remains. The Assiniboine believe that stone rings with openings to the south are related to Assiniboine occupations.

Cairn sites are defined by the presence of cairns, though other artifacts and features may also be present. Cairns are the second-most common feature observed in the BNGPA. They are generally defined by a cluster of rocks, usually located in upland settings. One thousand eight-hundred and ninety cairns have been found within 338 sites. From the available evidence, the cairns in the study area average 1.42 meters in size and have a rock density of 21 rocks per square meter. This is slightly smaller and less dense than averages observed within 20 counties of Montana (Deaver and Peterson 1999). Although common, the function of cairns is not understood. They likely represent a variety of functions. Tribes often express concern over cairns, especially those over two meters in size, as they are sometimes associated with human remains.

In addition to stone rings and cairns, there are a small number of other stone features within the study area. As with stone rings and cairns, other stone features tend to be found in upland settings. Most of the features (138) in the study area represent alignments. Alignments are roughly linear arrangements of rocks or small rock clusters. Archaeologists have traditionally interpreted alignments to represent drivelines used to direct bison to a kill site; however, other interpretations such as prayer lines or medicine wheel remnants have also been given (Deaver and Peterson 1999). Other features observed in the BNGPA include effigies (especially of Napi figures), a vision quest structure, and a medicine wheel. This site type would also include the Sleeping Buffalo Site, where a series of boulders on top of a ridge have the appearance of bison lying on the ground. Other stone features are often associated with ceremonial or religious activities. As such, they are commonly of concern to the tribes. In this region, Napi figures and medicine wheels are often ascribed to ancestral Blackfoot.

Bison kill sites are typically assigned to the location where bison were captured and killed, though they are sometimes ascribed to processing sites as well. The archetypical bison kill is represented by a high density of bison bone and numerous projectile points but few other artifacts. Bison kills are common along the Milk River in north-central Montana and most date to the Late Prehistoric Period (Deaver and Morter 1981). Unlike the other site types, bison kills tend to be situated near the base of ridges and are rarely found in upland settings. Tribes often identify bison kills as an important mnemonic of their past life and bison skulls are sometimes valued for ceremonial purposes.

Culture material scatters and lithic scatters represent prehistoric sites that are generally not associated with surface-visible features. While culture material scatters tend to be associated with a variety of artifacts (e.g. bone, pottery, stone tools, hearths), lithic scatters generally contain lithic debris and stone tools. The difference in artifact types is believed to be associated with the function of the site. Although these site types can occur anywhere, lithic scatters tend to be found in upland settings near lithic sources and culture material scatters tend to be found closer to water. Lithic scatters and culture material scatters found in plowed fields may represent remnants of stone ring or cairn feature sites.

Although not reported in the site files, there is one other site type found within the project area. The Larb Hills (24PH3878/24VL1777) also known as Saco Hills, was and continues to be an important plant-gathering location for the Fort Peck tribe. Of particular importance is the gathering of larb, which is used in ceremonial tobacco. As such it is identified as a traditional cultural landscape.

Historic Sites

Historic site types include homesteads, bridges, buildings, canals, cultural material scatters, cairns, dams, dikes, irrigation systems, depressions, foundations, farms, graffiti, roads, railroads, towns, wells, and rock alignments. The level of recording at many sites does not meet current standards.

Rural residential sites include those labeled as homesteads or farms, as well as sites containing associated features such as wells or foundations. The BNGPA contains 69 homestead sites, six farms, one dugout, one well site, and five foundations. The majority of the sites in this category are located along numerous small lakes and Whitewater Creek in the northwest portion of the project area. Other concentrations occur around Nelson Reservoir and Bowdoin Lake.

The buildings and towns category includes residential or other buildings not associated with homesteads or farms, and buildings that make up a town. Recreational cabins are also included in this category. Among the recorded sites in the Bowdoin project area, there are four labeled as ‘building’ or ‘structure’, one boathouse, 21 cabins, 17 commercial buildings, two schools, one town, and one trailer house. The sites in this category are concentrated around Nelson Reservoir (especially cabins), the Milk River, Lake Bowdoin, and the Burlington Northern Railroad.

The infrastructure category includes bridges, roads, railroads, and a railroad station. These sites are located throughout the project area. Prominent sites of this type include the Burlington Northern Railroad and Highway 2.

The irrigation category includes sites labeled as canals, dams, dikes, or irrigation systems. These sites are mainly concentrated along the Milk River, which is the main source of irrigation water in the project area. A few irrigation-related sites occur at Nelson Reservoir, Whitewater Creek, and Water Coulee.

This category contains an assortment of site types that do not fit into the other categories, including cultural material scatters, cairns, depressions, graffiti, petroglyphs, and rock alignments. These sites occur along Whitewater Creek and the Milk River, which is not surprising as this is the same area that contains the homesteads and other residential sites.

3.3 GEOLOGY

3.3.1 Regional Geologic Overview

The BNGPA lies northeast of Malta, in the northern part of the Upper Missouri River Watershed area, and is about equidistant from the Rocky Mountains (to the west) and the Black Hills Uplift (to the southeast). Regionally, the closest significant uplift to the BNGPA is The Little Rocky Mountains, a faulted anticlinal complex situated some 60 miles southwest of the town of Malta. Most of the BNGPA is contained within or proximal to the Bowdoin Dome (Collier, 1917; Erdmann and Schwabrow, 1932), a large yet topographically subdued structure with its surface expression confined to gently dipping Upper Cretaceous rocks.

Geologic mapping by the Montana Geological Survey (Colton and Patton, 1987*a*; Bergantino, 1999, 2003) documents that all exposed rocks and surficial sediments within the BNGPA are of Quaternary, Tertiary, and Late Cretaceous ages. These deposits are underlain by sedimentary rocks of Late Cretaceous through Cambrian age, which are in turn underlain by Precambrian plutonic and metamorphic basement rocks. Rock exposure in the BNGPA is generally poor due to the dominant subdued topography developed on the easily eroded Cretaceous Claggett Shale and Bearpaw Shale.

3.3.2 Quaternary Sediments

Quaternary sediments in the BNGPA include widespread alluvial floodplain, alluvial terrace, colluvial, and glacial deposits including large boulder erratics as well as weathering residuum (regolith soils) developed on Upper Cretaceous rocks, spring deposits, and mass-wasting (slump, earthflow, creep, and landslide) debris.

Quaternary deposits

Alluvial deposits consist of valley-fill, stream floodplain, and stream terrace gravels, sands, and muds. Valley fill and floodplain deposits are extensively developed in and proximal to the broad valley of the Milk River and the wider floodplains of its tributaries, especially Beaver Creek, Frenchman Creek, Larb Creek, Whitewater Creek, and the East Fork of Whitewater Creek, where they locally reach thicknesses exceeding 20 feet. Even thicker amounts of alluvium are probably developed proximal to the giant artificial abandoned oxbow lake of Nelson Reservoir. Lesser amounts of alluvium were deposited in the downstream parts of the valleys of Austin Coulee, Cottonwood Coulee, Lush Coulee, and Martin’s Coulee, and in those parts of the valleys of Cottonwood and Little Cottonwood Creeks that are near the confluence with the floodplain of the Milk River. Terrace gravels are developed sporadically throughout the BNGPA, but are especially well exposed on the high divides bordering Cottonwood and Little Cottonwood creeks. Strath terraces (flat, river-cut surfaces that are devoid of gravels) are well developed along the Milk River north of Nelson Reservoir, above Lush Coulee, and above the east side of the East Fork of Whitewater Creek.

Colluvium consists of an admixture of sand and mud and, occasionally, fine gravel that has been transported downward from topographically higher levels by means of slopewash activity. Within the BNGPA, colluvium is ubiquitously developed on the relatively gentle slopes between badland hills and in the laterally distal extremes of upland stream floodbasins.

Glacial deposits, including morainal sediments, outwash gravels, and erratics, are common in north-central Montana (Jensen and Varnes, 1964; Colton, et al., 1989). Within the BNGPA, glacial erratics were the only deposits of glacial origin seen; however, these boulders were encountered in obvious strewnfields upon every upland divide traversed and were commonly encountered as lag deposits mantling dissected topography. The largest erratic seen during this survey measures nine feet in length, although most appear to range from one to three feet in the long dimension.

Weathering residuum (regolith soils). All exposed Upper Cretaceous shales and mudstones within the BNGPA exhibit a thin (2- to 6-inch) rind of weathered debris formed by the actions of rainfall and temperature change in the present-day semiarid regime. These sediments are especially prone to weathering because of their high proportion of weakly bonded clay (phylosilicate) minerals. Actually an extreme type of immature soil, this shale and mudstone regolith is seasonally translocated downslope to form part of the colluvial debris prior to incorporation into alluvial sediments on stream floodplains.

Spring deposits. Dozens of freshwater springs occur within the BNGPA, and areas downstream from many of these features show substantial wetland area formation, and/or they act as water sources for artificial stock ponds. The majority of springs seen are developed at or very near the stratigraphic contact between the Upper Cretaceous Claggett Shale—an impervious unit of clay-dominated marine shale—and the relatively permeable sandstones at the base of the overlying Upper Cretaceous Judith River Formation (see also Osterkamp, 1968). Other springs appear to have their sources in buried, gravel-filled Tertiary and/or Quaternary channels (Colton and Patton, 1987*b*).

Mass-wasting deposits. Deposits of mass-wasting origin are those formed due to emplacement by gravity, commonly in concert with fluid supersaturation of either the mobile sediments themselves or a fluid-impervious contact between underlying beds and the sole of the mobile mass. *Slump* is mass-wasting in which either saturated or gravitationally unstable sediment moves downslope through a series of backward, curved rotations. Slumps generally develop rapidly, and are commonly formed on the steeper slopes of relatively unconsolidated sediment. *Earthflows* are formed by the rapid downward flow of slurry composed of supersaturated sediment. *Creep* refers to the relatively slow, gradual downward movement of a ‘skin’ of surficial sediment—commonly the surficial ‘sod’ of a grassy soil—and can take place over dozens, if not hundreds, of years. The term *landslide* has come to be so restricted in definition that it is generally not applicable to other than mountainous regimes—landslide debris now being defined as disaggregated detritus formed by: (1) free fall; (2) contact and comminution; and (3) slope flowage (cascade) phases. Most of what are termed landslide deposits in the civil engineering terminology are now perhaps best included in the terms *landslip* or *debris-avalanche* deposits. *Landslips* are relatively rapidly formed mass-wasting deposits of similar origin as slumps, but with no backward rotation of the displaced sediment. Most sediment collapse in roadcuts, steep road dugways, or along steeper streambanks are landslips. *Debris-avalanches* are simply landslips but on a much larger scale.

Within the BNGPA, mass-wasting deposits of slump, landslip, and creep origin are very common. Landslips occur along the steeper cutbanks of every major stream and coulee in the Project Area, and vast areas of massive slumping dominate nearly every upland exposure of the Claggett Shale. In fact, in most areas, the Claggett shows myriad orders of slump features that commonly extend down to the floodplains of the principal streams. Major landslips of the Bearpaw Shale are developed along the upper reaches of Frenchman Creek. Creep, including the tensile separation of vegetated areas on slumped masses, is especially well-developed above Beaver Creek, in the W ½ of Section 17, T. 31 N., R. 33 W., but also occurs in several other areas. All of these mass-wasting phenomena suggest the possibility of potential hazards to future road and well pad construction, with landslip areas being the most hazardous, and upland areas with slump deposits (due to their ubiquitous distribution) being secondary.

3.3.3 Tertiary Rocks

Bergantino (1999) mapped deposits of “Miocene-Pliocene sands and gravels; possibly equivalent to the Flaxville Formation; up to 30 meters (100 feet) thick” on the Malta 30 x 60-foot Quadrangle, in an area only six-odd miles southwest of the southwestern extremity of the BNGPA. Within the BNGPA, Bergantino (2003) mapped extensive areas of these later Tertiary sands and gravels on high, upland surfaces east of the town of Whitewater and southeast of Teakettle Butte and on the high surfaces west of Whitewater. Examination of these sediments at several localities showed only a few exposures to have lithified gravel and conglomerate, whereas at most sites the gravels seem to be unconsolidated. Interestingly, these sediments (up to 100 feet thick as mapped by Bergantino and up to about 50 feet thick at the localities visited by us) seem to always cap the Judith River Formation; in no place were they seen lying atop exposures of the Claggett Shale (stratigraphically beneath the Judith River Formation). Bergantino (2003) recorded “cemented gravels” locally capping the Bearpaw Shale, but did not directly relate those sediments to those capping exposures of the Judith River Formation. Upland surfaces in the northwest-central part of the BNGPA (e.g. the area south of the town of Loring) are strewn with cobbles and boulders that ranchers have piled up at intervals along fences. These large clasts are derived from the Miocene-Pliocene gravels and strewnfields of glacial erratic boulders.

3.3.4 Upper Cretaceous Rocks

Although Bergantino (2003) mapped undifferentiated Hell Creek and Fox Hills formations along the Canadian border east of the upper reaches of Frenchman Creek, Mesozoic rocks exposed within the BNGPA are confined to the Upper Cretaceous Claggett Shale (bottom of section), Judith River Formation (middle of section), and Bearpaw Shale (top of section). The Claggett Shale is a marine shelf deposit equivalent to the lower part of the Mesaverde Formation developed farther to the south in southern Montana and Wyoming. The Judith River Formation is a continental (alluvial) deposit that is largely equivalent to the upper part of the nearshore bar, beach, and continental Mesaverde Formation and (possibly) to part of the (largely continental) Meeteetse Formation farther south. The Bearpaw Shale is a nearshore marine shale and thin, discontinuous shelf sandstone deposit approximately equivalent to the Meeteetse Formation farther to the south.

Bearpaw Shale consists of up to 1,000 feet of dark gray to brown marine shale and thin sandstones with interbeds of rusty brown and yellow concretions and occasional thin bentonites (Bergantino, 1999, 2003; Berg, 2002). The concretions commonly contain fossils of marine invertebrates. Bearpaw exposures are generally poor and vegetated, and because the formation caps all of the highest uplands in the BNGPA, it has been altered by cultivation in many areas.

The **Judith River Formation** consists of up to 450 feet of gray, brown, and yellow mudstone; thin brown sandstones; and thick multistory-multilateral channel deposits, all of fluvial origin. The Judith River lies conformably on the Claggett Shale, and the Judith River/Claggett contact is generally marked by a notable increase in slope due to the more resistant nature of the dominant Judith River sandstones. Even in vegetated areas, the Judith River is marked by significant exposure of the more highly indurated sandstones. Judith River sandstones locally contain dinosaur, crocodilian, and mammal remains.

The Judith River Formation is perhaps best exposed: (1) in the Cottonwood Creek and Little Cottonwood Creek and Austin Coulee areas north of the town of Malta; (2) south and southwest of the town of Saco in the drainage of First Creek and between Hay and Abrahamson Coulees; (3) east of the town of Whitewater and south of Teakettle Butte; and (4) southwest of the town of Hinsdale between Limekiln Coulee and McNab Coulee in the salient separating the valleys of Beaver Creek (on the north) and Larb Creek (on the west).

Claggett Shale. Although the base of this formation is not exposed within the BNGPA, the Claggett Shale consists of up to 450 feet of dark gray and brown shale and sandy shale of marine origin. Thin, flaggy sandstones and yellow and rusty concretionary zones are common near the top of the unit, and the concretions commonly exhibit septarian structure or, more rarely, contain fossil wood and the fragmentary shells of marine invertebrates.

3.3.5 Paleontological Resources

Quaternary Sediments

Sediments of Quaternary age, especially the alluvial and colluvial deposits, comprise about a third of the area of the BNGPA. It is always a possibility that excavations will reveal fossils in Pleistocene rocks; however, such finds are infrequent and are normally restricted to fragmentary specimens of modern or extinct species of bison, and of the even rarer extinct elephant *Mammuthus*. No monitoring of disturbances of Quaternary sediments is recommended; however, mitigating field scientists are encouraged to spot-check any major excavations into Quaternary deposits as their field time permits.

Tertiary Rocks

No fossils are known from the indurated gravels of presumed later Tertiary (Miocene-Pliocene) age within or proximal to the BNGPA. No spot-checking or monitoring of these rocks is recommended.

Bearpaw Shale

Regionally, the Bearpaw Shale has produced bones of marine reptiles; however, within the BNGPA, Bearpaw exposures are known to yield only fossil invertebrates (e.g., ammonites and decapods) and fossil wood. It is recommended that operations involving surface disturbance of Bearpaw sediments be briefly and periodically spot-checked.

Judith River Formation

Known for a century and a half for its production of dinosaur remains (Leidy, 1856), the Judith River Formation in the United States and Canada is known to produce specimens of pachycephalosaurs, ankylosaurs, raptors, spinosaurs, hadrosaurs, and ceratopsians (Sues, 1977, 1978; Wilson and Currie, 1985; Currie, 1987; Paul, 1988). Rare Cretaceous mammals also occur in Judith River rocks (e.g., Montellano, 1992), and the formation is one of the most critical of all in the Western Interior of North America for contributing to an understanding of Late Cretaceous dinosaurian faunas.

In the last several years, a series of dinosaur discoveries has been made both within and adjacent to the BNGPA. These discoveries include finds such as virtually complete skeletons and/or skulls of a variety of forms including the fossilized skin, stomach contents, and muscle bundles preserved in the round of a unique specimen of *Brachylophosaurus*. This last-mentioned specimen is possibly the best-preserved dinosaur known from anywhere in the world (Horner 2007).

Because of the abundant, well-preserved, and even unique dinosaur remains known from Judith River rocks within the BNGPA (including two sites—one a dinosaur bone-bed—currently under investigation), as well as current ongoing dinosaur prospecting surveys within the BNGPA now being undertaken by the Judith River Dinosaur Institute, it is recommended that any and all operations involving surface disturbance of rocks of the Judith River Formation be monitored by repeated visits to affected sites during the course of all road, well-pad and other construction. It is further recommended that Jack Horner at the Museum of the Rockies be apprised of the schedule of construction activity and that the scientists involved in spot-checking and monitoring coordinate their activities with him.

Claggett Shale

Within the BNGPA, the Claggett Shale yields only a few ammonites; however, bones of plesiosaurs and rare fossils of the bird *Hesperornis montanus* are known from the Claggett in other areas. It is recommended that operations involving surface disturbance of the Claggett Shale be briefly spot-checked.

3.3.6 Geologic Hazards

The most likely geologic hazards to affect oil or gas field development in the project area are mass movements or swelling clays.

Bergantino (1999) mapped a normal fault in the southeastern part of the area, between Hinsdale and Vandalia that cuts across US Highway 2. This fault is a Laramide (latest Cretaceous) feature that formed in response to gentle arching of the area. The fault is down-dropped to the southeast, forming the northern bounding fault of a small graben, about 1/4–1/8 mile wide. The southern edge of the graben, which is down-dropped to the northwest, was not mapped by Bergantino apparently because it is unseen in the surface. Displacement across either fault is minimal, probably less than 50 feet (Gmza 2007). Bergantino’s map depicts the fault buried beneath alluvium preserved in Lime Creek and the Milk River. The fault is shown as dashed (or approximately located) at the surface through the Judith River Formation and Claggett Shale. It is also shown as dashed beneath Quaternary alluvium and colluvium on the north side of the Milk River implying that it cuts though those units, but this is probably a drafting error, and in reality, the fault does not cut this unit. There apparently is no evidence of reactivation of this fault in recent times, but that is always a possibility, albeit a very small one.

Mass Movements

Mass movement phenomena constitute a potential hazard for construction on steep slopes of the Claggett Shale and probably at and just beneath the contact of the Claggett Shale with the overlying Judith River Formation. On a regional scale, this contact is the source of many springs where water percolating through the relatively permeable sands of the Judith River Formation reaches the relatively impermeable Claggett Shale and is forced to migrate laterally. In the field, the Claggett/Judith River contact was seen to be the source of earthflows of Judith River rocks, as well as earthflows and slumps in the Claggett Shale, these last probably resulting from water percolating along joints and other fractures in the shale. Creep is also a common phenomenon in the report area and generally takes the form of the slow, downward movement of topsoil (weathered, vegetated Claggett Shale combined with eolian sediment). For the BNGPA, Godt (1997) classifies the region as one marked by moderate to high susceptibility to landsliding but with a low level of actual incidence of landslides.

Swelling Clays

Swelling clays can also pose a significant problem for well site construction in many areas. These clays commonly include illites and mixed-layer illite-smectites in which the lattice structure of the clays contains void spaces or in which the bond between clay minerals is weak (clays are sheet-like phyllosilicates). These spaces and weakly bonded surfaces can take on water causing the clays to swell when wet. Swelling can result in structural foundation damage as well as dislocation of surface structures not deeply embedded within the clays. Within the report area, both the Upper Cretaceous Claggett and Bearpaw formations are units dominated by clay shale, and Olive et al. (1989) record units in the Bowdoin Dome area as containing abundant clay with a high swelling potential.

3.3.7 Non-petroleum Resources

Non-fuel mineral resources within the BNGPA are limited to crushed stone and gravel that is used for a variety of construction (concrete aggregate, road metal, fill, rip-rap, ballast) and agricultural needs (McCulloch, 2004).

3.3.8 Oil and Gas

The oil and gas resources of the Bowdoin Dome (Montana Bureau of Mines and Geology, 2004) have been known since before World War I (Collier, 1917; Schroth, 1953; Crouch and Nydegger, 1976). Production on this structure is chiefly from relatively shallow (less than 3,000 feet) reservoirs in the Upper Cretaceous Carlile Shale, Mowry and Greenhorn Formations, and Belle Fourche Shale, and is from a combination of stratigraphic and structural traps (Rice and Shurr, 1980; Rice et al., 1990; Rice and Spencer, 1995; Condon et al., 2000; Ridgley et al., 2000, 2001*a*, 2001*b*). In the BNGPA, production from the Carlile Shale comes from the Bowdoin Sandstone, a facies equivalent of the shale that reaches about 300 feet in thickness near the town of Mosby. The Greenhorn Formation is about 250 feet thick in the Bowdoin Dome area where it is a principal gas-producing unit (Gautier et al. (1995). The Mosby Sandstone Member of the Belle Fourche Shale is known as the Phillips Sandstone on Bowdoin Dome, where it is a major gas-producing unit.

The potential for gas in deeper reservoir rocks that are older than Late Cretaceous in age, and for oil in the BNGPA, is unknown. The deepest well drilled in the Bowdoin Field had a total depth of 1,425 feet. The nearest oil production to the BNGPA in Valley County occurs about 35 miles to the east of the BNGPA in the Lustre Field (Section 2, T31N, R44E) where the Charles, Madison, Mission Canyon, and Radcliffe intervals produce oil and associated natural gas.

Cumulative oil production (bbls) from the field is 6,473,277 and post-1986 gas production (MCF) is 1,175,115. The deepest well drilled in Valley County (Section 9, T31N, R35E) had a total depth of 10,580 feet and was plugged and abandoned as a dry hole. The deepest well drilled in Phillips County (T35n, R27E) had a total depth of 7,035 feet and also proved to be a dry hole. There is no oil production in Phillips County.

3.4 WASTES, HAZARDOUS OR SOLID

The affected environment for releases of wastes or hazardous materials includes air, water, soil and biological resources that may be affected by the release in the course of transportation, use, or storage of the material in construction or field operations. Areas that are particularly vulnerable to the release of such materials include wetlands, waterbodies, areas of shallow groundwater and areas where wildlife and humans could be directly impacted.

The management of non-exempt hazardous and non-hazardous (solid) wastes is regulated under the RCRA (40 CFR Part 260-268) while the management of releases of hazardous materials into the environment is regulated under Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA) (40 CFR Part 300-374). Oil and gas exploration, production, gas-gathering, processing wastes, and releases of hazardous materials into the environment are generally considered to be RCRA-exempt and are regulated by the Montana Board of Oil and Gas (MBOG) or the Montana Department of Environmental Quality (MDEQ) and the BLM.

Numerous companies operate within the BNGPA, and each has a responsibility to comply with the state and federal regulations applicable to their operations. Different companies have different compliance philosophies, ranging from minimal compliance to compliance programs that exceed regulatory requirements.

Solid and Hazardous Waste

There are no known hazardous-waste disposal sites associated with the gas operations within the BNGPA nor are there any known permitted solid-waste disposal units. Buried non-hazardous materials may be present in the project area in association with historic gas production operations, homestead locations, and agricultural operations.

WBIP injects methanol into the natural gas pipeline system and recovers water-contaminated methanol from the natural gas stream at various locations within its system. Methanol is used to keep water in the natural-gas stream from freezing and causing unsafe conditions during pipeline transportation. WBIP continually recycles methanol to minimize the need for disposal of this hazardous substance as a requirement of its Waste Minimization Policy. WBIP has implemented a company policy regarding the safe handling and transportation of methanol.

A **Hazardous Materials Management Summary** including types and quantities of hazardous and extremely hazardous materials that may be expected to be used, stored, transported, or disposed within the BNGPA is found in **Appendix C**. This summary includes the appropriate classification and management of hazardous and non-hazardous wastes generated by operations and applicable company management protocols. Operators are encouraged to substitute less-toxic, yet equally effective, products when available (Gold Book 2006) in all phases of operations. Substitutions are not always available; therefore, it is acknowledged that hazardous materials may be used in the BNGPA. All wastes are to be treated or disposed of in an approved manner consistent with existing laws and regulations (Gold Book 2006). Non-exempt wastes will not be mixed with exempt wastes.

Drilling Mud

The BNGPA has been in continuous operation since 1929. Regulations and industry standards for the management of wastes have changed substantially since that time. Until the 1980s waste materials generated during drilling, production, and processing operations would typically have been buried near the point of generation within the field area. Reserve pit contents may have been buried at older producing or plugged and abandoned well sites. The disposal of these materials is now regulated and approved by the MBOG and the BLM. More recently the participating companies have recycled drilling mud between wells for re-use or provide it to area land-owners to use as reservoir or stock pond sealant. Both these practices reduce the volume of material to be disposed of. The BLM requires drilling pits to be pumped dry and either fenced or backfilled immediately upon well completion. If a liner has been used in the reserve pit, any liner material must be removed to below ground level before being covered (BLM 1989). Completion fluids are also recycled to the extent possible to minimize waste disposal but are generally produced to a pit on-site for disposal.

Produced Water

Since the beginning, the wells in this field have produced very small quantities of water. The volume of water produced in each well is dependent on which and how many gas zones are producing and where the well is located within the field. Older wells are generally completed in only one or two zones while some of the newer wells may be completed in numerous zones. Wells on the flanks of the structure generally produce more water than those on the crest. Water from wells producing less than 5 bbls of water per day (BWPD) is generally disposed of into an unlined pit at the well site. To manage water from wells producing more than 5 BWPD, Fidelity E&P and Noble have each permitted and constructed a centrally located produced-water disposal facility with a lined evaporation pit. BLM has approved the transportation of water within the field from wells which produce more than 5 BWPD to disposal in pits at sites where the wells produce less than 5 BWPD. Produced-water disposal is permitted through the BLM Onshore Oil and Gas Order Number 7 and the MBOG.

Migratory bird deterrent devices are generally not used at the produced-water disposal pits within the BNGPA as accumulations of hydrocarbon do not occur. The BLM/FS Gold Book (2006) requires such mitigation in the event that the pits “present a potential hazard to humans, livestock, wildlife, and other resources.” The Master APD for the field area states BLM “may require that the pit be designed or open vessel be covered to deter the entry of birds in any facility associated with drilling, testing, completing, or production of this well. Fencing, screening, and netting of pits may be required as a means to prevent the entry of migratory birds if oil is left in pits or open vessels after the cessation of drilling or completion of operations, if water disposal pits consistently receive oil, or if pits or open vessels are used repeatedly for emergency situations which result in the accumulation of oil.

Voluntary pit fencing, screening, and netting or sealing vessels are encouraged as methods to avoid potential instances that may result in the death of a migratory bird.

Hazardous Materials Releases and Spill Response

The participating companies each have trained personnel and the equipment needed to respond to releases of hazardous materials in the project area. As this is a gas field producing little or no condensate and no oil, the opportunity for a release to the environment is limited to materials brought in for operations such as fuel, lube oils, mud products, and completion fluids. Releases of materials are reported to state and federal regulators as required. BLM NTL-3A is the appropriate mechanism for reporting spills, accidents, blowouts or other undesirable events that occur from federal minerals or on BLM-managed surface; otherwise, spills of hydrocarbon and hazardous materials are reported to MDEQ and MBOGC. Remediation of contaminated soils or off-site disposal of contaminated material is approved by BLM prior to the management action. Participating companies must comply with the applicable provisions of SPCC regulations of EPA found at 40 CFR 112. These regulations require secondary containment for mobile and non-mobile equipment that contains oil in volumes greater than 1,320 gallons that could impact navigable waters of the United States in the event the material was released. This rule applies to compressor stations, drilling operations and other activities within the BNGPA. Most Operators in the project area have prepared contingency plans that will be activated should there be an emergency or hazardous materials release.

Miscellaneous Waste Streams

Portable chemical toilets are provided for field activities such as construction, drilling, and completion operations, as are dumpsters or trash cages for the collection of non-hazardous solid wastes. Trash is also collected in individual containers or bags for off-site disposal. These waste materials are disposed of in accordance with state standards as imposed by the county sanitarian.

In the event flaring or venting of natural gas is required to facilitate safe operations, Operators comply with the notification provisions of BLM NTL-4A, which allows the flaring of gas in emergencies for up to 30 days or 50 MMCF with approval required thereafter.

All participating companies and their contractors are responsible for compliance with all applicable local, state, and federal regulations for environmental protection. The WBIP environmental compliance manual includes the following statement: “WBI Holdings, Inc. and subsidiary companies will meet or surpass local, state and federal environmental laws, rules and regulations in a cost-effective manner and will minimize environmental liabilities associated with the company’s activities.”

In the event that ‘diesel cores’ are to be taken during drilling operations, the BLM requires the use of a closed mud system with above-ground mud tanks to manage oil-based mud and diesel fuel lubricants. The Operator will also be required to provide a contingency plan for BLM review that will be implemented in the event of equipment failure during the coring operation.

3.5 WATER RESOURCES, SURFACE AND GROUND

Water resources within the BNGPA include both surface and groundwater resources. Surface water features include the perennial Milk River, numerous (primarily intermittent and ephemeral) tributary streams, lakes, reservoirs (larger reservoirs and smaller dams), ponds, springs, and abundant prairie pothole wetlands. Groundwater resources include free water contained within both shallow alluvial and deep bedrock aquifers that are or could be used for agricultural, domestic, and or/industrial purposes. Shallow aquifers are limited, however, and deep bedrock aquifers are relatively costly to develop due to depth. Water resource abundance, type, flow regime, and quality are inextricably linked primarily to landform, geology, climate, and soils of the area, as well as localized precipitation events.

3.5.1 Landform and Geology

The BNGPA is within the Northern Great Plains region and consists of gently rolling continental glacial till plains and rolling hills, slightly to heavily dissected by drainage systems, albeit mostly intermittent and ephemeral in nature. Grass-covered rangeland is interspersed with non-irrigated farmland in the uplands and, where soil and water permit, by irrigated farmland in the valleys. Shale and sandstone bedrock underlie the area (Bergantino 2003). The Pleistocene-age glaciers that covered this area retreated only about 11,000 years ago and deposited the glacial till that created the soil parent material and landforms that are present today. Glacial deposits have produced a variety of soils in the area, but the dominant soil texture is silt or clay loams that affect infiltration and runoff.

3.5.2 Climate and Precipitation

Climate

Northeastern Montana is relatively cool and dry. The BNGPA's climate regime is semi-arid continental, which is characterized by low precipitation, cold winters, warm summers, drier season during winter, and a somewhat well-defined May–June wet season. Annual precipitation over the BNGPA is approximately 10–13 inches. Winds average 11 miles/hour and are generally from the northwest throughout the year (WRCC 2006).

Precipitation

Average annual precipitation ranges from 10 inches at Whitewater to 11 inches at Loring. Average annual snowfall is relatively light. Precipitation is somewhat unevenly distributed throughout the year with the most precipitation falling in May, June, and July. At the Loring, Whitewater, and Saco weather stations, the highest average monthly precipitation of 2.79, 2.42, and 2.43 inches, respectively, occurs in June. The majority of precipitation falls as rain from frontal systems and thunderstorms. Average annual snowfall at Loring and Whitewater is 24.5 and 19.8 inches, respectively (WRCC 2006). The greatest snowfall at these stations occurs in January and February (WRCC 2006). Table 3.5-1 presents a summary of temperature and precipitation measurements recorded at these three weather stations (WRCC 2006).

Temperature. At the Saco station, temperatures average 10 °F in January and 69 °F in July. At the Loring station, temperatures average 5 °F in January and 67 °F in July. Temperatures may fluctuate widely during the course of a day in either winter or summer. The average diurnal range between maximum and minimum temperatures is from 20 °F to 30 °F (WRCC 2006).

Evaporation and evapotranspiration. Mean annual evaporation ranges from 35–40 inches within the BNGPA, exceeding mean annual precipitation by approximately 25 inches (USGS 2000). Most precipitation is lost through evaporation, transpiration, or runoff. Approximately 80–90 percent is lost through evaporation and transpiration, while about 9–19 percent is lost as runoff, which leaves generally less than one percent to recharge groundwater aquifers. Average annual runoff is approximately 0.5 inch (BLM 1989).

Table 3.5-1. Temperature and Precipitation Data

Station	January Temperature (°F)			July Temperature (°F)			Annual Precip. (inches)	Avg. Total Snowfall (inches)
	Mean	Avg. Max	Avg. Min	Mean	Avg. Max	Avg. Min		
Loring 10N (northerly station)	5.0	17.7	-5.2	67.3	83.7	50.1	11.67	24.5
Whitewater (central station)	Insufficient data						10.70	19.8
Saco 1NNW (southerly station)	10.3	22.7	-2.0	68.9	84.2	53.6	11.43	n/a*

Source: NCDC Coop Stations, temperature and precipitation data from WRCC website (http://www.dri.edu/summary/climsmmt.html), July 2006.
* The WRCC website reports 2.0 inches average total snowfall, but this value appears erroneous as compared to nearby station values, is likely incorrect, and was not used.

3.5.3 Surface Water Quantity

Surface-water features within the BNGPA include perennial, intermittent, and ephemeral streams; several lakes, reservoirs and ponds; seeps/springs; and prairie pothole wetlands. The BNGPA lies within the Milk River Watershed, USGS Hydrologic Unit Code (HUC) 100500 of the Upper Missouri River Basin. Approximately 93 miles of the perennial Milk River (river miles) flows from west to east across the southern portion of the BNGPA, and joins the Missouri River near Nashua, Montana, approximately 35 miles southeast of the BNGPA. The BNGPA covers portions of seven sub-basins of the Milk River Watershed (Table 3.5-2). The BNGPA falls mainly within the Whitewater (37 percent of the project area), Middle Milk (32 percent of the project area), and Beaver (20 percent of the project area) sub-basins of the Milk River. Approximately 87 percent of the Whitewater sub-basin lies within the BNGPA, whereas 12 percent of the Middle Milk, 14 percent of the Beaver, 21 percent of the Frenchman, and minor percentages of the other three sub-basins lie within the project area (Table 3.5-2).

Table 3.5-2. BNGPA Surface Water Bodies by Sub-Basin

Sub-Basin[1]	Sub-Basin Area (acres)	Project Area within Milk River Watershed (by sub-basin) (%)	Project Area within Sub-basin (%)	Major Stream/Tributary	Major Lakes or Reservoirs
Whitewater 10050011	341,191	87.14	36.58	• Whitewater Creek • East Fork Whitewater Creek	• Whitewater Lake (665 ac.) • Austin Lake (225 ac.) • Pea Lake (157 ac.)
Middle Milk 10050004	2,246,634	11.74	32.45	• Milk River • Little Cottonwood Creek • White Creek • Frenchman Creek • Cottonwood Creek	• Martin Lake (252 ac.) • Hewitt Lake (250 ac.)
Beaver 10050014	1,169,725	13.93	20.05	Beaver Creek	Nelson Reservoir (4,114 ac.)
Frenchman 10050013	170,256	21.42	4.49	Frenchman River	
Lower Milk 10050012	975,289	2.71	3.25	Antelope Creek	
Cottonwood 10050010	580,619	2.39	1.71	Cottonwood Creek	
Rock 10050015	554,344	2.15	1.47	Rock Creek	

[1] Per USDA-NRCS fourth-code sub-basin boundaries

Source: Montana Natural Resource Information System, Digital Atlas of Montana, 2007

Streams

The main tributaries to the Milk River within the BNGPA include Cottonwood Creek (intermittent), Little Cottonwood Creek (intermittent), Whitewater Creek (perennial), White Creek (intermittent), Frenchman River (perennial), and Beaver Creek (perennial). Most of the drainageways within the BNGPA are intermittent or ephemeral, but may become perennial near the confluence with the downgradient water, typically the Milk River. Sub-basins of the Milk River and the associated streams that occur within the BNGPA are depicted on Figure 3.5-1.

Lakes and Reservoirs

Several lakes and reservoirs occur within the BNGPA, including Nelson Reservoir, Whitewater Lake, Austin Lake, Pea Lake, Hewitt Lake, and Martin Lake, to name a few of the larger waterbodies. Abundant prairie pothole wetland features dot the landscape in this general region, especially in the Whitewater Watershed.

The major lake or reservoir waterbodies within the BNGPA by sub-basin include:

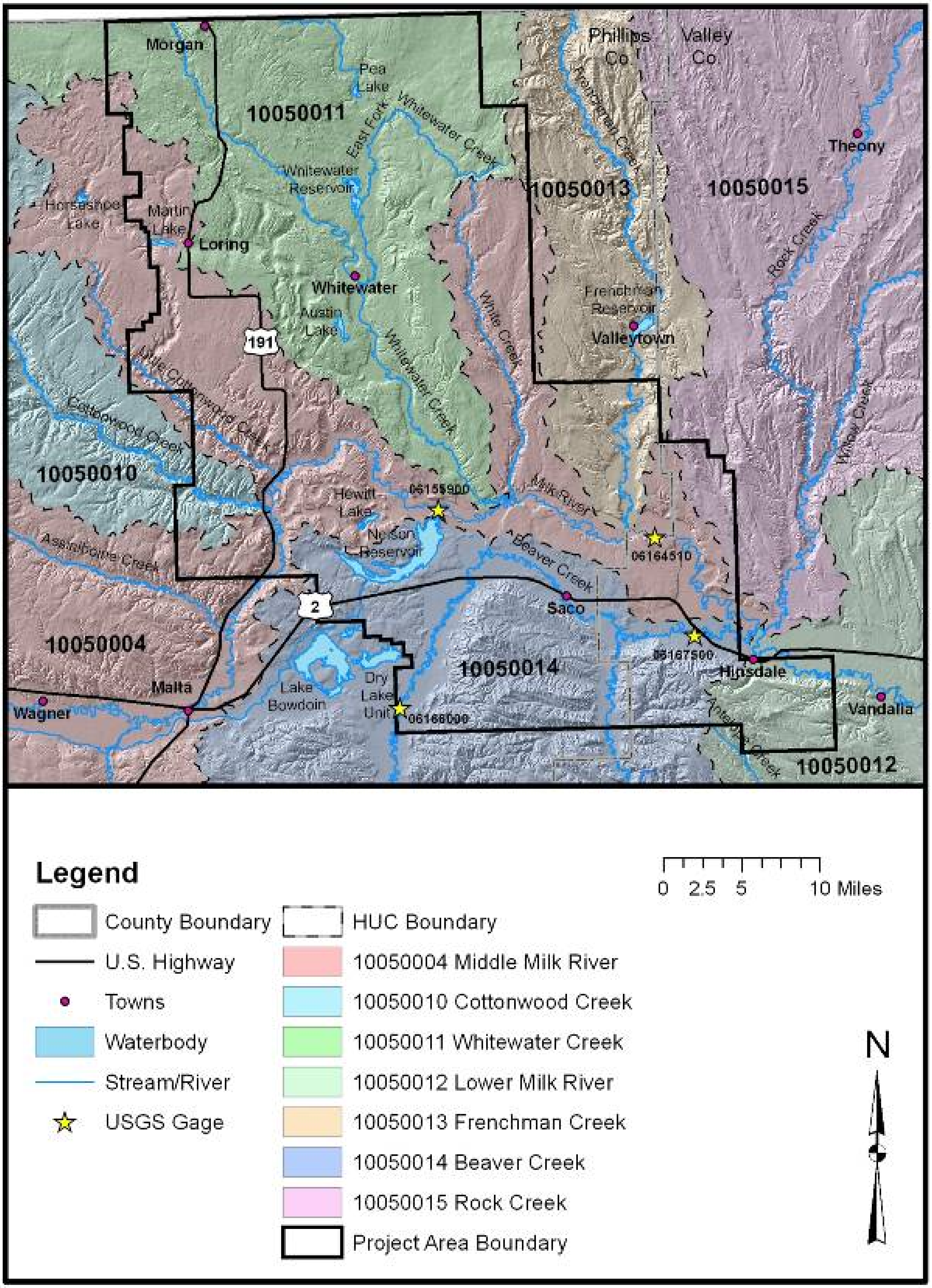
- Whitewater Watershed (10050011) Whitewater Lake, Austin Lake, Pea Lake
- Middle Milk Watershed (10050004) Hewitt Lake, Martin Lake
- Beaver Watershed (10050014) Nelson Reservoir

Because of the dominance of ranching in the area, numerous smaller dams (primarily 0 to 50 feet in height) with associated surface water are found throughout the BNGPA (DNRC 2006 and NRIS 2006).

Prairie Potholes

Prairie potholes are abundant within BNGPA. The Whitewater watershed, which covers approximately 37 percent of the project area, has been identified as one of the five significant areas in Montana where prairie potholes occur (Crowe and Kudray 2003). Montana potholes are very small (typically less than 2.5 acres, although some are larger) and generally much drier, with standing water only present perhaps one year in five due to the semi-arid climate. Virtually all are grazed, and many have been altered hydrologically (impounded and/or excavated) to provide water for livestock or wildlife habitat.

Figure 3.5-1. Surface Water Resources Associated With the BNGPA



Streamflow

Streamflow rates, volumes, and duration vary widely within the BNGPA, depending primarily on response to localized precipitation and overall seasonal fluctuations. As previously mentioned, most of the drainageways are intermittent or ephemeral. However, perennial flows do occur within some of the major drainageways in the BNGPA such as the Milk River, Whitewater Creek, Frenchman Creek, and Beaver Creek. Flows in unregulated streams have large seasonal variations with the largest flows generally occurring during spring or early summer as a result of snowmelt and intense rainfall events. Peak flows on prairie streams occur in March or April resulting from snowmelt. Larger peak flows on small drainages can occur from intense summer thunderstorms. Summer rainstorms can result in short intervals of increased streamflow during June through September. During winter, streamflow in prairie streams is greatly reduced or absent as a result of ice formation and little groundwater inflow (BLM 1992).

Four currently active USGS streamflow gauging stations are found within the BNGPA (USGS 2006). Two are on the Milk River, and two are on Beaver Creek. The upgradient Milk River station is located 500 feet upstream from the Nelson Reservoir Canal. The downgradient Milk River station is located approximately seven miles northeast of Saco, 1.5 miles downstream of the confluence with Frenchman Creek. The upgradient Beaver Creek station is located roughly 13 miles southwest of Saco, close to the southern boundary of the BNGPA. The downgradient Beaver Creek station is located approximately 4.5 miles northwest of Hinsdale, roughly five miles upstream of Beaver Creek's confluence with the Milk River. Figure 3.5-1 depicts the locations of these four USGS streamflow monitoring sites, and they are described in further detail as follows:

- **Station 06155900 Milk River at Cree Crossing, near Saco, MT**
  This station is operated in cooperation with the Montana Department of Natural Resources and Conservation. The period of record is May 2000 to present. This site is located within the Milk River sub-basin, on the Milk River, 500 feet upstream from the Nelson Reservoir Canal. The drainage area upstream of this gauge is 13,118 square miles. The mean monthly streamflow values for the entire period of record at this location ranges from a low of 32 cubic feet per second (cfs) in October to a high of 404 cfs in March. The maximum monthly values of the entire period of record ranges from a low of 50 cfs in October (2005 water year) to a high of 1,196 cfs in March (2004 water year). The highest daily mean flow of 3,800 cfs occurred March 15, 2004, while the lowest daily mean flow of 2.6 cfs occurred on May 28, 2001. The mean annual streamflow ranges from 33 cfs* in 2001 to 293 cfs* in 2004 (*incomplete data is used for statistical calculations; no data exists for November through February due to ice-over). This is presently a real-time streamflow monitoring station, and streamflow on July 25, 2006 was 146 cfs.

- **Station 06164510 Milk River at Juneberg Bridge, near Saco, MT**
  The period of record is October 1977 to present. This site is located within the Milk River sub-basin, on the Milk River, 1.5 miles downstream from the Frenchman River confluence, and near the downstream edge of the BNGPA. The drainage area upstream of this gauge is 17,670 square miles. The mean monthly streamflow values for the entire period of record at this location ranges from a low of 117 cfs in January to a high of 979 cfs in March. The maximum monthly values of the entire period of record ranges from a low of 271 cfs in January (1987 water year) to a high of 6,221 cfs in April (1978 water year). The mean annual streamflow ranges from 70 cfs in 2001 to 1,042 cfs in 1978. This is presently a real-time streamflow monitoring station, and streamflow on July 25, 2006 was 289 cfs.

- **Station 06166000 Beaver Creek below Guston Coulee, Near Saco, MT**
  This station is operated in cooperation with the U.S. Fish and Wildlife Service (USFWS). The period of record is April 1920 to September 1921, and April 1981 to present. This site is located within the Beaver Creek sub-basin, on Beaver Creek, where the stream enters the southern boundary of the BNGPA. The drainage area upstream of this gauge is 1,208 square miles. The mean monthly streamflow values for the entire period of record at this location ranges from a low of 6.7 cfs in August to a high of 64.5 cfs in March. The maximum monthly values of the entire period of record ranges from a low of 40.7 cfs in August (1993 water year) to a high of 1,187 cfs in September (1986 water year). The highest daily mean flow of 11,900 cfs occurred September 27, 1986, while the lowest daily mean flow of zero occurred on April 5, 1981. The mean annual streamflow ranges from 1.0 cfs* in 2000 to 270 cfs* in 1986 (*incomplete data is used for statistical calculations; no data exists for November through February due to ice-over). This is presently a real-time streamflow monitoring station, and the stream was dry on July 25, 2006 (in 2006, streamflow ended at this location on June 29).

- **Station 06167500 Beaver Creek near Hinsdale, MT**
  The period of record is October 1917 to August 1921, recommissioned in 2006 as a real-time streamflow monitoring station. This site is located within the Beaver Creek sub-basin, on Beaver Creek, approximately five miles upstream from the Milk River confluence and four miles upstream from the BNGPA's eastern boundary. The drainage area upstream of this gauge is 1,785 square miles. The mean monthly streamflow values for the entire period of record at this location ranges from a low of 0.5 cfs in January to a high of 239 cfs in April. The mean annual streamflow for the period of record is 116 cfs. This is presently a real-time streamflow monitoring station, and streamflow on July 25, 2006 was 31 cfs.

3.5.4 Surface Water Quality

The federal Clean Water Act (CWA) and Montana's Water Quality Act require an ongoing program of water quality assessments and reporting as part of a process intended to protect and improve the quality of rivers, streams, and lakes in the state (MDEQ 2006). The CWA requires states to adopt standards for protecting surface water quality. Montana has adopted water quality standards (ARM 17.30.601) and anti-degradation rules (ARM 17.30.701) for surface waters. Montana's standards are designed to conserve water by protecting, maintaining, and improving the quality and potability of water that will support the beneficial uses identified by the Montana Water-Use Classification System. Classifications assigned by this system require waters to support some or all of the beneficial uses listed below. The water quality standards employed to maintain these uses address parameters such as coliform, dissolved oxygen, pH, turbidity, temperature, color, toxics and other harmful substances. The non-degradation rules apply to any activity that may affect the quality of surface and groundwater.

Beneficial Uses

Montana waterbodies (including rivers, streams, lakes and wetlands) are classified according to the present and future beneficial uses that they should be capable of supporting (75-5-301 MCA). The State Water-Use Classification System (ARM 17.30.606-629) identifies the following beneficial uses:

- Drinking, culinary use, and food processing
- Aquatic life support for fishes and associated aquatic life, waterfowl, and furbearers
- Bathing, swimming, recreation, and aesthetics

- Agricultural water supply
- Industrial water supply

Use Classification

Water bodies are classified primarily by: (1) the level of protection they require; (2) the type of fisheries they support (warm or cold water) or; (3) their natural ability to support use for drinking water, agriculture, etc. The designated beneficial uses for each class in the system are as follows:

A-Closed. Waters are suitable for drinking, culinary, and food processing purposes after simple disinfection.

A-1. Waters are suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities.

B-1. Waters are suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

B-2. Waters are suitable for drinking, culinary, and food-processing purposes after conventional treatment; bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

B-3. Waters are suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

C-1. Waters are suitable for bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

C-2. Waters are suitable for bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

C-3. Waters are suitable for bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture, and industrial water supply. Degradation which will impact existing or established uses is not allowed.

I. The State of Montana has a goal to improve these waters to fully support the following uses: drinking, culinary, and food-processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

A summary of the designated beneficial water uses by these classifications is presented in Table 3.5-3.

Table 3.5-3. Designated Beneficial Uses by Water Body Class

Beneficial Uses	WATER BODY CLASS							
	A-Closed	A-1	B-1	B-2	B-3	C-1	C-2	C-3
Drinking Water (Human Health)	X	X	X	X	X			M
Agriculture	X	X	X	X	X	X	X	M
Industry	X	X	X	X	X	X	X	M
Aquatic Life	X	X	X	X	X	X	X	X
Recreation	X	X	X	X	X	X	X	X
Cold Water Fisheries (salmonid)	X	X	X	X		X	X	
Warm Water Fisheries (non-salmonid)					X			X

Source: (MDEQ 2004)
X = Beneficial use
M = Marginal use (may exist)

Assessment Status Categories

Under Section 303(d) of the CWA, states have been required to submit their lists (termed 303(d) lists) of impaired or threatened waters to the EPA every two years. When water-quality monitoring data reveal changes to the natural conditions that exceed those allowed by the state standards, the water is determined to be impaired (does not fully meet standards) or threatened (is likely to violate standards in the near future). Under requirements of the CWA, any water found to have one or more impaired or threatened uses must be placed on a list of water for which a 'water quality management plan' must be developed to correct the causes of the impairment. In those cases where the impairment involves the need to reduce the amount or concentration of specific pollutants, the water-quality management planning process must identify the total maximum daily load (TMDL) of each pollutant causing the exceedance(s). A schedule for the development of water-quality management plans (including a schedule for developing TMDLs where necessary) is a required element of these 303(d) lists. A category of 1–5 is assigned to each stream segment to indicate the assessment status and TMDL development needs for the stream segment.

Category 1: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.

Category 2: Waters for which those beneficial uses that have been assessed are fully supported, but some applicable uses have not been assessed.

In 2006, the EPA revised the Category 2 definition to: Available data and/or information indicate that some, but not all of the beneficial uses are supported. Therefore, two new subcategories are as follows:

- 2006 Category 2A: Available data and/or information indicate that some, but not all of the beneficial uses are supported.
- 2006 Category 2B: Available data and/or information indicate that a water quality standard is exceeded due to an apparent natural source in the absence of any identified anthropogenic sources.

Category 3: Waters for which there is insufficient data to assess the use support of any applicable beneficial use, so no use determinations have been made.

Category 4: Waters where one or more beneficial uses have been assessed as being impaired, fully supporting but threatened, all TMDLs are completed but impaired beneficial uses have not yet achieved fully supporting status, or impaired and TMDLs are not required.

Category 5: Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.

BNGPA Water Bodies on the 303(d) List, 2006

Within and downstream of the BNGPA, nine stream segments and two waterbodies have been assessed by the Montana Department of Environmental Quality (MDEQ) and have listed impairments on the 303(d) list (Table 3.5-4). These include segments of the Milk River, Beaver Creek, Cottonwood Creek, Whitewater Creek, Frenchman Creek, Larb Creek and Nelson Reservoir. In general, these B-3 waters are suitable for all beneficial uses to some degree, except for the growth and propagation of salmonid fishes and associated aquatic life. The probable causes and sources of impairment in all cases vary, but generally are related to agricultural practices. Stream segment use classifications and assessment status categories are provided in Table 3.5-4.

Table 3.5-4. Summary of State and Federal Water Quality Act Listed Water Bodies Within the BNGPA

Segment Name and Number	Size	Use Class	Probable Causes / *Probable Sources* of Impairment	Water Quality Category
Milk River MT40J001_010	270.4mi. From Fresno Dam to Whitewater Crk	B-3	Mercury / *Agriculture, dam or impoundment, natural sources*	5—One or more uses are impaired and a TMDL is required.
Milk River MT40J001_020	38.2 mi. From Whitewater Crk to Beaver Crk	B-3	Alteration in stream-side or littoral vegetative covers / *Crop production (crop land or dry land), irrigated crop production, rangeland grazing* Iron / *Natural sources* Nitrates / *Crop production (crop land or dry land), irrigated crop production, rangeland grazing* Other flow regime alterations / *Flow alterations from water diversions*	5—One or more uses are impaired and a TMDL is required.
Cottonwood Creek MT40J005_020	54.1 mi. Black Coulee to the mouth (Milk River)	B-3	Alteration in stream-side or littoral vegetative covers / *Grazing in riparian or shoreline zones, natural sources, source unknown* Iron / *Natural Sources* Sedimentation/Siltation / *Grazing in riparian or shoreline zones, natural sources, source unknown*	5—One or more uses are impaired and a TMDL is required. 2B—Available data and/or information indicate that a water quality standard is exceeded due to an apparent natural source in the

Segment Name and Number	Size	Use Class	Probable Causes / *Probable Sources* of Impairment	Water Quality Category
				absence of any identified anthropogenic sources.
Whitewater Creek MT40K001_010 (both stream and waterbody segments)	61.7 mi. Canadian border to the mouth (Milk River)	B-3	Mercury / Source unknown	5—One or more uses are impaired and a TMDL is required.
Frenchman Creek MT40L001_010	74.5 Canadian border to the mouth (Milk River)	B-3	Alteration in stream-side or littoral vegetative covers / *Agriculture, dam or impoundment, grazing in riparian or shoreline zones* Chlorophyll-a / *Source unknown* Low flow alterations / *Dam or impoundment*	5—One or more uses are impaired and a TMDL is required.
Beaver Creek MT40M001_020	81.3 mi Black Coulee to the mouth of the Milk River	B-3	Alteration in stream-side or littoral vegetative covers / *Agriculture* Nitrogen (Total) / *Agriculture* Phosphorus (Total) / *Agriculture* Physical substrate habitat alterations / *Agriculture* Uranium / Source unknown	5—One or more uses are impaired and a TMDL is required.
Larb Creek MT40M002_020	73.8 headwaters to mouth (Beaver Creek)	B-3	Alteration in stream-side or littoral vegetative covers / *Agriculture, animal feeding operations (NPS), natural sources, source unknown* Copper / *Natural sources* Lead / *Natural sources* Oxygen, Dissolved / *Source unknown* Phosphorus (Total) / *Animal feeding operations (NPS), natural sources, source unknown* Total Kjehldahl Nitrogen (TKN) / Animal feeding operations (NPS), natural sources, source unknown	5—One or more uses are impaired and a TMDL is required. 2B—Available data and/or information indicate that a water quality standard is exceeded due to an apparent natural source in the absence of any identified anthropogenic sources.

Segment Name and Number	Size	Use Class	Probable Causes / *Probable Sources* of Impairment	Water Quality Category
Nelson Res. MT40M003_020 (both stream and waterbody segments)	3901.7 ac.	B-3	Other flow regime alterations / *Impacts from hydrostructure flow regulation/modification* Phosphorus (Total) / Irrigated crop production	5—One or more uses are impaired and a TMDL is required.
Milk River MT40O001_010	135.9 mi From Beaver Crk to mouth of Missouri River	B-3	Fecal Coliform / *Agriculture, dam or impoundment* Lead / *Source unknown* Mercury / *Source Unknown*	5—One or more uses are impaired and a TMDL is required.

Source: MDEQ 2004

Surface-Water Quality Monitoring Data

A paucity of water quality data exists for the smaller tributaries that may be impacted within the BNGPA. There are few perennial streams within the project area, and they may only be perennial at the confluence of the Milk River, for instance, and then become intermittent and ephemeral upstream.

Surface water quality in semi-arid regions is typically seasonal and dependent on the magnitude and frequency of discharge. The susceptibility of the BNGPA to erosion varies widely. The soils most susceptible to erosion occur in the Sedimentary Uplands Physiographic Province, including the Frenchman and Cottonwood Breaks in Phillips County (BLM 1992).

Various parameters are used to evaluate water quality. The BNGPA is predominantly used for livestock, grain cultivation, and oil and gas development (NRIS 2006). Water quality constituents of concerns in the project area include total suspended solids (TSS), salinity or total dissolved solids (TDS), nutrient enrichment, and some trace metals. Erosive and saline soils naturally occur within and around the BNGPA. Once the soil is disturbed, the potential for the release of residual soil sediment is increased. It is possible that oil and gas activities in the general area have and will continue to contribute to both sedimentation and salinity levels of the Milk River. TSS concentrations and sediment yield (or load) are used to asses runoff and erosion concerns; TDS concentrations, specific conductance, pH, hardness, and sodium adsorption rates (SARs) are used to evaluate salinity; and temperature, dissolved oxygen (DO) and nutrients are used to evaluate aquatic habitat.

Three of the four USGS streamflow gauging stations on the Milk River and Beaver Creek that were discussed in the Surface Water Quantity section are also established water quality monitoring stations (06155900, 06164510, and 06166000). Specific conductance and temperature, as well as dissolved solids, nutrients, and sodium adsorption ratio (SAR) are constituents that are primarily evaluated, as they are typically indicators for the evaluation of water for various uses. Notable parameters such as TSS and trace metals have not been included. Because only temperature and specific conductance have been monitored at the upgradient Milk River station (06155900), comparisons of water quality with the downstream Milk River station (06164510) are difficult to analyze. Similarly, only one water-quality monitoring station within and near the BNGPA exists on Beaver Creek, which precludes comparison and trend analyses for that stream. Data are available on the USGS website (USGS 2006) and are summarized in Tables 3.5-5, 3.5-6, and 3.5-7.

Table 3.5-5. General Water Quality of the Milk River at USGS Station 06155900 Milk River at Cree Crossing Near Saco, MT

Parameter	Mean	Median	Range	No. of Samples	Period of Record
Temperature (°C)	11.21	13	0–26	29	2000–2004
Instantaneous Discharge (cfs)	304.06	71	4.7–3,490	29	2000–2004
Specific Conductance (µS/cm)	1,022.99	1,010	330–1,870	29	2000–2004

Table 3.5-6. General Water Quality of the Milk River at USGS Station 06164510 Milk River at Juneberg Bridge Near Saco, MT

Parameter	Mean	Median	Range	No. of Samples	Period of Record
Temperature (°C)	9.55	8.75	0–27	240	1977–2004
Instantaneous Discharge (cfs)	668.85	151	2–10,500	237	1977–2004
Specific Conductance (µS/cm)	1,033.89	1,020	202–2,020	237	1977–2004
pH (standard units)	7.97	8	7.3–8.7	29	1977–1980
Total Hardness as $CaCO_3$ (mg/L)	317.53	290	80–540	55	1977–1982
SAR (unitless)	3.51	4	2–5	55	1977–1982
Nitrite + Nitrate as nitrogen (mg/L)	0.24	0.16	0–1.7	79	1977–1983
Phosphorus (mg/L)	0.02	0.02	0–0.14	85	1977–1990
TDS, sum of constituents (mg/L)	776.56	728	210–1,370	55	1977–1982

Table 3.5-7. General Water Quality of Beaver Creek at USGS Station 06166000 Below Guston Coulee Near Saco, MT

Parameter	Mean	Median	Range	No. of Samples	Period of Record
Temperature (°C)	13.36	14	0–28	70	1980–2004
Instantaneous Discharge (cfs)	168.57	16.5	0.04–1,960	70	1980–2004
Specific Conductance (µS/cm)	832.30	660	200–31,000	63	1982–2004
pH (standard units)	8.05	8.1	7.1–8.7	24	1980–1985
Total Hardness as $CaCO_3$ (mg/L)	317	180	51–1,200	15	1980–1982
SAR (unitless)	2.47	2	2–5	15	1980–1982
Nitrite + Nitrate as nitrogen (mg/L)	0.21	0.1	0–0.61	8	1980-1985
Phosphorus (mg/L)	0.04	0.035	0.01–0.1	20	1980–1985
TDS, sum of constituents (mg/L)	674.20	352	148–2,570	15	1980–1982

3.5.5 Waters of the U.S.

Most surface water features in the BNGPA qualify as Waters of the U.S. Prairie potholes, however, would likely need to be evaluated on a case-by-case basis, based upon a ‘significant nexus’ to other Waters of the U.S. (e.g., their surface water connectivity to other jurisdictional waters). Irrigation ditches, also, would likely need to be evaluated on a case-by-case basis, as a result of the Talent Decision (2001). Waters of the U.S. include the territorial seas, interstate waters, navigable waterways (such as lakes, rivers, and streams), special aquatic sites, and wetlands that are, have been, or could be used for travel, commerce, or industrial purposes; tributaries, and impoundments of such waters. All channels that carry surface flows and that show signs of active water movement are Waters of the U.S. Similarly, all open bodies of water (except ponds and lakes created on upland sites and used exclusively for agricultural and industrial activities or aesthetic amenities) are Waters of the U.S. (EPA 33 CFR § 328.3(a)). Such areas are regulated by the EPA and Department of Army Corps of Engineers (COE). Any activity that involves discharge of dredge or fill material into or excavation of such areas is subject to regulation by the COE pursuant to Section 404 of the CWA. Activities that modify the morphology of stream channels are also subject to regulation by the COE. Special aquatic sites and wetlands are discussed in greater detail in section **3.11.3. Wetlands and Riparian Zones**.

3.5.6 Groundwater Quantity

Shallow groundwater (less than 500 feet below land surface) is scarce or absent within the general area (BLM 1989, 1992). Shallow aquifers occur in the Quaternary alluvium of major drainages, in buried pre-glacial alluvial channels, and terrace deposits. Depth, yield, and quality vary widely. Yields range from one to 100 gallons per minute (gpm), but average 2 to 5 gpm. This shallow water is generally marginal for domestic use due to high TDS concentrations (1,000 to 5,000 mg/L), but suitable for livestock and wildlife use (BLM 1989).

Deeper aquifers (greater than 500 feet below land surface) include the Upper Cretaceous Bearpaw Shale, Judith River Formation and Claggett Shale (Lawlor 2000), and the much-deeper Mississippian Madison Limestone. Except for the Madison, these aquifers are generally marginal to unsuitable for domestic use due to exceedingly high TDS levels. Depths of these aquifers range from 700 to 4,000 feet, making them generally too deep to be economical for livestock and wildlife use. The Madison Aquifer is generally suitable for domestic use, but again, its depth increases cost.

Primary hydrogeologic units in the general area that contain water used for domestic and stock supplies are Quaternary alluvium and glacial deposits and the Upper Cretaceous Judith River Formation. Quaternary alluvium and glacial deposits are underlain by the Upper Cretaceous Bearpaw Shale, Judith River Formation, or Claggett Shale (Lawlor 2000). The Bearpaw Shale and Clagget Shale are relatively impermeable. Any water withdrawn from the Bearpaw and Clagget Shale units would likely be too mineralized for domestic, stock, and irrigation purposes.

3.5.7 Groundwater Quality

The Lawlor study (2002) of the quality of groundwater along the Milk River Valley, from Havre, Montana, to its mouth near Nashua, Montana, applies to the project area along the Milk River and in similar formations. Most of the wells in this inventory were completed in either the Quaternary alluvium and glacial deposits or the Upper Cretaceous Judith River Formation. TDS concentrations ranged from 432 mg/L to 3,550 mg/L, with a median of 1,655 mg/L. Groundwater from sampled wells generally was suitable for stock watering based on TDS concentrations less than the recommended standard of 3,500 mg/L (Lawlor 2000).

3.5.8 Surface Water and Groundwater Rights

Due to the predominance of agriculture within the BNGPA, 8,468 water rights have been filed with the Montana Department of Natural Resources (2006) for both surface and groundwater for such uses as irrigation, dams, stock ponds, wildlife and waterfowl, reservoirs, domestic, and municipal uses. Seventy-one percent of the water rights filed within the project area are for stock (3,645 water rights filed) and irrigation (2,336 water rights filed). Irrigated agriculture is the largest use of water. Of the diverted water claims, approximately 10 percent are from groundwater sources, and 90 percent from surface water sources (DNRC 2006). Most irrigation water supply is from the Milk River and from Quaternary alluvium and glacial deposits and the Upper Cretaceous Judith River Formation. Water for domestic supplies is obtained from the Milk River, the alluvium and glacial deposits, and the Judith River Formation. Water for domestic supplies from these sources typically requires some form of treatment before use.

3.6 LIVESTOCK GRAZING

3.6.1 Range Resources

Livestock grazing is currently one of the principal economic uses of land in the project area. Grazing allotments are areas of land where individuals graze livestock. An allotment generally consists of federal rangelands, but may also include intermingled parcels of fee-lands or state lands. The BLM stipulates the type and number of livestock and period of use for each allotment.

An Animal Unit month (AUM) is the amount of forage needed by an ‘animal unit’ (AU) grazing for one month. The animal unit in turn is defined as one mature 1,000-pound cow and her suckling calf. Assuming that such a cow nursing her calf will consume 26 pounds of dry matter (DM) per day as forage. That consumption, combined with a factor for tramping and waste of about 25 percent, results in an estimate of about 1,000 pounds of dry matter (DM) from forage to supply one AU each month.

Recommended stocking rates are based upon results from grazing research, local experience, and clipped plot yields. Herbage production can be highly variable due to differences in range site topography, climate, exposure, level of the water table, and in the depth, texture, and salinity of the soil. The more productive range sites usually occur where soils are deeper and additional moisture is supplied either through overflow or sub-irrigation and are typically associated with riparian environments and valley floors. The less-productive soils are characterized as shallow if less than 20 inches deep or very shallow if less than 10 inches to a root-limiting layer such as bedrock. Although all parts of the environment have the potential to influence the vegetation on a site, precipitation probably is the single-most important factor (Fisser 1987).

3.7 RECREATION AND VISUAL RESOURCES

3.7.1 Recreation

Introduction

The BNGPA contains opportunities for hunting, fishing, pleasure driving (including off-highway vehicle rides) and wildlife observation. Boating, picnicking, and camping also occur in the project area.

BLM land in the BNGPA supports dispersed recreation. Site-specific resources are those of the BOR (Nelson Reservoir), the USFWS (parts of the Bowdoin National Wildlife Refuge complex), and the State of Montana (fishing access sites on the Milk River and Cole Ponds). Private lands throughout the area are accessible to hunting through non-commercial and commercial arrangements.

Montana residents are the main users of recreation resources in the BNGPA, with most resident users likely from northeastern Montana, coinciding with the Region 6 management division of the Montana Department of Fish, Wildlife and Parks. Out-of-state users include hunters, visitors passing through the area on their way to major destinations such as Glacier National Park or the Missouri River, and holders of recreation cabin site permits at Nelson Reservoir.

The Bitter Creek Wilderness Study Area (WSA) is located in the BLM Glasgow Field Station, outside of the BNGPA to the east. The western boundary of this WSA is never closer than approximately 10 miles from the eastern boundary of the project area.

Phillips and Valley Extensive Recreation Management Areas

Most BLM land in the BNGPA is within the Phillips Extensive Recreation Management Area (ERMA) located in northern Phillips County. The remainder of the BLM land in the BNGPA is contained in the Valley ERMA in northern Valley County. The Judith-Valley-Phillips RMP (1994) issued management directives for the Phillips and Valley ERMAs. BLM's management regime supports dispersed and unstructured recreation with minimal maintenance and no developed facilities.

Recreation use in the BNGPA appears to be moderate. The area may support some type of recreational activity throughout the year, with the heaviest use occurring during the fall hunting seasons. Hunting for upland birds, big game, and waterfowl occurs from August through December. Some small reservoirs scattered about the area are stocked for fishing though their primary use is for livestock (Collins 2006).

Land tenure is scattered among public and private interests, but owner-sanctioned access to private land is common so access is generally good for hunting and other recreation throughout the BNGPA (Collins 2006).

Off-highway vehicle (OHV) use on BLM lands in the Malta Field Office is primarily associated with other activities such as hunting, fishing, and driving for pleasure. The highest concentration of OHV use occurs during fall hunting season (BLM 1992). Public cross-country travel (off-road travel) is prohibited year-round as per the OHV EIS Proposed Plan Amendment for Montana, North Dakota and South Dakota, June 2003 Record of Decision. All public motorized wheeled-vehicle travel is restricted to existing roads and trails within the BNGPA and the Malta Field Office boundary. The ROD limits travel for administrative use by the BLM, other government entities, and lessees and permittees, but allows motorized wheeled cross-country travel when necessary. The exemption in the ROD for necessary cross-country travel by oil and gas lessees states, “Motorized wheeled cross-country travel for lessees and permittees is limited to the administration of a federal lease or permit. Persons or corporations having such a permit or lease could perform administrative functions on public lands within the scope of the permit or lease; however, this would not preclude modifying permits or leases to limit motorized wheeled cross-country travel during further site-specific analysis to meet resource management objectives or standards and guidelines” (BLM 2003). The Malta Field Office considers this exemption when regulatory and environmental compliance work is undertaken pursuant to existing statutes and regulations.

Fishing-Based Recreation Areas

Nelson Reservoir is located in the southeast corner of the project area on U.S. 2 near Saco, Montana. The reservoir has 4,320 surface acres and 30 miles of shoreline. The reservoir and recreation sites are managed by the BOR Montana Area Office in Billings. Developed facilities operated by the BOR include a concrete boat ramp, campground, and picnic shelters. Nelson Reservoir contains a walleye, yellow perch, and northern pike fishery managed by the Montana FWP, with the private organization Walleye Unlimited also involved in funding for stocking of the reservoir. There are also black crappie and possibly other sport fish species in Nelson Reservoir.

The BOR issues permits, or leases, to construct and maintain recreation cabins on sites in designated areas on the Nelson Reservoir shoreline. There are now 106 cabin-site leaseholders, about one-third from outside Montana. All permit holders are members of the Nelson Reservoir Recreation Association, which represents their interests to the BOR (Anderson 2006).

Leaseholders are allowed to construct and own site improvements, which may include a single family dwelling for seasonal use, water and sanitation systems, boat docks, retaining walls, and access routes (Frasure 2006). The cabin sites are generally used on weekends and for longer stays during the fall hunting season. In the last five years a number of new improvements have been built by lessees, more permits have been transferred from one holder to another, and the BOR has received more inquiries about availability of sites than in the past, indicating a rising trend of interest in the cabin site area at Nelson Reservoir (Anderson 2006, Frasure 2006).

BOR lands surrounding Nelson Reservoir contain existing natural gas wells, with two wells next to recreation cabin sites and one well on a cabin site (Frasure 2006). Gas wells and recreation cabins have coexisted for sometime near the Nelson Reservoir area, with wells predating many recreation improvements, according to the Nelson Reservoir Recreation Association; no issues or conflicts between cabin owners and natural-gas development have been reported (Anderson 2006, Frasure 2006). There are also grazing leases on BOR land that surrounds the designated recreation area; the leases are managed by the Malta Irrigation District under contract to the BOR (Frasure 2006).

Other sport fisheries in the BNGPA are the Milk River and five small reservoirs that are stocked by Montana FWP. Montana FWP maintains Fishing Access Sites (FAS) at two of these resources. They are the Bjornberg Bridge FAS, seven miles east of Saco on the river bank (toilet) and the Cole Ponds FAS, 10 miles northwest of Saco (primitive campsite and toilet). Compton Reservoir, PR 22, and PR 54 are stocked for fishing, and found at scattered locations in the northern part of the BNGPA within 10 miles of the Canadian border.

Bowdoin National Wildlife Refuge Complex

Six units of the Bowdoin National Wildlife Refuge (NWR) complex are inside the BNGPA. These are Hewitt Lake NWR, a satellite refuge, and five small waterfowl production areas (WPAs). The 15,550-acre Bowdoin NWR itself is adjacent to the BNGPA but outside the project area. The USFWS owns the five WPAs in the BNGPA for a total of 5,566 acres (Graham 2006). The Hewitt Lake NWR area is 1,680 total acres, composed of 720 acres of Public Domain and 960 acres of easement land (USFWS undated).

Recreation Activities and Use

Hunting, fishing and wildlife observation are primary motivations for recreation visits to the BNGPA. Other recreation activities may be the main reason for a visit but more often they are part of a visit made primarily for hunting, fishing, or wildlife watching (Collins 2006).

The BLM estimates recreation visits for its recreation areas overall but not for smaller sub-areas, so the number of recreation visits is not known for the Phillips and Valley ERMAs, which contain the BNGPA. Based on trends for lands under BLM management, recreation use is likely to be on the increase within the BNGPA since the 1992 JVP predicted a two percent annual increase (BLM 1992).

Among the non-resident tourists and recreation visitors to Montana are many who use BLM lands for recreation. The State of Montana tracks visitor spending for multi-county regions but not for single counties or smaller areas, so total visitor numbers are not available for the BNGPA (BLM 1992). Total visitors to the state include non-resident hunters. Estimates are found below of how many non-resident hunters use the hunt districts that overlap the BNGPA though not specifically for the project area itself.

Hunting. Hunter use data specifically for the BNGPA are not available. Estimates of hunter use are available for Montana FWP Hunt Districts (big game) or for counties (upland game birds). The hunter activity estimates presented below were compiled from the 2003 Deer Hunting Report (Montana FWP 2004*a*), the 2003 Pronghorn Antelope Hunting and Harvest Report (Montana FWP 2004*b*), and the 2003 Upland Game Bird Hunting and Harvest Report (Montana FWP 2004*c*).

In 2003 the four hunt districts that overlap the BNGPA drew a total of 5,125 mule or whitetail deer hunters and 2,016 antelope hunters. Twenty-six percent of the deer hunters and 12 percent of the antelope hunters were non-residents. The deer season generated 21,836 hunter days of activity (4.3 days per hunter) and the antelope season generated 6,721 hunter days (3.3 days per hunter). Whitetail deer hunting is generally concentrated in riparian and agricultural habitats along the Milk River from Malta east to Glasgow.

The 2003 upland game bird season attracted 3,524 hunters to Phillips and Valley counties for a total of 30,276 hunter days of activity, or an average 8.6 days per hunter. Thirty-nine percent of upland game bird hunters were non-residents of Montana.

The only estimates of area waterfowl hunters are for the Bowdoin NWR, which is outside the BNGPA. However, the Hewitt Lake NWR and USFWS WPAs within the project area are also known as places for waterfowl hunts. In 2005, the Bowdoin NWR drew 150 Montana resident waterfowl hunters and 185 non-residents from 25 states and Canada. The site also attracts upland bird hunters—in 2005, 603 residents and 313 non-residents representing 28 states and Canada (Graham 2006). A small part of the Bowdoin NWR hunter data could come from the USFWS Pearce WPA directly north of Bowdoin NWR. It is managed by Bowdoin NWR but is located within the BNGPA. Some hunters probably hunt on Pearce WPA and Bowdoin NWR in the same day and report combined harvest information for both at the hunter check station at Bowdoin NWR.

Phillips County is also known for winter coyote and rabbit hunting.

Fishing. Fishing pressure at Nelson Reservoir was 12,558 days fished in 2003, ranking it third in Montana Fish, Wildlife and Parks Region 6, which covers northeastern Montana (Montana FWP 2006*a*). Fishing pressure on the Milk River from Hinsdale to Malta, which is mostly in the BNGPA, was 1,595 days fished in 2003, for a regional rank of 13 (Montana FWP 1006*b*). Cole Ponds had 28 days fished in 1999 (last published data), a regional rank of 102 (Montana FWP 2006*c*). No data are published for other small reservoirs in the BNGPA.

Wildlife Observation. Wildlife observation in the BNGPA generally occurs as scouting for hunting. However, northeastern Montana attracts wildlife observation not connected to hunting, and bird watching is promoted in a brochure published by the regional tourism agency using accommodations tax funds (Northeastern Montana Birding Trail 2005). The route identified in the brochure follows U.S. 2 from Malta to Hinsdale through the BNGPA. The only specific viewing site identified by the brochure near the project area is the Bowdoin NWR, which is outside the BNGPA.

3.7.2 Visual Resources

Extent and Location of VRM Classified Lands

BLM-administered land in the BNGPA is in visual resource management (VRM) Classes II, III, and IV (BLM-LDO 1994a; BLM-LDO 1994*b*). Table 3.7-1 summarizes acreage by VRM Class. The lower the class number, the greater the management objective to minimize the introduction of contrast to the characteristic landscape from incompatible elements of form, line, color, and texture.

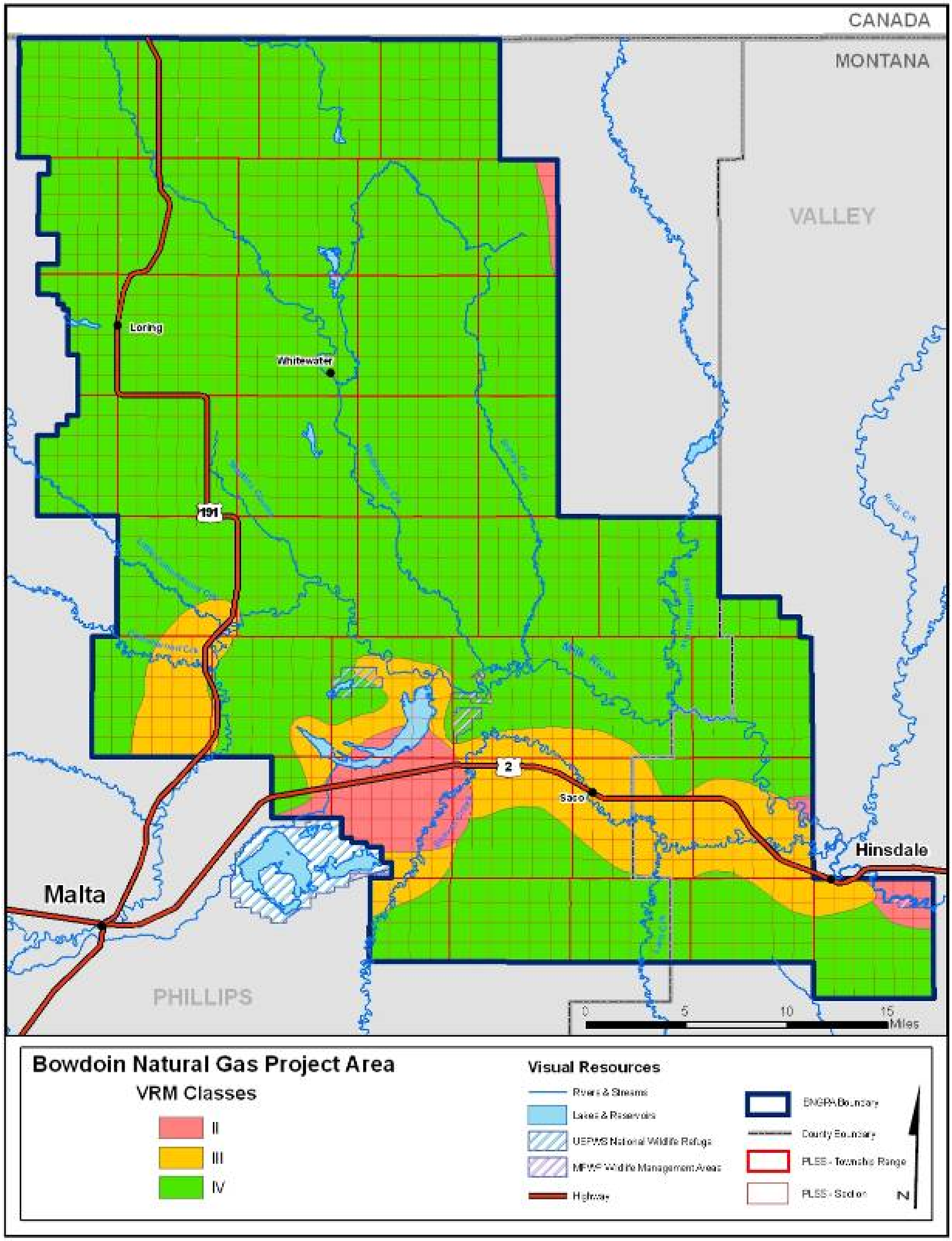
Table 3.7-1. BLM Lands in the BNGPA by VRM Class

VRM Classification	Acreage
Class II	31,191
Class III	94,385
Class IV	686,812

Source: Acreage calculated by GIS software from digital data (VRM_b.shp) obtained from BLM Malta Field Office, May 18, 2006.

Potentially affected areas with the highest level of visual resource protection are found in the southern part of the BNGPA. Most Class II and Class III landscape is associated with Nelson Reservoir, selected reaches of the Milk River, and parts of the tributary Little Cottonwood and Beaver creeks. The western edge of a block of Class II landscape associated with the Frenchman Creek drainage, found to the east of the BNGPA, just extends into the upper northeastern part of the BNGPA. Figure 3.7-1 illustrates the distribution of BLM lands by VRM class in the BNGPA.

Figure 3.7-1. BLM Lands by VRM Class in the BNGPA



Source: Map prepared from digital data (VRM_b.shp) obtained from BLM Malta Field Office, May 18, 2006. Original data from BLM-MSO 1992, Map 1.

Scattered, irregular blocks of BLM land categorized as VRM Class II landscape lie on the north and south shore of Nelson Reservoir in the southwestern part of the BNGPA and extend south from the reservoir to Beaver Creek. Several scattered parcels of VRM Class II landscape are associated with the Milk River between Hinsdale and Vandalia. Some of the VRM Class II viewshed associated with the Frenchman Creek drainage spills over into the northeastern part of the BNGPA.

VRM Class III landscape is located on irregular blocks of land north of Nelson Reservoir, and along Little Cottonwood Creek west of Hewitt Lake NWR. VRM Class III landscape is also found in irregular blocks scattered along the Milk River from the western to the eastern boundary of the BNGPA. Other BLM-managed landscapes within the BNGPA are rated as VRM Class IV.

Characteristic Landscapes

VRM Class IV landscapes within the BNGPA are generally broad, open prairie grasslands. Their similarity and frequent occurrence lead to a lower rating in terms of scenic quality. These areas have views of uniform vegetation, simple skylines, and open skies that create the appearance of relatively unbroken, horizontal bands and lines. Class III lands in the BNGPA are similar in appearance to Class IV lands; however, they are distinguished by being adjacent to and visible from the Class II lands of the project area. Class II areas in the BNGPA are scattered, smaller blocks of BLM landscape that offer a pleasing contrast to the uniformity of the plains because they contain the Milk River, tributary streams, or lakes and reservoirs as described in section **3.7.1**, **Recreation**.

Landscape Viewers

Recreational users may be sensitive to adverse contrast in the higher-rated landscapes of the BNGPA. As noted in Section 3.7.1, these would be Nelson Reservoir; the Milk River riparian area; Montana Fish, Wildlife and Parks Fishing Access Sites (FAS); and the six waterfowl-oriented units of the NWR complex that are located within the BNGPA. As also noted in Section 3.9.1, potential viewers may include participants in hunting, fishing, camping, picnicking, pleasure driving (sightseeing), and wildlife observation (e.g., birding). The scenery found at these locations provides the backdrop for local recreation activity.

Management Directives

A landscape’s VRM class sets the BLM’s management objectives for allowable change in the area’s appearance. These are stated as levels of adverse contrast that a new BLM activity can introduce to the landscape. Adverse contrast occurs when the new elements do not repeat or harmonize with the characteristic form, line, color, and texture of the natural landscape.

In VRM Class II areas, which are relatively sensitive areas found in parts of the BNGPA, the management objective is to retain the existing character of the landscape. The level of change should be low. New activities may be seen but should not attract the attention of the casual observer. Changes *must* be designed to repeat naturally appearing form, line, color and texture.

In VRM Class III areas, which are found near rivers, streams and reservoirs in the southern part of the project area, the objective is to partially retain the existing character of the landscape by allowing moderate change. Moderate change may attract attention but not dominate the view of the casual observer. Change *should* be designed to repeat naturally appearing form, line, color and texture.

VRM Class IV areas are the most common BLM lands in the BNGPA. These are designated specifically for activities that require major modification of the existing character of the landscape. A new activity can create a high level of change to a Class IV landscape and may even dominate the view. However, BLM's management objective for these areas does call for every attempt to be made to use careful location, minimization of disturbance, and characteristic design elements to help offset the visual impact of a new activity.

In approved management plans for the Phillips and Valley RAs, BLM noted increased interest in tourism and sightseeing activity and, because of it, placed management emphasis on maintaining scenic quality within VRM Class II areas within the overall multiple-use management direction. For Class III and IV areas, BLM noted that management allows alteration of the visual landscape but works to minimize the visual disruption. To implement the objectives, BLM stated that surface developments will be designed or mitigated to complement and harmonize with natural features and the VRM class objectives. Visual contrast rating will be used as a guide for major projects proposed on VRM Class I, II, and III lands. The VRM class objectives may not always be met due to non-discretionary actions or exceptions that may occur after evaluation and at the discretion of the authorized officer (BLM-LDO 1994*a*; BLM-LDO 1994*b*).

Surface restrictions affecting the location of mineral exploration and development with respect to visually sensitive resources such as recreation development may also apply to mineral tracts located within the boundary of a BOR project where the United States owns 100 percent of the fee mineral interest. These restrictions may be included as stipulations at the request of BOR in leases issued by the BLM for activity on BOR surface (Stiles 2006).

3.8 SOCIOECONOMICS

The study area for assessment of potential effects of the Proposed Action and alternatives on social and economic conditions includes northern Phillips County and western Valley County. These rural, north-central Montana counties are bordered by the Missouri River/Fort Peck Lake on the south and the Canadian border on the north. The project area is located north/northeast of Malta, the county seat for Phillips County and northwest of Glasgow, the Valley County seat. In Phillips County, the town of Saco and the settlements of Loring and Whitewater are located within the BNGPA, as are the Valley County settlements of Hinsdale and Beaverton (see Figure 1.1-1, General Location Map).

Economic and population trends were identified by running and reviewing the Sonoran Institute/BLM's *Economic Profile System* for Phillips and Valley counties, which are available online at: http://sonoran.org/index.php?option=com_content&task=view&id=70&Itemid=188. This information was augmented with data from a variety of other federal, state and local sources, as cited in the text.

The cultural and social setting of the area including Native American occupation and use of the land and the post-European settlement history is discussed in section **3.2, Cultural Resources**.

During the last century, ranching, farming, mining, natural-gas development, the railroad and, in Valley County, construction of the Fort Peck Dam and the establishment and subsequent closure of Glasgow Air Force Base have all been important factors in the social and economic history of the area. More recently, outdoor recreation and tourism have been increasingly important contributors to the local economies. Long-term socioeconomic trends in both counties are also characterized by gradual population loss.

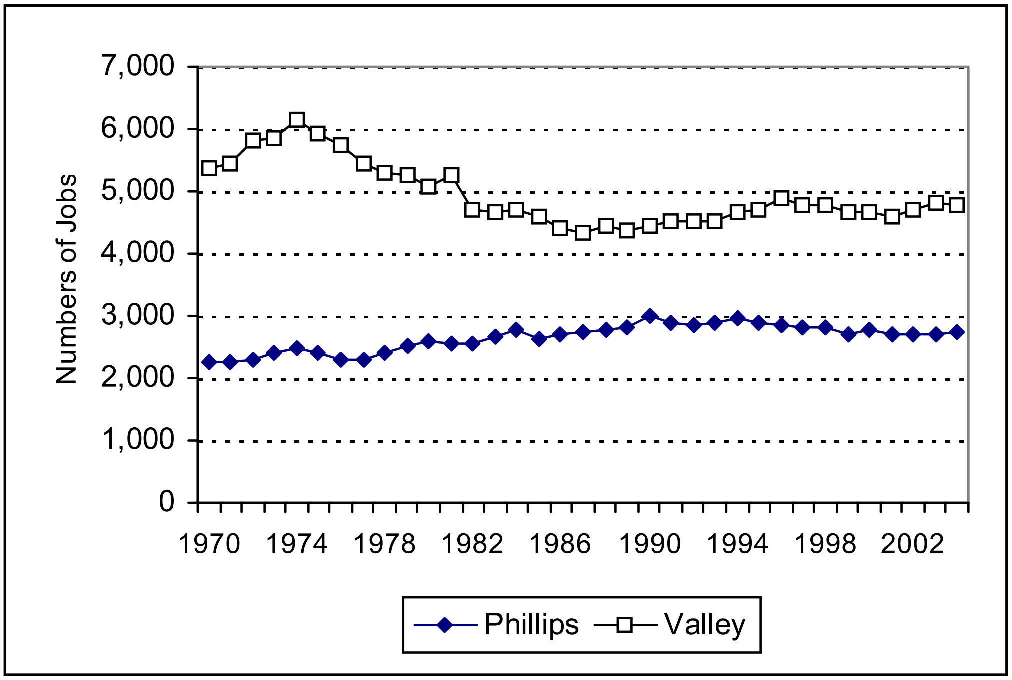
3.8.1 Regional Economy

Phillips and Valley counties share an economic heritage with other areas of the northern Great Plains, one in which agriculture played the dominant role in the region's initial post-European settlement and economic expansion. The development of the railroad across northern Montana in the late 1880s and the subsequent opening of the area to homesteading in the early 20^{th} century ushered in an era of accelerated European settlement. Agriculture and other natural resource production helped spur the development of additional transportation infrastructure and the emergence of Malta and Glasgow as regional trade and service centers for north-central Montana. In more recent times, the establishment and subsequent closure of Glasgow Air Force Base, and federal water and wildlife management projects and programs have played pivotal roles in the region's economic development. Mineral and energy resource development, primarily in the form of mining and natural gas, have also shaped the area's economic history. The mining, oil and natural gas industries have also been important contributors to the regional economic base through their fiscal support for local government and education.

Employment

Over the past three decades, the Phillips and Valley county economies have experienced volatility associated with military base realignment and development and closure of a mining operation. In Valley County, employment rose dramatically in the early 1970s due to the reactivation of Glasgow AFB, peaking at 6,139 jobs in 1974. Beginning with the base's closure, total employment experienced a protracted decline, eventually falling by more than 1,800 jobs through 1987 (Figure 3.8-1). Losses in the agriculture sector also contributed to those declines. Employment trends since then are characterized by steady increases through 1996, followed by another cycle of modest contraction and expansion. Total employment stood at 4,779 jobs in 2004.

Figure 3.8-1. Total Full and Part-Time Employment, 1970–2004



Source: U.S. Department of Commerce, Bureau of Economic Analysis. 2006

The Phillips County economy, generally characterized by modest long-term growth since 1970, has experienced some volatility associated with precious-metal mining. Since 1970, total employment in Phillips County climbed from 2,263 jobs to a peak of 2,985 jobs in 1990. Post-1990, the local economy has experienced some contraction, with total employment falling to 2,712 jobs in 2001. In 2004, total employment in Phillips County was 2,745 jobs.

From the late 1970s thru the mid-1990s, gold mining was a major employer in Phillips County. Activity at the Zortman Landusky gold mine raised total mining employment to an estimated 350 jobs, about 12 percent of total employment. Current employment in mining is not reported due to confidentiality restrictions; however, industry sources estimate that there are around 50 direct mining jobs in the county; the large majority of those are associated with natural-gas development and production. In Valley County, jobs in mining have not exceeded two percent of the total within the past four decades.

The current composition of the local economies, in terms of employment, is evident in Table 3.8-1 below. Agriculture continues to be an economic cornerstone for the region, with more than 1,400 proprietors and employees in the two counties. Trade, hospitality services, health care, education, and public-sector employment are also important economic sectors in the region.

Table 3.8-1. Full and Part-Time Employment, by Selected Industrial Clusters, 2004

Employment	PHILLIPS COUNTY		VALLEY COUNTY	
	Number	% of Total	Number	% of Total
Farm employment	623	23%	823	17%
Mining	< 50 *	< 2%	41	1%
Construction, Manufacturing, Utilities, & Transportation	271	10%	513	11%
Wholesale & Retail Trade	387	14%	638	13%
Information, Finance and Insurance, & Real Estate	175	6%	334	7%
Hospitality — Arts, Entertainment, Recreation, Accommodations & Food Services	207	8%	418	9%
Other, including health care	587 to 637 *	20% to 22%	2,012	42%
Government	445	16%	803	17%
Total Employment	2,745	100%	4,779	100%

* Not reported due to confidentiality disclosure guidelines. The potential upper range of employment is determined from other data sources. The disclosure issues also affect reported employment in "Other" as well.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2006

Agriculture. As with other industries, the federal government conducts an economic census of agriculture every five years. Results of the 2002 census are the most current available. A total of 1,268 Phillips and Valley county farms and ranches were recorded in the 2002 Census of Agriculture (Table 3.8-2). These operations involved more than 3.9 million acres, equivalent to approximately 60 percent of the combined land area of the two counties. In 2002, local farms and ranches reported total sales of $105.2 million in agricultural products. Livestock sales were the primary source of agricultural revenue in Phillips County, with crops the primary source of sales in Valley County. Despite the large receipts from sales, farmers and ranchers in Phillips County recorded an aggregate negative net income of $1.2 million in 2002. Farmers and ranchers in Valley County fared better, recording an aggregate income of $13.5 million.

Table 3.8-2. Overview of Local Agriculture, 2002

	Phillips County	Valley County
Number of farms	525	743
Land area in farms (acres)	1,896,941	2,051,667
Farm land – percent of county area	57.7	65.1
Market value of agricultural products sold	$37.81 M	$67.44 M
• Crops	$12.14 M	$32.39 M
• Livestock	$26.67 M	$35.05 M
Farm Operators with farming as a principal occupation	376	542
Total farm labor and proprietor's Income	($1.2) M	$13.5 M

M = Millions

Source: U.S. Department of Agriculture, 2004 and U.S. Department of Commerce, Bureau of Economic Analysis, 2006.

Minerals. Mining sector activity in the study area has included gold mining in Phillips County, oil production in Valley County and natural gas production and bentonite mining in both counties.

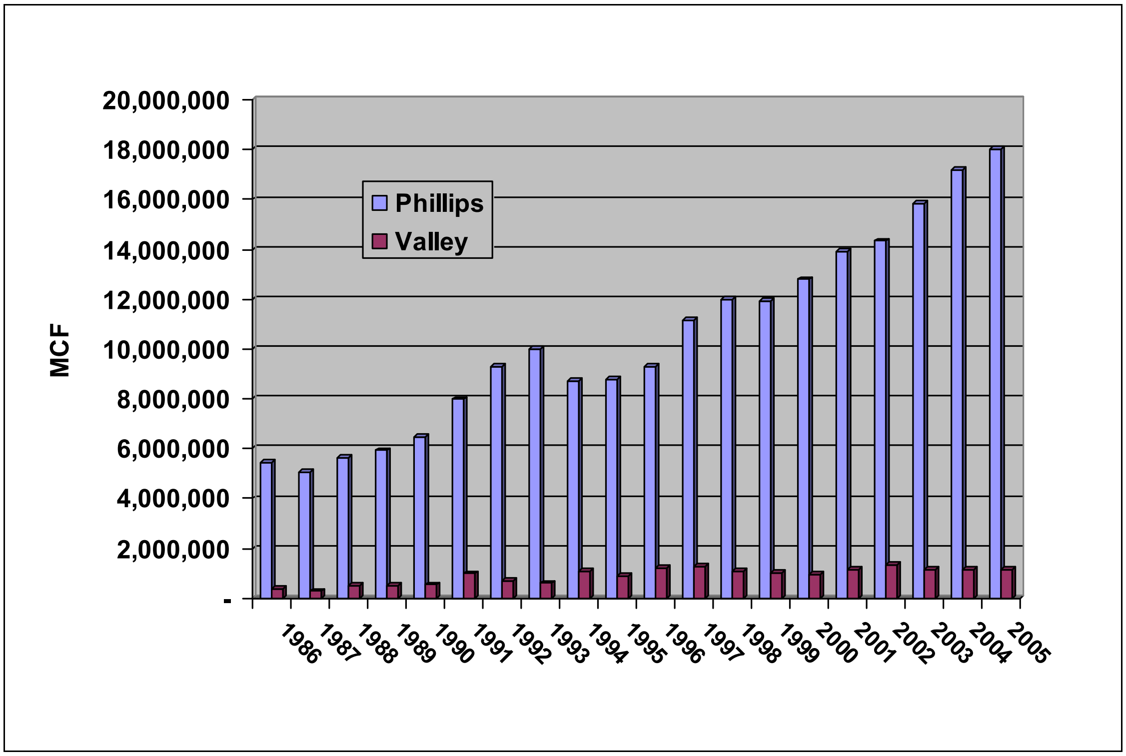
Gold mining once provided a major economic stimulus in the region. As described in the BLM's Judith Valley Phillips RMP, gold-mining activities in the Little Rocky Mountains, south and west of the BNGPA, have waxed and waned for over 100 years. Since the closure of the Zortman-Landusky mine in the mid-1990s, the few remaining jobs related to gold mining have been associated with the environmental reclamation and restoration of the mine. Jobs in oil and natural gas development and production account for most of the direct employment reported in the mining sector. In addition, local oil and gas production supports jobs in the natural gas pipeline transmission industry. According to a national database of businesses, a total of seven natural gas firms with a combined total of 64 employees presently have offices in Phillips and Valley counties. These firms are supported by field-service firms from regional oil and gas centers such as Casper, Wyoming; Havre, Montana; and the Williston Basin of North Dakota. These firms deploy staff and equipment to the region as needed (Dun & Bradstreet 2006, Bowman 2006). A variety of local contractors, primarily in the service and construction sectors, also provide contract services to the Bowdoin-area gas fields.

Natural gas production in Phillips County ranked first in the state in 2005, with over 18 Bcf gas produced. Natural gas production from Valley County, although substantially lower (1.15 Bcf), nonetheless ranked sixth in the state.

BLM manages 54 percent of minerals in Phillips County and 43 percent in Valley County. In FY 2006, payments from the U.S. Minerals Management Service related to mineral royalties from production of federal minerals on public domain managed by the BLM were $1.1 million to Phillips County and $100,169 to Valley County (Montana Department of Revenue, 2006). In addition, payments from minerals leasing, oil and gas bonuses, oil and gas pipeline right-of-way, and oil and gas royalties from Bankhead Jones (aka Land Utilization Project) lands administered by the BLM were $222,549 for Phillips County and $52,502 for Valley County (BLM, 10/25/06)

Annual gas production for Phillips and Valley counties from 1986 through 2005 is shown in Figure 3.8-2. Production has been on a general upward trend in both counties: annual gas production increased 236 percent in Phillips County and 207 percent in Valley County over the 20-year period, although Valley County reached its 20-year peak in 2002 at 1.35 Bcf.

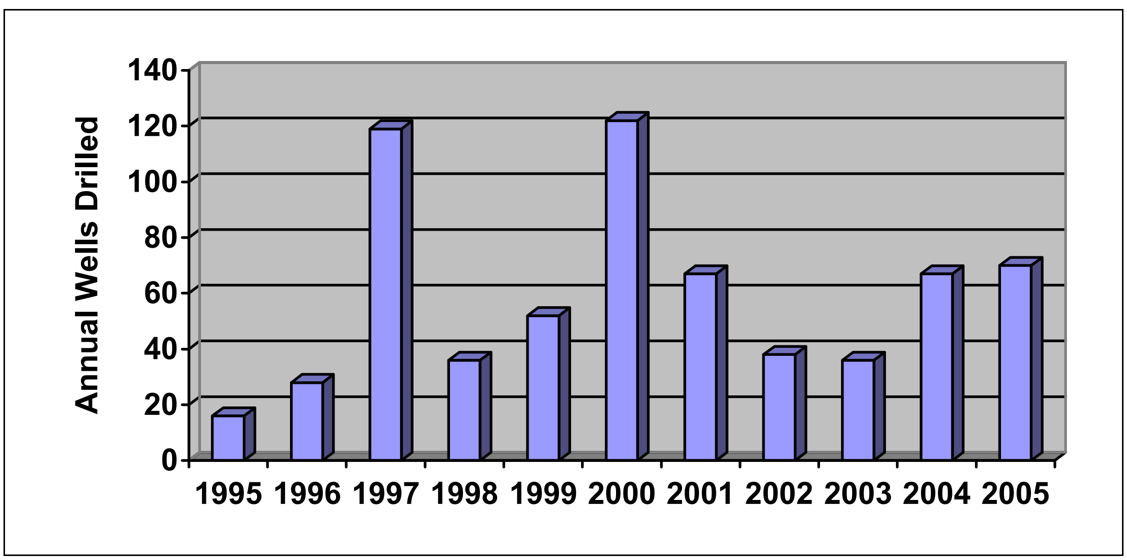
Figure 3.8-2. Annual Natural Gas Production, Philips and Valley Counties: 1986–2005



Source: MBOG 2006

Annual drilling levels in the BNGPA have varied substantially over the last 10 years, as shown in Figure 3.8-3. Annual drilling levels ranged from 16 wells in 1995 to 122 in 2000.

Figure 3.8-3. Bowdoin Gas Field Annual Drilling Levels 1995–2005



Source: Bowdoin Operators 2006

Over the past 10 years the annual drilling program in the Bowdoin field has been accomplished with one or two drilling rigs operating in the field at any given time (Bowman 2006, Divestco 2006).

The Montana Board of Oil and Gas reports there were 1,459 producing wells in fields within the BNGPA during 2005 and that a total of 382 wells were drilled in Phillips County between 2000 and 2005. Of that total, 99.7 percent were productive and one well (or less than 0.3 percent of total wells drilled) was unproductive. A total of 27 wells were drilled during this period in Valley County, resulting in 7 producing oil wells, 14 producing gas wells and 6 dry holes. A total of 77.8 percent of all Valley County wells drilled during this period were productive and 22.2 percent were unproductive.

The costs for developing a well in the BNGPA can run between $100,000 and $300,000 including lease acquisition, surveying, cultural/biological clearance, site preparation, drilling, completion, surface facility and gathering-system installation. Well production costs can run upwards of $200 per well per month, depending on the Operator and the location of the well within the BNGPA.

Drilling in the BNGPA normally occurs during the July through November period. When the winters are mild, drilling also occurs during the winter. Drilling rarely occurs during the spring due to muddy road conditions. Natural gas wells in the Bowdoin area can typically be drilled in 36 to 40 hours. Cased-hole logging of the well requires another day. In the recent past, several Bowdoin Operators have contracted with the same drilling company (recently a Casper, Wyoming-based company) to drill all Bowdoin-area wells in a particular drilling season. The drilling contractor transports a rig and crew to the Bowdoin area and drills continuously until all wells are completed. The rig then moves on to its next assignment. Consequently, only one or two rigs are typically in operation in the Bowdoin area at any one time (Bowman 2006).

The temporary drilling workforce typically includes 15 drilling-related workers, four workers involved in cementing the well, and a 3-person cased-hole logging crew.

Similarly, one completion crew (14 workers) typically travels to the Bowdoin area to complete all wells drilled during one drilling season. Bowdoin-area wells are typically completed for one to five zones. Although it requires approximately 11 days to complete a zone, activity typically occurs on-site during four days and in some cases for only a matter of hours during those four days.

One crew (10 to 15 workers) also typically installs gathering lines for all Bowdoin-area wells drilled in one drilling season.

Up to four compressor stations will also be built during the 15-year development period assumed for this assessment. Compressor station construction would require a relatively small number of construction workers for a several-month period.

Drilling, completion, gathering system/field infrastructure construction crews are generally non-local, locating to the BNGPA for the duration of their task. Some crews hire a few local workers, but non-locals require temporary lodging in motels or recreational vehicle parks for the duration of their stay. Additional jobs are generated in the lodging, food service, entertainment, and automotive services sectors of the local economy.

Field operations employment includes fieldmen, water haulers, and pipeline and compressor facility operations and maintenance personnel. Fieldmen or pumpers maintain wells (each fieldman visits an average of 10 to 12 wells a day; each well is typically visited on a schedule ranging from twice a week to once every two weeks). Fieldmen can be either company or contract employees. Water haulers are typically contract employees. Additionally, a variety of local contractors in the natural gas service and construction industries are employed on an intermittent basis.

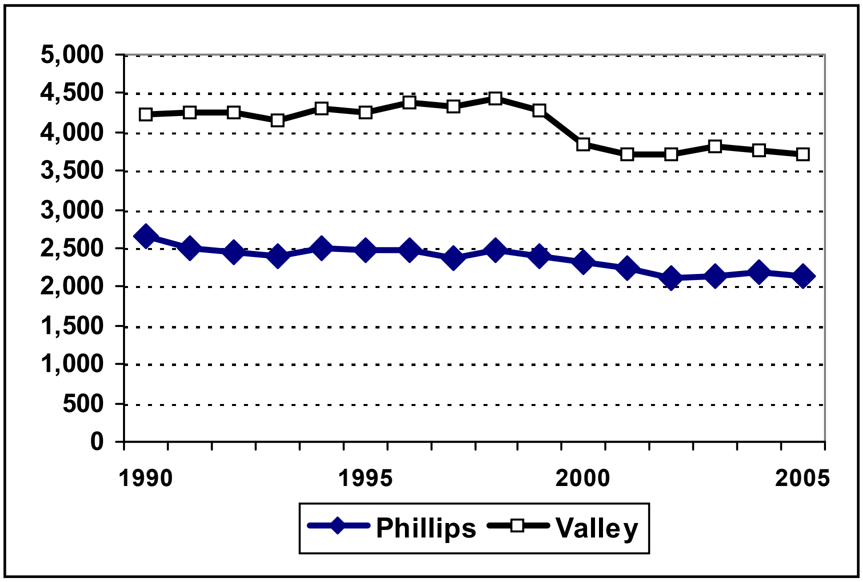
Tourism and Recreation. Recreation resources and use are described in section **3.7.1**, **Recreation**. Most tourism and recreation visits to the area are outdoor recreation-oriented, associated with hunting, fishing, boating, wildlife-watching or sightseeing. Major attractions include the Charles M. Russell and Bowdoin National Wildlife Refuges and Nelson and Fort Peck reservoirs. The Phillips County Museum, Sleeping Buffalo Resort, and other attractions also draw tourists from Montana and elsewhere. The Judith Valley Dinosaur Institute organizes fossil digs which are a growing source of visitors to the area. The Fort Peck Theater provides plays and a performing-arts camp. Events like county fairs and the Montana Governor's Cup Walleye Tournament also attract visitors.

Labor Market Conditions

Long-term population declines, coupled with the general aging of the population and regional economic contractions, are reflected in the local labor market conditions. The local pool of individuals employed or actively seeking work has decreased by nearly 20 percent in Phillips County since 1990, as the labor force declined to 2,127 in 2005. Much of the change is the result of population out-migration triggered by layoffs and ultimate closure of the Zortman Landusky mine in the mid-1990s.

Valley County's labor force has fluctuated within a relatively small range of 4,200 to 4,400 individuals through much of the 1990s. Out-migration of former residents in the late 1990s and reassessments in the wake of the 2000 Census revealed a sharp decline in the labor force, 3,848 in 2000 compared to 4,430 in 1998. Since 2000, the labor force has experienced a cyclical period of decline, modest growth, and another decline (Figure 3.8-4).

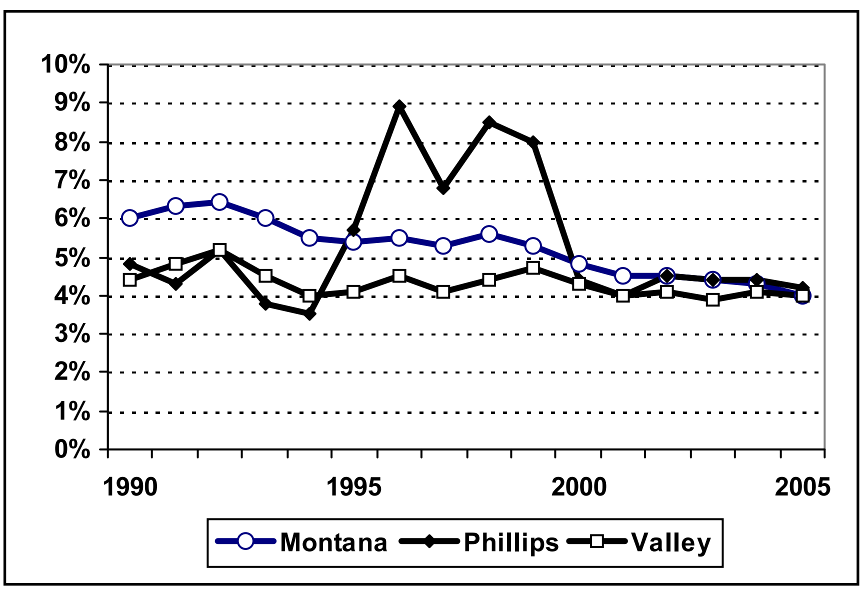
Figure 3.8-4. Phillips and Valley County Labor Force Trends, 1990–2005



Source: U.S. Department of Labor, 2006

Except during periods of relatively dramatic economic dislocation, such as the closure of the Zortman Landusky mine, unemployment in the region since 1990 has generally been between 3.5 and 5.0 percent, below the statewide average (Figure 3.8-5 below). Migration plays a significant role in maintaining unemployment rates below the statewide norms. Estimates for the U.S. Census Bureau indicate a net outflow of 360 residents from Phillips County between 2000 and 2005 and a net outflow of 446 residents from Valley County during the same period. (U.S. Census Bureau, 2006.)

Figure 3.8-5. Trends in Phillips & Valley County Unemployment Rates: 1990–2005



Source: U.S. Department of Labor, 2006

Labor markets are presently relatively tight in both counties. In May 2006, unemployment in Phillips County was at 76 individuals, 3.5 percent of the labor force. In Valley County, unemployment during the same period was 120 persons, equal to 3.3 percent of the labor force. (U.S. Department of Labor 2006)

Personal Income

Residents of Phillips County had total personal income of $100.36 million in 2004. The total personal income of Valley County's residents was $224.88 million. Wages, salaries, and proprietors' income accounted for the majority of total income in both counties, although non-labor earnings, such as dividends, nearly matched labor earnings in Phillips County. Positive net-residency adjustments, gained by local residents who work outside the county, were recorded in both counties (Table 3.8-10). Personal current transfer receipts are a significant source of income in the region, accounting for 23 percent of all income in Phillips and 19 percent of income in Valley County.

Table 3.8-3. Personal Income, Phillips and Valley Counties, 2004

	Phillips County	Valley County
Derivation of Personal Income:		
Earnings by Place of Work	$ 54.29 M	$ 136.39 M
Net Earnings Adjustment for Residency [1]	1.40 M	3.42 M
Dividends, Interest and Rent	27.95 M	57.27 M
Personal Current Transfer Receipts [2]	23.24 M	42.98 M
Contributions for Social Insurance	(6.52) M	(15.18) M
Total Personal Income	$ 100.36 M	$ 224.88 M
Per-Capita Personal Income (PCPI)	$ 23,670	$ 31,048
Montana Statewide PCPI	$ 27,567	$ 27,567
Local PCPI / Statewide PCPI	86%	113%

M = Millions

[1] The adjustment for residence is the net inflow of earnings of local residents commuting to jobs in other counties, less earnings paid by local firms to workers commuting to work from residences in other counties.

[2] Personal current transfer receipts are benefits received for which no current services are performed. Examples include unemployment, retirement and disability benefits, Medicare, and public medical and income maintenance benefits. Pensions and annuities for private and government employee retirement plans are not included.

Source: U.S. Department of Commerce, Bureau of Economic Analysis. 2006.

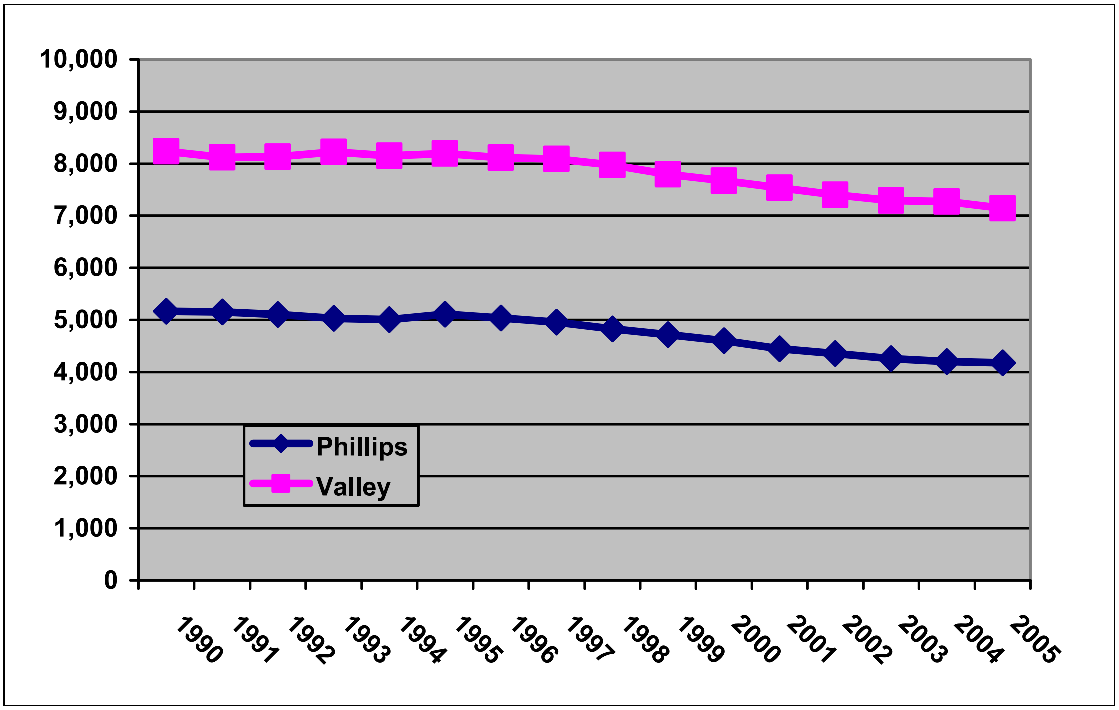
When viewed on a per-capita basis, Phillips County residents lagged behind the statewide average by a considerable margin—nearly $4,000 in 2004—extending a three-decade-long pattern. That relationship contrasts with that in Valley County where residents had an average income of $31,048 per capita, about $3,500 above the statewide average. Per-capita income in both counties was below the national average of $33,050 in 2004. The income disparities are also apparent in the 1999 median household income, which accounts for differences in household size: $28,702 in Phillips, $30,979 in Valley, and $33,024 statewide, compared to $41,994 for the nation as a whole.

3.8.2 Population

Both Phillips and Valley counties have been losing population for some time. Phillips County population declined from 9,311 in 1920 to 4,601 in 2000, a 50 percent decline over 80 years. Valley County reached its peak decennial population of 17,080 in 1960 and then declined to 7,675 in 2000 a loss of 9,405 or 55 percent over 40 years.

Figure 3.8-6 displays the total populations of Phillips and Valley counties from 1990 through 2004; between 1990 and 2005, Phillips County declined by 984 persons or 19 percent and Valley County declined by 1,096 persons or 13 percent. In contrast, the statewide population of Montana grew by 17 percent between 1990 and 2005.

Figure 3.8-6. Phillips and Valley County Population: 1990–2005



Sources: Population Division, U.S. Census Bureau. 1990–1999: Release Data: April 17, 2002; 2000 to 2004, Release Data: June 30, 2005

Population in local communities also declined during the 1990–2004 period. As shown in Table 3.8-4, community population declines ranged from a high of 28.6 percent in Fort Peck in Valley County to a low of 9.4 percent in the Phillips County town of Saco, home to a number of gas field and pipeline employees. Unincorporated areas of both counties also lost population; Phillips County areas outside of incorporated communities fell by 19.7 percent between 1990 and 2004, while Valley County unincorporated areas fell by 7.3 percent.

Table 3.8-4. Population in Phillips and Valley County and Communities: 1990, 2000 and 2004

County/Community	1990	2000	2004	% Change: 1990-2004
Phillips County	5,163	4,601	4,201	-18.6
Dodson	137	122	111	-19.0
Malta	2,340	2,120	1,940	-17.1
Saco	261	224	203	-9.4
Rest of County	2,425	2,135	1,947	-19.7
Valley County	8,239	7,675	7,270	-11.8
Fort Peck	325	240	232	-28.6
Glasgow	3,572	3,253	3,084	-13.7
Nashua	375	325	307	-18.1
Opheim	145	111	105	-27.6
Rest of County	3,882	3,746	3,542	-7.3

Sources: US Census Bureau 1990 and 2000 Census; Population Division US Census Bureau, Annual Estimates of the Population for Incorporated Places in Montana, by County: April 1, 2000 to July 1, 2004.

Population within the study area is anticipated to continue to decline. The Montana Census and Economic Information Center forecasts Phillips County population to decline to 3,830 in 2020, a 349-person or 8 percent decline from the estimated 2005 population of 4,179. Valley County is forecast to decline to 6,190 in 2020, a 953-person or 13 percent loss over the 2005 level of 7,143 (CEIS 2006).

3.8.3 Temporary Housing Resources

This section addresses temporary housing, the category of housing likely to be affected by ongoing natural-gas development. BNGPA drilling, completion, and field-development activities are relatively short-duration tasks performed primarily by contractors. Currently these activities occur during a five-month period each year, resulting in a temporary, transient workforce and demand for temporary housing such as motel rooms and spaces for mobile homes, recreational vehicles (RVs), and rig camps near the project area. Although year-round employment is likely to increase under several of the alternatives, the forecast population losses in the study area would likely preclude impacts to conventional housing resources.

As shown in Table 3.8-5, there are seven mobile home communities in Malta with a total of 119 pads and one in Glasgow with a total of seven pads.

Malta has six hotels/motels with a total of 124 rooms, Saco has one motel with nine rooms, and Glasgow has five motels with a total of 187 rooms.

Malta has two commercial Recreational Vehicle (RV) park/campgrounds with a total of 63 spaces and Glasgow has a total of five RV Park/campgrounds with a total of 131 spaces.

Table 3.8-5. Temporary Housing Units in Communities Near the BNGPA

	Malta		Saco		Glasgow	
	#	# Units	#	# Units	#	# Units
Mobile Home Parks	7	119 pads	--	--	1	7 pads
Hotels/ Motels	6	124 rooms	1	9 rooms	5	187 rooms
RV Park/ Campground	2	63 spaces	--	--	5	131 spaces

Source: BCLLC/Progress Resources Survey 2006

3.8.4 Local Government Service Demand

As noted above, natural gas drilling and field-development activities are largely performed by contractors who relocate to Phillips and Valley counties during July to November of each year. Contract employees typically live in temporary housing during their five-month stay in the area and generally impose demands on a limited range of local government services. As a result of declining population, many county and community facilities were developed for a larger population and therefore have some excess capacity.

Road maintenance is the only substantial demand that natural-gas development has historically placed on county government (Blunt 2006, Dunbar 2006, Peterson 2006, Pippin 2006, Reinhardt 2006). The volumes of traffic in certain areas of the BNGPA, particularly during drilling and field-development periods, coupled with the necessity to access wells, compressor stations, and other gas facilities in all types of weather, results in elevated demand for maintenance on roads that serve wells and facilities. The costs associated with gas-field road maintenance are offset by revenues from the counties' share of the gas production tax allocated to the counties for transportation purposes, by the counties' share of general-purpose gas production taxes, and by the counties' share of federal mineral royalties.

Given the higher level of development anticipated under several alternatives in this analysis, demand may emerge for law enforcement, emergency response, and fire-suppression services in the BNGPA. Services to historic gas field activities in the Bowdoin area have been minimal (Abramson 2006, Dunbar 2006, Meier, 2006. Moran 2006).

Hospital and emergency medical services in the BNGPA are provided by hospitals in Malta and Glasgow. Phillips County Hospital and Family Health Clinic, located in Malta, is a 14-bed Critical Access Hospital and Federally Certified Rural Health Clinic, staffed by one physician, one physician's assistant, and one nurse practitioner. This community-owned health care organization provides medical services to Malta and the surrounding communities, averaging nearly 9,000 primary-care clinic visits per year (EMTN 2006).

Frances Mahon Deaconess Hospital (FMDH), located in Glasgow, is a Joint Commission accredited, acute-care facility licensed for 54 beds (including swing beds). FMDH has two operating-room suites with recovery, a four-bed ICU, a four-bed telemetry unit, a medical/ surgical wing with OB, and an emergency room. The hospital recently completed a $1.2 million remodeling project. Average inpatient daily census is 10 patients, and the hospital performs an average of 120 surgeries per month (most on an outpatient basis). Each month, the emergency room staff sees about 200 patients; each year FMDH delivers approximately 75 babies. MDH has a dedicated, fixed-wing air ambulance that transports patients from throughout northeastern

Montana to tertiary-care facilities located in Billings, Minneapolis/St. Paul and elsewhere (EMTN 2006).

3.8.5 Fiscal Conditions

Mineral and energy resource development is closely linked to fiscal conditions of local governments and school districts in the region. That linkage is the result of direct and indirect contributions to the local property-tax base, gas-production taxes, and federal mineral royalty payments on production from the public mineral estate. It can also yield state corporate and personal income taxes levied on royalties paid to private mineral estate owners.

Taxable Values for Property Taxes

Gas production in Montana is not subject to ad valorem, or property taxes; rather, it is subject to a production tax. The production equipment, gathering and transmission-system pipelines, ancillary facilities, and some equipment classified as pollution-control equipment are, however, subject to ad valorem property tax. Under Montana's property classification system such equipment and improvements are categorized as Class 4 – Commercial and Industrial, Class 5 – Pollution Control Equipment, or Class 9 – Pipelines and non-electrical generating property of electrical utilities. Statutorily established assessment rates to establish taxable value for these classes of property, as a percent of their adjusted market value are 3.3 percent, 3.0 percent, and 12.0 percent, respectively.

Detailed breakdowns of taxable values associated with the natural gas industry are not available. However, as shown in Table 3.8-6, Class 9 property, which includes pipelines, is the single largest category of taxable value in each county; 39 percent of the $13.7 million total taxable valuation in Phillips County and 50 percent of the $24.7 million total in Valley County. Taxable values of the vast areas of private agricultural land are the second category of taxable values in these counties, followed by residential property located principally in the Malta and Glasgow communities, respectively.

Table 3.8-6. Distribution of Assessed Valuation, by Property Class, FY 2004–05

	Phillips County		Valley County	
	Taxable Value	% Total	Taxable Value	% Total
Class 1 – Net Mining Proceeds	$ 0	0	$ 0	0
Class 2 – Gross Proceeds	0	0	0	0
Class 3 – Ag Land	3,744,074	27	4,605,850	19
Class 4 – Residential	1,995,524	15	3,618,508	15
Class 4 – Commercial and Industrial	561,363	4	1, 243,147	5
Class 5 – Pollution Control Equip.	224,806	2	431,049	2
Class 7 – Non-centrally assessed utilities	0	0	0	0
Class 8 – Business Equipment	826,304	6	1,112,473	4
Class 9 – Pipelines & non-electrical generating equip. of elec. Utilities	5,454,225	40	12,426,990	50
Class 10 – Forest land	1,023	0	0	0
Class 12 – Railroads & airlines	727,705	5	1,075,680	4
Class 13 – Telecommunications & Electrical Generating Equip.	212,304	2	217,962	1
TOTAL	**$ 13,747,328**	**100**	**$ 24,731,659**	**100**

Source: Montana Association of Counties, 2006.

Oil and Natural Gas Production Tax. In 1995 the Montana Legislature replaced all existing state and local extraction taxes on oil and natural gas production with a single production tax based on the type of well and production. The tax has been further refined in the intervening years. For all new natural gas production the tax rate on the working interests is 0.50 percent of the value during the first 12 months of production and 9.0 percent of the value of production thereafter. Producers are allowed to deduct the value of produced natural gas subsequently used in the production of gas. The tax rate on royalty interests is 14.80 percent. In 2005, the state legislature also enacted a privilege and license tax on oil and gas production, a portion of which funds local impact aid. All governmental royalties are exempt from taxation. (Montana Department of Revenue 2006.)

Revenues generated by the production tax are collected by the state, with subsequent disbursement of a share of the revenues distributed to the county and school district in which the production occurs, according to a legislatively established allocation formula. The state's share is 45.98 percent on production in Phillips County and 48.53 percent in Valley County (15-36-331 M.C.A.). The majority of the state's share is deposited in the general fund, with smaller shares earmarked for the Board of Oil and Gas Conservation, the University system, and other accounts. Portions of production taxes distributed to the two counties are in turn distributed among the public school retirement accounts, county-wide transportation purposes, and the school district(s), within which the production occurred. Finally, one-third is retained by the county and the other two-thirds distributed to incorporated cities and towns in the respective counties (15-36-332 M.C.A.). The current allocations of the local distributions from the oil and gas production tax are shown in Table 3.8-7.

Table 3.8-7. Statutory Allocations of the Local Shares of the Oil and Gas Production Tax

	Phillips County	Valley County
Elementary Retirement	0.43%	2.26%
High School Retirement	6.60%	12.61%
Countywide Transportation	1.08%	4.63%
School Districts	41.29%	41.11%
County General Purpose	16.87%	13.13%
Municipalities in the County	33.73%	26.26%

Source: Montana State Legislature, 2005.

In 2005, five of the nine potentially affected districts received distributions of natural gas production taxes. Those districts are Saco Elementary, Saco High School, Whitewater K-12, Hinsdale Elementary, and Hinsdale High School.

Federal Mineral Royalties (FMR). Mineral and energy resource producers generally pay a 12.5 percent royalty to the federal treasury on the value of all surface coal, natural gas, oil, and other minerals produced on federal leases. One-half of the FMR receipts are subsequently disbursed to the state in which the production occurred. The volume of production, recent rising market prices for gas, size of the resource base, and large share of federal mineral ownership combine to make federal mineral royalties an important revenue source.

Under Montana statute, 25 percent of the state's annual FMR receipts are deposited into a mineral impact account (17-3-240 M.C.A.). Monies deposited into that account are then distributed to counties from which the minerals were produced. The distribution is statutorily appropriated. The current distribution allocations and appropriations for FY 2005 and FY 2006 are summarized in Table 3.8-8 below.

Table 3.8-8. Distributions of Federal Mineral Royalties, FY 2005 and 2006

	Phillips County	Valley County	Montana Statewide
Percent of State Total *	9.1584%	1.0139%	n/a
FY 2005 Distribution	$ 373,171	$ 45,171	$ 14,009,604
FY 2006 Distribution	$ 826,694	$ 91,520	$ 36,106,573
Increase	$ 453,523	$ 46,349	$ 22,096,969

* Percent of the 25 percent distributed to counties.

Source: Montana Association of Counties, 2006.

Under the current appropriations Phillips and Valley counties collectively receive 10.17 percent of the annual distributions to local counties. In response to sharp increases in market price, the combined total rose by 119 percent to $918,214 between FY 2005 and FY 2006. Reflecting the differences in production levels, the Phillips County share of disbursements is substantially larger than the Valley County share. Phillips County allocated FMR receipts to a variety of uses, including its road-maintenance program. FMR receipts support the general fund in Valley County.

County and Municipal Fiscal Conditions

Given the location of the producing resources, natural-gas development in the region most directly affects fiscal conditions for county governments. Not only do the counties receive royalty and tax revenues generated by the production and the associated capital equipment, but they face additional demands for services, principally in the form of demands on local roads. In addition, such development indirectly affects local communities through local services provided to workers and their families, as well as indirect effects on local revenues.

Most traditional government administrative services associated with local government are included in the general fund. Road maintenance is generally covered under a separate budget, as are other services and enterprise operations. Depending on the jurisdiction, such other functions include landfill operations, solid-waste disposal, airport operations, water and wastewater systems, and public safety.

Table 3.8-9 below shows selected budget data for Phillips County and Valley County, and the cities of Malta and Glasgow. Differences in the governmental organization of the counties are suggested in the differences in the general fund expenditures budgets, $1.87 million for Phillips County and $3.19 million for Valley County. However, total annual expenditures are more comparable in magnitude: $7.95 million and $8.49 million, respectively. Employment levels of the two counties are also comparable: 57 employees in Phillips County and 60 in Valley County.

Table 3.8-9. Selected Financial Characteristics for Affected Units of Local Government

	Taxable Valuation 2005-06	Property Tax Mills 2005-06	Budgeted FY 2006 Expenditures		Budgeted Employees **
			General Fund	Total *	
Phillips County	$ 13,829,064	77.52	$ 1,869,150	$ 7,950,088	57
City of Malta	$ 1,613,031	142.00	$ 573,217	$ 3,028,830	18
Valley County	$ 24,806,426	105.22	$ 3,192,263	$ 8,492,913	60
City of Glasgow	$ 2,673,415	236.00	$ 1,352,652	$ 6,108,646	41

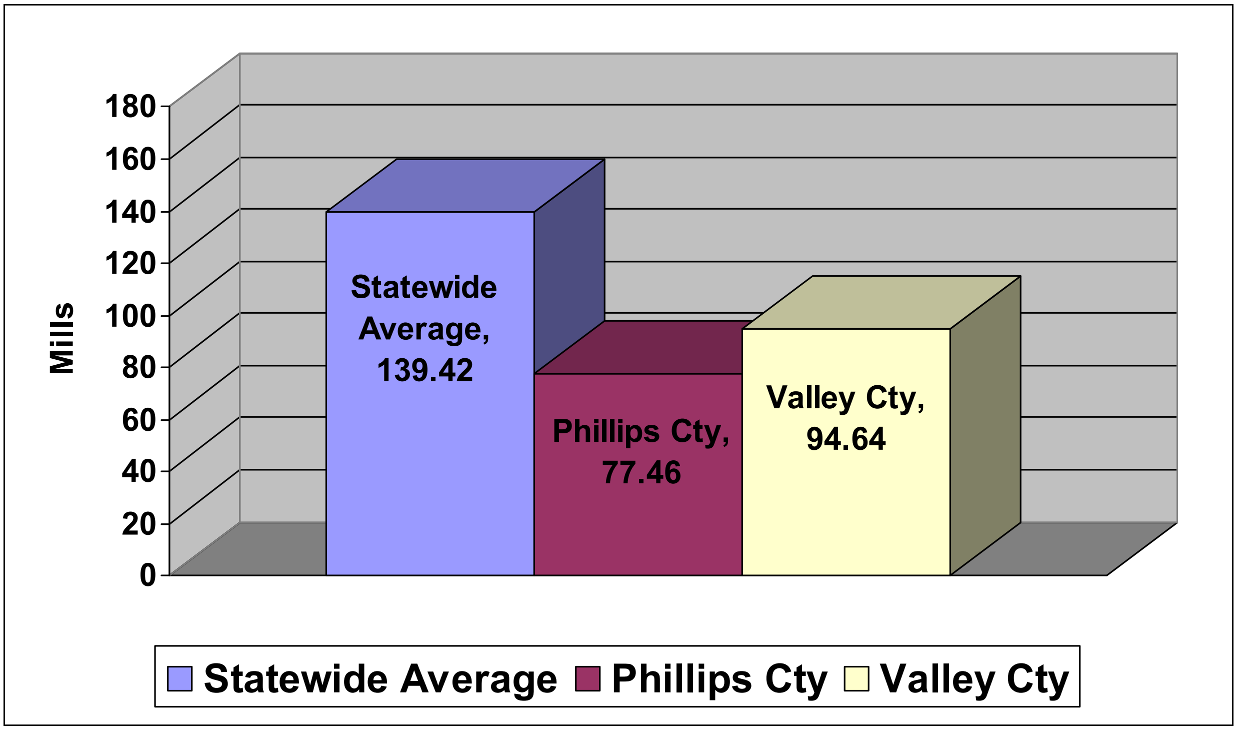
* The totals include all operating, enterprise and capital funds reported by the entity.
** Includes elected officials.
Source: Annual Budgets filed with the Montana State Department of Administration.

The budgets of Malta and Glasgow, $3.02 million and $6.1 million in total expenditures, respectively, reflect differences in the sizes of the community, the services provided by local government and programmed capital outlays, the latter of which vary from year to year. The differences are also apparent in the staffing levels: 18 employees and elected officials in Malta, compared to 41 in Glasgow.

As described above, Phillips and Valley county governments, incorporated communities, and some school districts receive revenues from natural gas production taxes and ad valorem property taxes on certain gas field and pipeline facilities. Natural gas revenues distributed to local governments and school districts affect residents in two ways. In some cases, the additional revenue allows a higher level of government and/or school district service than would be available without these revenues. In other cases, the availability of natural gas revenue reduces the tax burden on residential, commercial and other industrial property taxpayers within the county or school district. These benefits can be offset by higher service demand associated with natural gas activities; however, in Phillips and Valley counties, road maintenance appears to be the only government function that requires a higher level of service as a result of natural gas industry activities (Blunt 2006, Dunbar 2006, Peterson 2006, Pippin 2006, Reinhardt 2006).

Figure 3.8-7 contrasts county levies for Phillips and Valley counties with the average for all Montana counties. In 2004, Phillips County levied a total of 77.46 mills, Valley County levied a total of 94.64 mills and the statewide average for all counties was 139.42 mills. Although not strictly comparable because counties make different choices about the types and levels of services they provide, revenue from natural gas production, facilities, and federal mineral royalties reduces the tax burden for all other Phillips and Valley county taxpayers.

Figure 3.8-7. 2004 County Assessed Mill Levies: Phillips and Valley Counties and Montana Statewide Average



Source: Montana Department of Revenue 2005

3.8.6 Affected Groups

This section is based on scoping comments; interviews with local officials and staff of federal, state, and local government and nongovernmental organizations; and secondary sources as cited.

As indicated in the preceding sections, the study area is largely rural. Slightly more than half of the residents of Phillips and Valley counties live on ranches or farms or in small communities; slightly less than half live in Malta or Glasgow, the two county seats. Social conditions in the area include a relatively high degree of community cohesion and community attachment (USDOI BLM 1992, BPDC 2006). Self-reliance, rural/small-town life, uncrowded surroundings and access to outdoor recreation are valued by many study-area residents (BLM and Sonoran Institute, 2001 and 2007).

Population loss is a long-term trend affecting social conditions in the study area (described in section 3.8.2) as young people leave the area to seek higher education and employment opportunities. The consolidation of farms and enrollment of farm lands in the federal Conservation Reserve Program, which reduces the local agricultural economy, have accelerated population loss in the two counties as have the closure of the Zortman and Landusky mines in Phillips County and the closure of the Glasgow Air Force Base in Valley County.

Natural-gas development and production has been ongoing for over 80 years in the Bowdoin area. As a result, current and historic effects of natural-gas development on general social conditions and on specific groups are well known. The direct effects of natural-gas development are largely economic. The economic aspects of gas development have indirect effects on social conditions by slowing population loss through the creation of direct and indirect employment opportunities, reducing the tax burden on local property owners and residents and by helping fund public facilities and services, all of which contribute to community well-being and quality of life. Several factors associated with natural-gas development in the BNGPA have combined to help avoid adverse social effects sometimes associated with resource development. These include the long-term duration of development which has bred familiarity with natural-gas development and production activities, the relatively low profile and minimal footprint of the gas wells and most facilities, the dispersed nature of development, and the fact that drilling and field development typically involves a limited number of temporary crews and workers dispersed across a large area. Communities in Phillips and Valley counties have not experienced the large and rapid influx of workers and population associated with many recent resource development projects, because much of the direct employment associated with field production and indirect employment associated with both drilling and production involves existing residents.

Natural-gas development has also resulted in land-use effects. In some cases natural gas activities occupy the same land as agricultural and recreational users, which has the potential to affect social conditions by generating conflict, dissatisfaction, and a reduction in the well-being and quality of life of affected individuals and groups.

Two specific groups have been affected by natural-gas development in the BNGPA. These include ranchers, farmers, and livestock grazing permittees who occupy split-estate lands[1] or lease BLM lands that have hosted natural-gas development and recreationists who use lands and recreation resources within the BNGPA. Additionally, two groups have expressed an interest in further gas development in the BNGPA. These include groups and individuals who place a high priority on resource protection, and groups and individuals who place a high priority on resource use. These groups are similar to groups who have been identified for other land and resource management assessments in Montana, including the recent Upper Missouri Breaks National Monument Draft Resource Management Plan and Environmental Impact Statement, which included a four-county area including Phillips County (BLM 2005). Membership in any of these groups is not mutually exclusive. An individual may be a member of more than one affected group. For example, ranchers and farmers may also be recreationists and ranchers, farmers and recreationists may also give a high priority to resource protection or resource use. Some individuals and groups who give a high priority to resource use may do so in part because they believe that environmental values can be protected as resources are used.

The key perspectives and linkages of each of these four groups to historic natural-gas development in the BNGPA are discussed below.

Ranchers, Farmers and Livestock Permittees

Ranching to raise livestock, including its linkage to grazing on public lands, is the major agricultural activity in the study area although some crop farming also occurs. Members of the ranching and farming community typically have strong attachment to the land and many farms and ranches are intergenerational, passed down from the fathers and mothers of one generation to the sons, daughters, and in-laws of the next. The recent difficult economic environment for agriculture has contributed to population loss in the county as some children of

[1] A split-estate situation occurs when the surface rights and subsurface rights (such as the rights to develop minerals) for a parcel of land are owned by different parties and are said to have been severed. For split estate, mineral rights dominate, or take precedence over, other rights associated with the property, including those associated with owning the surface (US BLM 2006).

ranching families choose to pursue other careers and some ranchers and farmers choose to enroll their lands in the federal Conservation Reserve Program, which has had adverse secondary effects on industries that supply equipment and other goods and services to farmers and ranchers.

On split-estate lands, natural-gas development has at times come in conflict with the generally shared values of the ranching and farming community including autonomy, attachment to the land, self-reliance, the exercise of control over access and land use, and a preference for a quiet, rural environment. Historically these conflicts have led to a decrease in well-being and diminished quality of life for some ranchers and farmers.

Some surface owners of split-estate lands and grazing users of BLM lands have experienced dissatisfaction or conflict when natural gas operators have entered and used a portion of the surface estate in order to access the natural gas resources associated with the mineral estate. Sources of dissatisfaction and conflict include surface disturbance with associated acceleration of soil erosion and incursion of weeds, alteration of crop or grazing lands, and disruption of cultivation and grazing activities, traffic and dust associated with well and ancillary facility development and ongoing access, noise and visual intrusions, perceived change in the landscape and aesthetic values, and concern that water quantity and quality and property values could be negatively affected. Some ranchers and farmers who operate on split-estate lands have taken legal and political action to address these issues.

Surface owners in the Bowdoin area are typically paid a one-time surface damage payment. Where the mineral estate is administered by the BLM, surface owners have the right to participate in the BLM's on-site inspections during the Notice of Staking and Application for Permit to Drill process and are entitled to the same level of surface protection provided on federal surface. These and other surface-owner rights on split-estate lands where the BLM administers the mineral estate are specified in the BLM publication *Split Estate: Rights, Responsibilities and Opportunities* (BLM/WO/GI-06/022+3161).

In contrast to split-estate lands where the BLM holds the mineral interest, farmers and ranchers who own mineral rights and have leases with the Operators typically receive revenue for leases and, if a well is located on the lease, they receive royalties based on production value. Because members of this group have entered into these leases as business arrangements, they are more likely to perceive natural-gas development as beneficial, and less likely to experience conflict with the Operators because they have contractual arrangements that control the manner in which development on their land occurs.

Recreationists

Recreation users of lands within the BNGPA include residents of the area, other residents of Montana and residents of other states. Recreational use of lands within the BNGPA, described in the section **3.7.1, Recreation**, includes hunting, fishing, pleasure driving (including off-highway vehicle rides), and wildlife observation. Boating, picnicking, and camping also occur in the project area, but are limited to Nelson Reservoir. According to Section 3.7.1, recreation use of public lands within the BNGPA is believed to be moderate. Recreationists can be affected by natural-gas development and production activities and facilities that change the recreation setting and disrupt wildlife patterns for wildlife viewers and hunters. For residents of the BNGPA and other users, these effects can result in dissatisfaction and a perceived reduction in well-being and quality of life.

The large size of the BNGPA combined with the fact that drilling and field development operations have typically involved only one or two rigs and associated completion and gathering-system construction crews during the drilling/field-development season has historically resulted in a relatively low potential for conflict between recreation users and drilling/field-development activities. Similarly, given the generally unobtrusive profile of wells within the BNGPA and low volume of traffic associated with production operations, the potential for conflict between recreation users and natural gas production operations has similarly been low. According to the recreation assessment in section 3.7.1, the areas around Nelson Reservoir, along the Milk River, and near the Bowdoin National Wildlife Refuge complex have the highest potential for sensitivity to changes in the recreation setting.

A subset of recreation users in the BNGPA are the 106 leaseholders on BOR lands at Nelson Reservoir. Leaseholders own cabins and other improvements on the leases; the surrounding lands contain natural gas wells. Gas wells and recreation cabins have coexisted for sometime in the Nelson Reservoir area; in many cases the gas development predates the construction of cabins. According to Section 3.7.1, no issues or conflicts between cabin owners and natural-gas development have been reported to the Nelson Reservoir Recreation Association.

Individuals and Groups Who Give a High Priority to Resource Protection

During the scoping process, representatives of regional and national organizations have identified environmental and resource-use concerns and issues associated with gas development in the BNGPA. These groups have expressed concern that best management practices, rigorous analyses, and strong resource protection measures be implemented to avoid damage to environmental values and natural resources, both within and outside the BNGPA.

Individuals and Groups Who Give a High Priority to Resource Use

A number of individuals and organizations have expressed support for development of the natural gas resources within the BNGPA. The justification for this support is generally economic and fiscal, expressed in terms of jobs, income and local and state tax revenues. Some individuals who support development in the BNGPA have expressed the belief that development has been accomplished with minimal environmental degradation.

3.8.7 Environmental Justice

Executive Order (EO) 12898, "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations" was published in the *Federal Register* (59 FR 7629) on February 11, 1994. EO 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies and activities on minority populations and low-income populations. Low-income populations are defined as those living below the poverty level.

Implementation of EO 12898 for NEPA requires two steps:

- Identifying the presence of minority and low-income populations in areas that may be affected by the action under consideration.

- Determining if the action under consideration would have disproportionately high and adverse human health or environmental effects on identified minority or low-income populations.

Minority Populations within and near the BNGPA

Table 3.8-10 identifies the percentage of minorities in areas relevant to Bowdoin Natural Gas Project. The percentage of minority residents of Phillips and Valley counties is not meaningfully higher than the state of Montana as a whole. The percentage of minority residents in the census block groups that contain the BNGPA and communities near the project area are lower than the statewide average.

Table 3.8-10. Percentage of Minorities in the U.S., Montana, Areas Within and Near the BNGPA, Nearby Communities, Montana and U.S.

	Percentage of Total Population					
Geographic Area	White Alone	American Indian and Alaska Native Alone	Hispanic or Latino	Hispanic or Latino and White Alone	Racial and Ethnic Minorities	Percentage of Minority Population Above/Below the State Average
United States	75.1	0.9	12.5	6.0	30.9	20.4
Montana	90.6	6.2	2.0	1.0	10.5	0.0
Phillips County	89.4	7.6	1.2	0.7	11.2	0.8
Valley County	88.1	9.4	0.8	0.3	12.2	1.7
Census Block Groups around the BNGPA						
Phillips County Census Block Group 601-1	90.8	6.1	0.8	0.3	9.6	-0.9
Valley County Census Block Group 1001-1	97.7	0.9	1.0	0.3	2.6	-7.8
Nearby Communities						
Malta	92.8	4.7	1.0	0.8	8.0	-2.5
Saco	96.4	1.8	0.0	0.0	3.6	-6.9

Source: 2000 US Census, US Census Bureau, Summary File 1.

Note 1: Racial minorities includes all persons identifying themselves in the census as a non-white race, including “Black or African American,” “American Indian and Alaska Native,” “Asian.” “Native Hawaiian and Other Pacific Islander,” “Some other race alone,” and “Two or more races.” Ethnic minorities include persons who identify themselves as Hispanic or Latino.

Note 2: As Hispanic or Latino persons can identify themselves as part of any race, the calculation used to determine racial and ethnic minorities would be (a) taking all persons who did not identify themselves as white alone and adding Hispanic or Latino and White alone individuals. For the United States, this would be (1-75.1%+6%) or 30.9%.

As shown in Table 3.8-11, three Native American Tribes have trust lands within Phillips and Valley counties.

- A number of parcels of Turtle Mountain Tribal Trust lands are located within and near the project area, but these lands are not occupied by Tribal members. Both surface and mineral estates associated with these lands are administered from the Fort Belknap Reservation.
- A portion of the Fort Belknap Indian Reservation is within Phillips County about 40 miles to the south and west of the project area. According to the 2000 Census, the American Indian population of the reservation was 2,790 persons, 94 percent of the total reservation population.

- A portion of the Fort Peck Indian Reservation is located in Valley County, about 40 miles east of the project area. According to the 2000 Census, the American Indian population of the reservation was 6,391 persons, 62 percent of total reservation population.

Table 3.8-11. American Indian Populations Associated With Reservations and Trust Lands Within and Near the BNGPA

Description of American Indian Lands	Proximity to Project Area	Total Population	American Indian and Alaska Native Population	Percent of Total Population American Indian and Alaska Native
Turtle Mountain Off-Reservation Trust Land	In and near BNGPA	0	0	0.0%
Fort Belknap Reservation and Off-Reservation Trust Land, MT	Approximately 40 Miles southwest of BNGPA	2,959	2,790	94.3%
Fort Peck Reservation and Off-Reservation Trust Land, MT	Approximately 40 miles East of BNGPA	10,321	6,391	61.9%

Source: 2000 US Census, US Census Bureau, Summary File 1.

Low-Income Populations within and near the BNGPA

As shown in Table 3.8-12, the percentage of low-income persons in the State of Montana was 2.2 percent higher than the nation at the time of the 2000 census. The percentage of low-income persons in Valley County was lower than the state as a whole, but the Phillips County poverty rate was 3.7 percent higher than the statewide average.

Valley County census block group 1001-1, which contains a portion of the BNGPA, was 0.4 percent higher than the state. Phillips County census block group 601-1, which contains most of Phillips County north of US Highway 2 and the bulk of the BNGPA, had a 10.1 percent higher poverty rate than the statewide average. Although higher than the statewide average, the large size of census block group 601-1, the relatively small number of residents below the poverty level (116 persons), and the dispersed nature of the population within the census block do not indicate an environmental justice population based on poverty standards.

The Town of Saco, the only incorporated community within the BNGPA had a smaller percentage of people in poverty than the statewide average.

Table 3.8-12. Percentage of Low-Income Population Within and Near the BNGPA, Nearby Communities, Montana and U.S.

	Percentage of Total Population			Percentage of Low Income (Below Poverty) Above/Below the State Average Poverty Level
	Below Poverty Level	Below 150% of Poverty Level	Below 200% of Poverty Level	
Geographic Area				
United States	12.4	20.9	29.6	-2.2
Montana	14.6	25.7	37.1	0.0
Phillips County	18.3	29.8	41.4	3.7
Valley County	13.5	26.0	36.4	-1.1
Census Block Groups around the BNGPA				
Phillips County Census Block Group 601-1	24.7	38.2	50.5	10.1
Valley County Census Block Group 1001-1	15.0	29.8	40.5	0.4
Nearby Communities				
Malta	13.1	24.7	36.4	-1.5
Saco	14.0	31.0	39.7	-0.6

Source: 2000 US Census, US Census Bureau, Summary File 3.

Public Participation

Public participation by potentially affected minority and low-income groups is also important for environmental justice compliance. The EPA guidance for incorporating environmental justice concerns in NEPA assessments requires that potentially affected Indian Tribes be offered cooperating agency status under CFR 1508.5 (USEPA 1998). In addition to the standard scoping process for the BNGPA, the BLM consulted directly with affected tribes to determine their interest in the BNGPA and the proposed project. This consultation process is described in Section 5 of this EA.

3.9 SOILS

Introduction

Soils in the BNGPA are derived from glacial till, sedimentary bedrock, and alluvium from mixed rock sources. The BNGPA is within the Great Plains Physiographic Province and the Glaciated Missouri Plateau. Annual precipitation averages 12.7 inches and the frost-free period is generally from 90 to 131 days.

Soil information presented in this section is derived from the Soil Survey of Phillips County Area, Montana (NRCS, 2004), Soil Survey of Valley County, Montana (SCS, 1984), the National Soils Information System (NASIS) database (NASIS, 2006), and the Final Judith Valley Phillips Resource Management Plan, Environmental Impact Statement (BLM, October 1992). Because of the availability of complete, current soil survey information for the project area, a sound description of the affected environment and analysis of environmental consequences is possible.

A total of 171 consociations, complexes, associations, taxadjuncts, and variant map units occur within the BNGPA. Mollisols, with 310,685 acres at roughly 38 percent of the project area, make up the largest percentage of soil orders in the BNGPA. Entisols, with 188,263 acres and 23 percent of the project area, are also a predominant soil order. Alfisols, with 89,893 acres at 11 percent, and Vertisols, with 50,247 acres at 6 percent, are also major soil orders present in the project area. Minor areas of roughly 2 percent each of Aridisols, Inceptisols, and rock outcrop/ water/badland areas, are also present.

According to the Phillips County Soil Survey (NRCS, 2004) the majority of the project area is used as rangeland. A small portion of the project area is used for dryland and irrigated farming. The principal dryland crop is wheat and the main irrigated crops are small grains and alfalfa, used for hay. Approximately 32 percent, or 259,349 acres, of the soils in the BNGPA are considered farmland of statewide importance.

3.9.1 General Description of Major Soil Types

Three major soil types are present within the BNGPA: glacial till upland and glacial outwash soils, sedimentary upland soils, and alluvial soils. Glacial till upland and glacial outwash soils in the BNGPA formed from glacial till deposited near the end of the Tertiary Period, between 130,000 and 15,000 years ago. The glacial till ranges from a few feet to 50 feet thick and is generally underlain by clayey and loamy shale. Soils formed in glacial till are loamy or clayey, depending upon the texture of the glacial till. Soils that formed in outwash material generally have a high percentage of sand and gravel.

Sedimentary upland soils in the BNGPA are derived from shale and sandstone. Soils formed from shale parent materials are generally clayey while soils formed in sandstone parent material are more sandy. Some sedimentary parent materials, such as marine shales, can be high in salts and sodium, leading to the formation of saline and/or sodic soils.

Alluvial soils in the BNGPA developed in alluvium from mixed rock sources, predominantly alluvial materials from clay shale, sandstone, and glacial till. These soils formed on flood plains, terraces, and alluvial fans. Alluvial soils range from sandy to clayey, depending on the source material. Local areas have rock fragments throughout the soil or in the underlying parent material.

3.9.2 Soil Limitations

To assess the potential limitations of the BNGPA soils, four areas of concern were addressed. Water erosion hazard, wind erosion hazard, vehicle trafficability (mobility), and reclamation potential were assessed using soils information from the NASIS database. Results are summarized in Table 3.9-1 with a discussion provided for each category below.

Water Erosion Hazard. To assess the potential hazard for soil erosion caused by water, the soil-erosion factor Kw and soil slope values were obtained from the NASIS database for each soil mapping unit and ranked for hazard to erosion. Kw indicates the susceptibility of a soil to sheet and rill erosion (Institute of Water Research, 2002). It is one of the six factors used in the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss by water erosion. K is based on percentage of silt, sand, and organic matter, soil structure, and hydraulic conductivity (USDA-NRCS, 2007).

Water erosion hazard rankings were determined for each soil mapping unit within the BNGPA by multiplying the surface soil horizon Kw factor by the slope and plotting the product as shown on Figure 3.9-1. Depending on where the product was graphed on Figure 3.9-1, the soil was ranked as having a slight, moderate, or severe water erosion hazard. Water erosion hazard for the soils of the BNGPA is shown in Table 3.9-1 and Figure 3.9-2. Seventy-six percent, or 621,181 acres, of the BNGPA is predominantly rated as having a slight water erosion hazard (Table 3.9-1). Only 16 percent, or 128,233 acres, is rated as having a severe water erosion hazard.

Wind Erosion Hazard. To assess the potential hazard for soil erosion caused by wind, the wind erodibility index (WEI) was obtained from the NASIS database for each soil mapping unit. The WEI is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. The WEI correlates to the wind erosion group. Soils are grouped for susceptibility to wind erosion based on percent sand, silt, and clay; calcium carbonate content; presence of surficial coarse fragments; and surface wetness conditions (USDA-NRCS, 2007).

Soils with a WEI of 0, 38, 48, or 56 are considered to have a slight hazard for wind erosion; soils with a WEI of 86 have a moderate hazard for wind erosion; and soils with a WEI of 134, 160, 180, 220, 250, or 310 are classified as having a severe hazard for wind erosion. Wind erosion hazard for soils of the BNGPA is shown in Figure 3.9-3. Sixty percent of the total project area, or 491,766 acres, of the BNGPA predominantly has a slight hazard for wind erosion (Table 3.9-1). The remaining 38 percent, or 310,278 acres, of the BNGPA is mostly considered moderately erodible.

Vehicle Trafficability. To assess the capacity of the soil to support vehicle traffic during drilling and completion activities, the Military Operation Interpretation—Vehicle Trafficability, Type 7 (50 passes, wet season), was obtained from the NASIS database; to assess the capacity of the soil to support vehicle traffic during production activities, the Military Operation Interpretation—Vehicle Trafficability, Type 6 (50 passes, wet season), was obtained (NASIS, 2007). Trafficability interpretations are based on soil strength, slipperiness, stickiness, large surface stones, and slope. Slipperiness is the condition where the soil has a potential to become slick when used for vehicular traffic; during the wet season this condition is common and persistent. Stickiness is the condition where the soil has a potential to become sticky when used for vehicular traffic. During the dry season, soil stickiness is most common and persistent where the soil is ponded, flooded, or has a high water table; the soil may become sticky after precipitation events, but the condition is not persistent.

Type 7 refers to military category type-7 vehicles; type-7 vehicles are generally rear-wheel-drive and are usually not expected to operate off-road, especially in wet soils. Type-6 vehicles are all-wheel-drive and rear-wheel-drive trucks and trailed vehicles intended primarily for highway use. Trafficability performances were estimated for 50 vehicle passes in the same ruts during wet season conditions.

In the vehicle trafficability rating classes, an ‘excellent’ rating indicates that the soil has characteristics that do not limit trafficability and have very low maintenance. A ‘good’ rating indicates that the soil may have characteristics that limit trafficability but are favorable for use. Good operational performance and low maintenance can be expected. The limitations can be overcome or minimized by special planning, design, or management. A ‘fair’ rating indicates that the soil has characteristics that limit trafficability and are moderately favorable for use. The limitations can be overcome or minimized by special planning, design, or management. Fair performance, moderate maintenance, and soil degradation can be expected. A ‘poor’ rating indicates that the soil has characteristics that severely limit trafficability and one or more features that are unfavorable for use. Generally, the limitations cannot be overcome without major soil reclamation, special design, or special management. Poor performance, high maintenance, and soil degradation can be expected.

The BNGPA is predominantly rated as having fair vehicle trafficability with respect to wet roads used during drilling and completion activities, with 69 percent of the project area, or 558,043 acres, having this rating (Figure 3.9-4; Table 3.9-1). The BNGPA is predominantly rated as having good vehicle trafficability with respect to wet roads used during production activities, with 57 percent of the project area, or 464,636 acres, having this rating (Figure 3.9-5; Table 3.9-1). The extent of the soils rated as fair or poor for road construction may be overstated, as the more conservative rating class was chosen for complexes and associations with multiple ratings.

Reclamation Potential. Reclamation is the construction of topographic, soil, and plant conditions following disturbance to allow the area to fully function as part of the ecosystem (Munshower, 1994). BLM’s long-term objective of final reclamation is to set the course for eventual ecosystem restoration, including the restoration of the natural vegetation community, hydrology, and wildlife habitats. In most cases, this means returning the land to a condition approximating or equal to that which existed prior to the disturbance. The Operator is generally not responsible for achieving full ecological restoration of the site. Instead the Operator must achieve the short-term stability, visual, hydrological, and productivity objectives of the surface management agency and take the steps necessary to ensure that long-term objectives will be reached through natural processes (USDOI and USDA, 2006).

To determine reclamation potential of the BNGPA area soils, a ranking of several soil parameters, obtained from the NASIS database, was conducted and a reclamation potential class was calculated. The soil parameters included: sand, silt and clay percentage, coarse fragment content, pH, salinity, sodium adsorption ratio (SAR), calcium carbonate content, depth, and soil wetness condition. Appropriate ranking criteria for these parameters were obtained from MDEQ (1998), Schafer (1979), Dollhopf (2006), and are provided in Table 3.9-2.

The BNGPA is considered to primarily have good reclamation potential; approximately 74 percent of the project area, or 603,446 acres, has this ranking (Figure 3.9-6, Table 3.9-1). Even though a soil is considered to have a good reclamation potential, it still may have a limiting feature that may require mitigation. For example, a soil with pH levels outside of the desired range may be limited due to the unavailability of certain plant nutrients; therefore the soil may require amendments to adjust pH.

The limiting features to reclamation are provided in Table 3.9-1. The number of acres of soils with limiting features may be conservatively overstated, as any time a complex or association had multiple limiting features, all were added into the total acreage. Soil pH, SAR, texture, coarse fragments, and salinity are the main limitations to reclamation in the BNGPA.

Table 3.9-1. Potential Soil Limitations Within the BNGPA

Potential Limitation	Rating Class/Limiting Features	Acres	Percent of Total Area
Water Erosion[1]	Slight	621,181	76
	Moderate	53,058	6.5
	Severe	128,233	16
	Not Rated / Water	11,576	1.4
Wind Erosion[2]	Slight	491,766	60
	Moderate	310,278	38
	Severe	1,587	0.2
	Not Rated / Water	10,417	1.3
Vehicle Trafficability - Wet Season Conditions[3]			
Roads Used for Drilling and Completion Operations	Excellent	0	0.0
	Good	729	0.1
	Fair	558,043	69
	Poor	228,931	28
	Not Rated / Water	25,972	3.2
Roads Used During Production Operations	Excellent	729	0.1
	Good	464,636	57
	Fair	130,697	16
	Poor	191,641	24
	Not Rated / Water	25,972	3.2
Reclamation Potential[4]	Good	603,446	74
	Fair	77,346	9.5
	Poor	123,318	15
	Not Rated / Water	9,662	1.2
Reclamation Rationale	pH out of range	803,348	99
	High SAR	352,514	43
	Texture out of range	295,867	36
	Coarse fragments too high	294,556	36
	High salinity	175,721	22
	Shallow soils	101,520	12
	Calcium carbonate too high	33,745	4.1
	Saturated soils	10,352	1.3

1 To assess the potential for soil erosion caused by water, the soil erosion factor Kw and soil slope values were obtained from the NASIS database.

2 To assess the potential for soil erosion caused by wind, the wind erodibility index was obtained from the NASIS database.

3 To assess the capacity of the soil to support vehicle traffic during drilling and completion activities, the Military Operation Interpretation – Vehicle Trafficability, Type 7 (50 passes, wet season), was obtained from the NASIS database; the capacity of the soil to support vehicle traffic during production activities, the Military Operation Interpretation – Vehicle Trafficability, Type 6 (50 passes, wet season), was obtained.

4 To determine reclamation potential of the BNGPA area soils, a ranking of several soil parameters, obtained from the NASIS database, was conducted. The limiting features should not sum to the total project acreage, as a single soil could be limited by several of the features listed.

Figure 3.9-1. Water Erosion Hazard as Determined by Soil Erosion Factor (Kw) and Slope

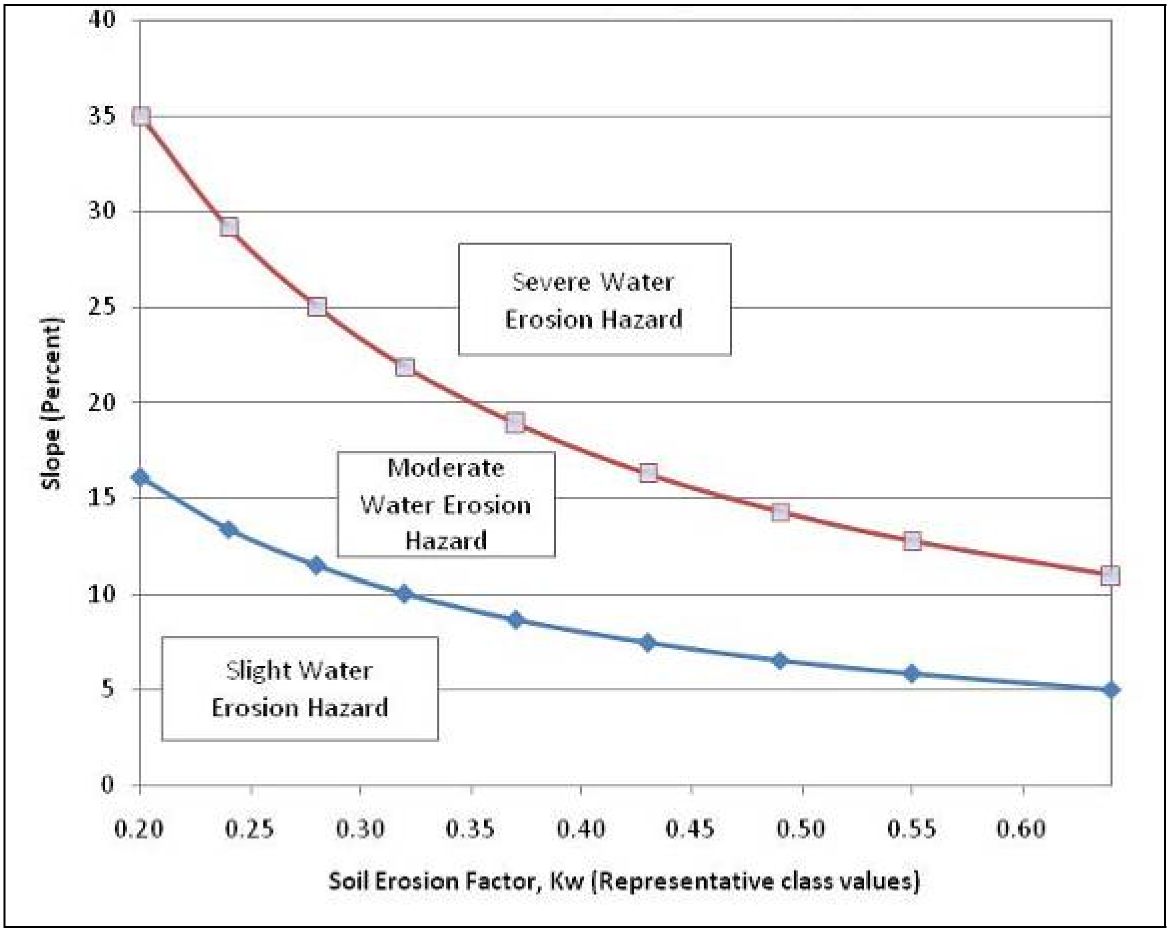


Figure 3.9-2. Water Erosion Hazard of Soils in the BNGPA

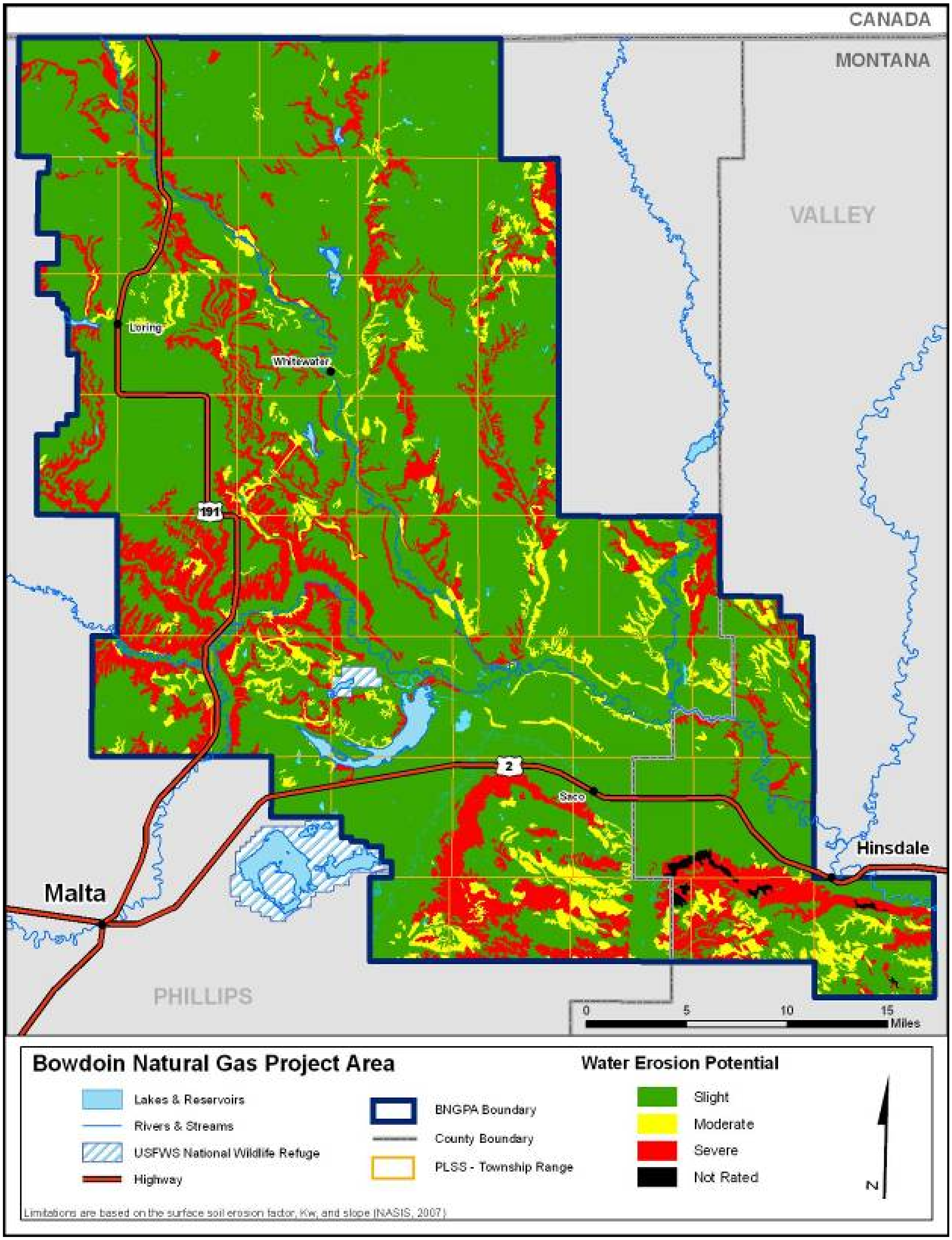


Figure 3.9-3. Wind Erosion Hazard of Soils in the BNGPA

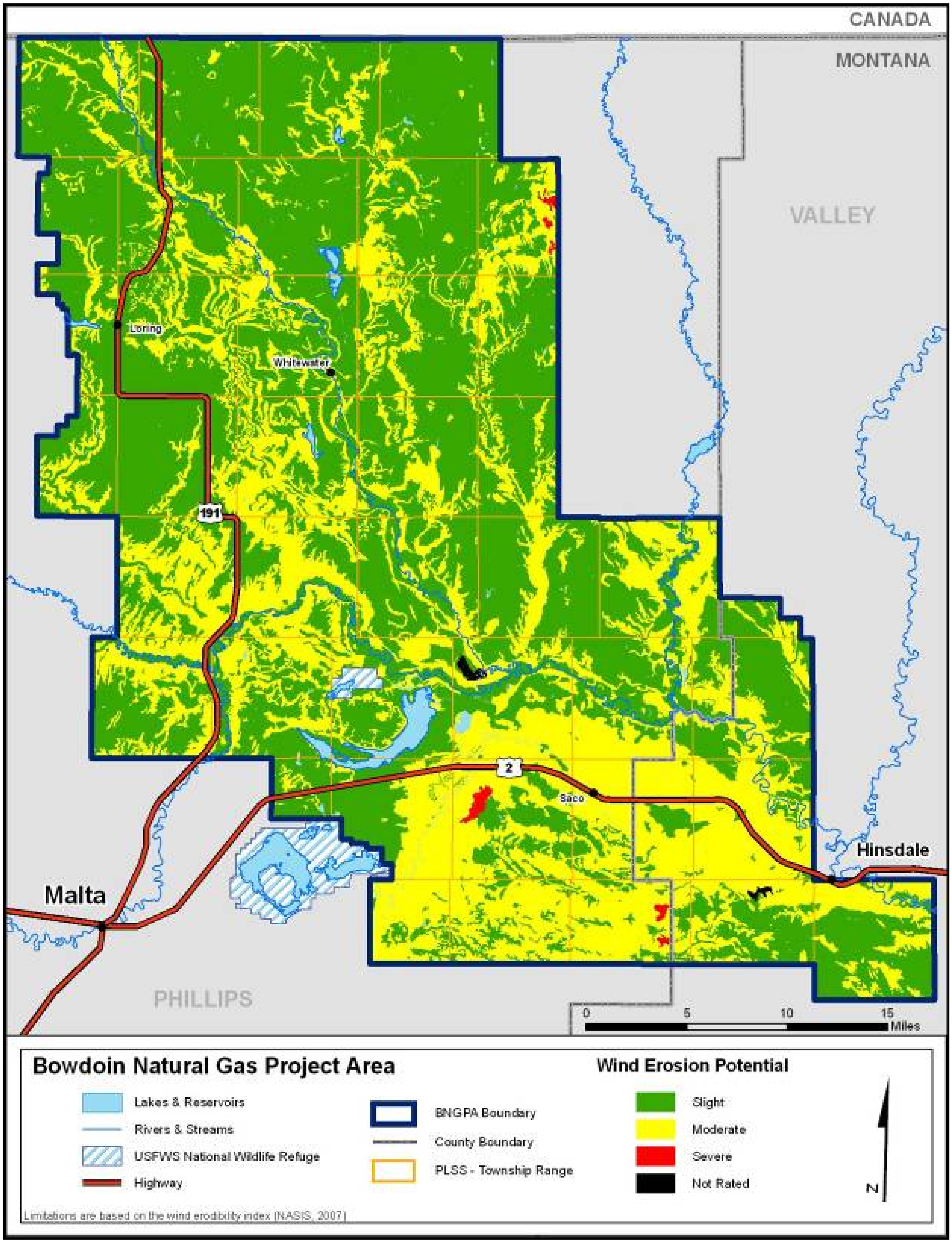


Figure 3.9-4. Vehicle Trafficability for Roads Used During Drilling and Completion Activities in the BNGPA

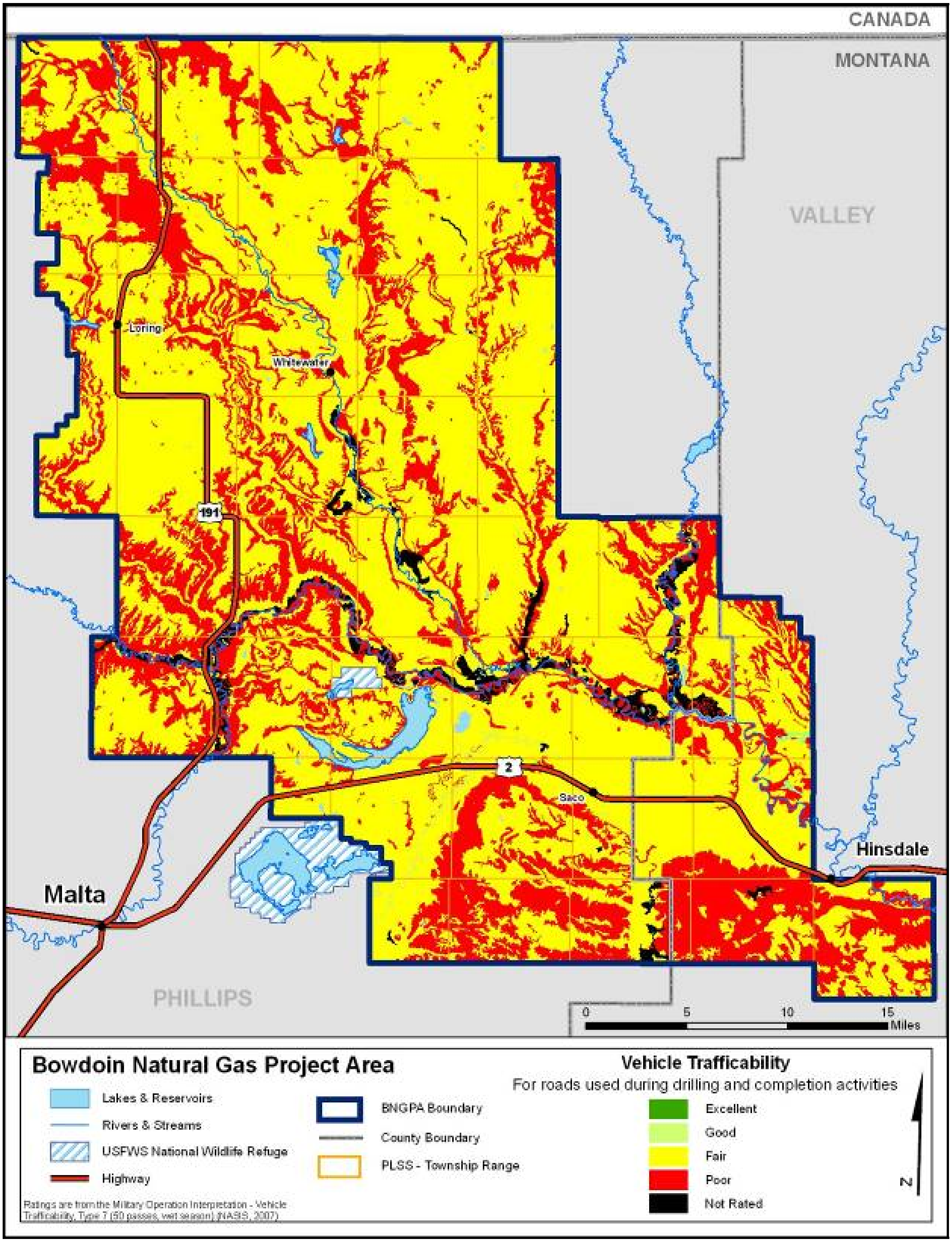


Figure 3.9-5. Vehicle Trafficability for Roads Used During Production Activities in the BNGPA

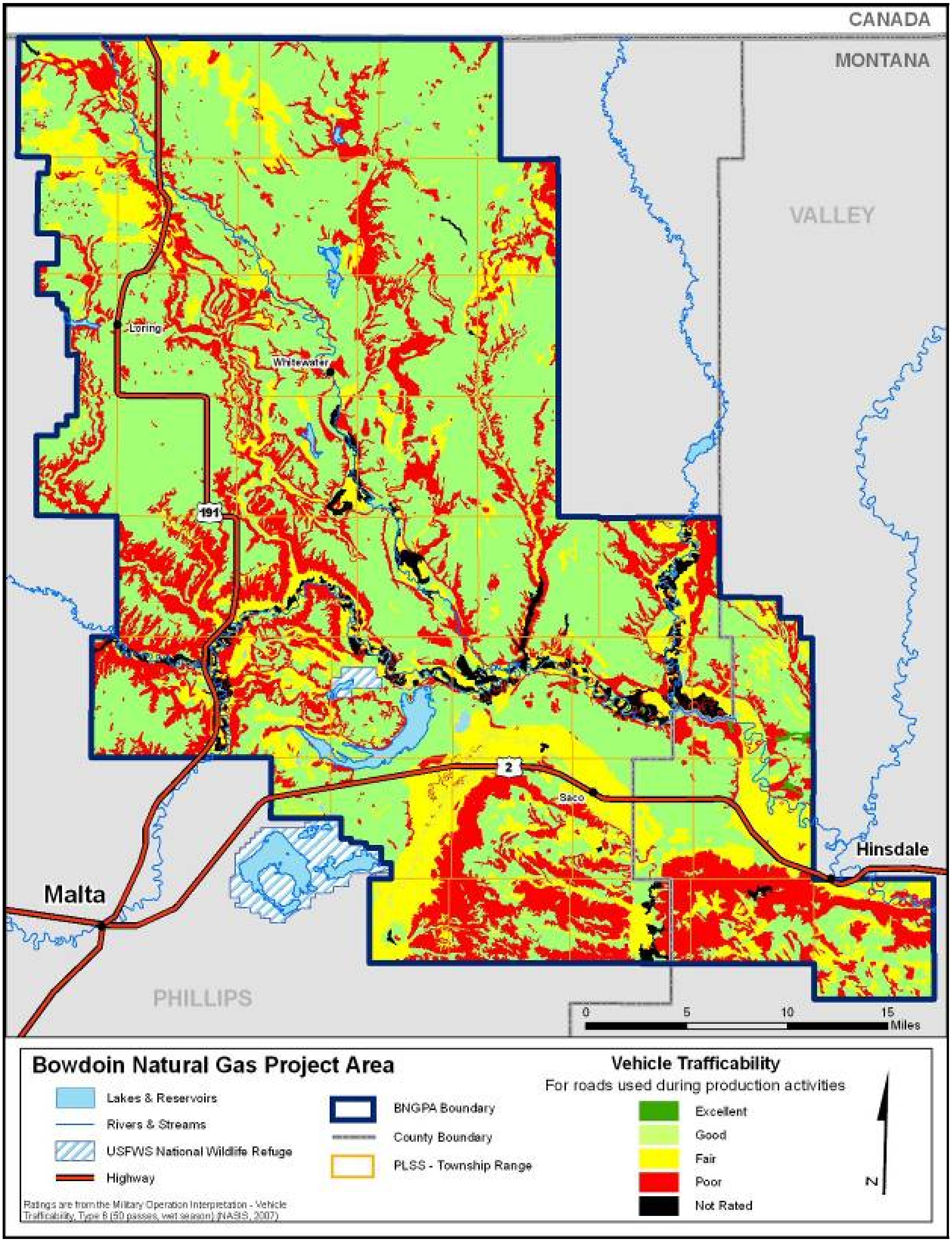
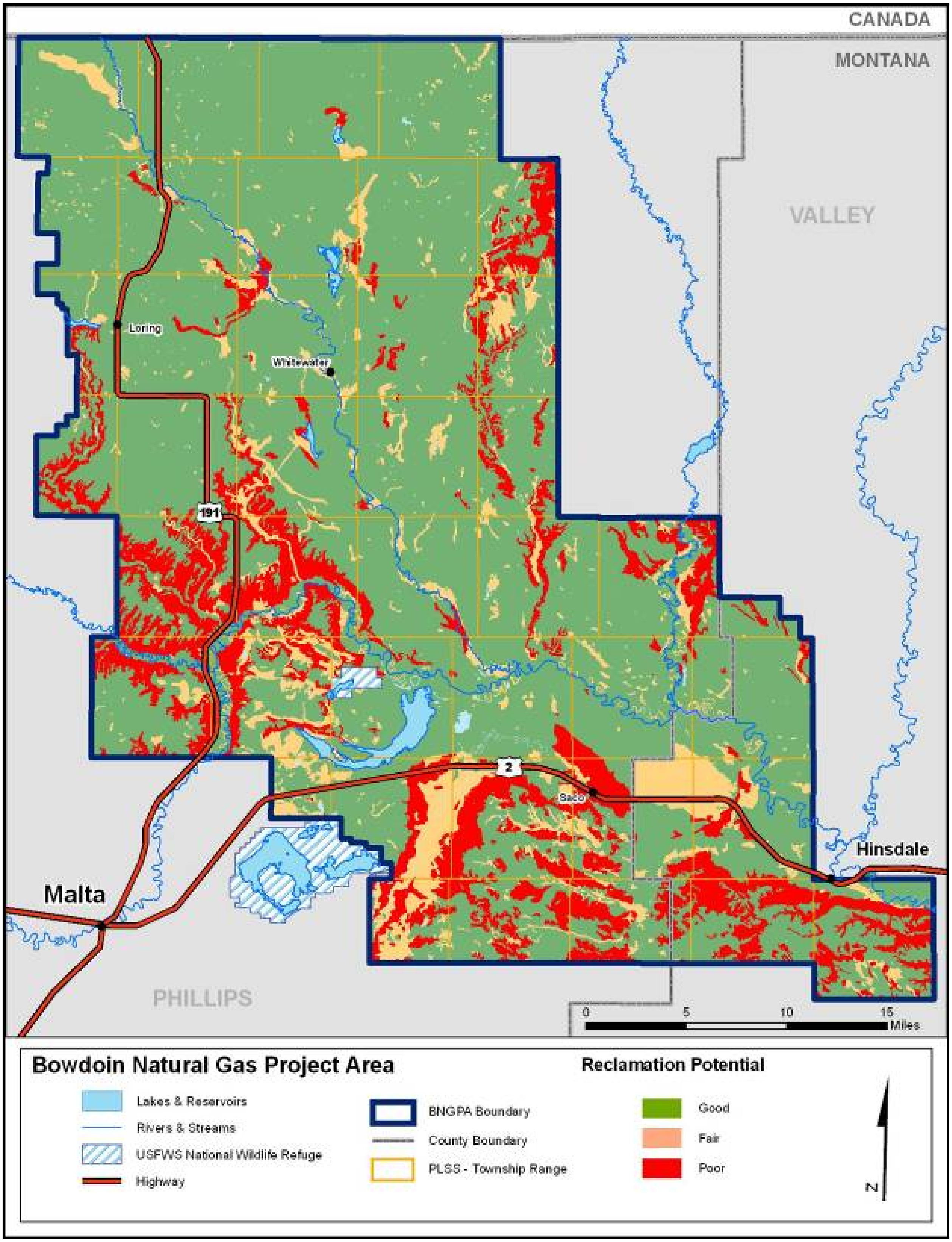


Table 3.9-2. Factors and Criteria Used to Determine Reclamation Potential at the BNGPA

Factors	Units	Good	Fair	Poor
Saturated soils	-	No	-	Yes
Depth	inches	> 24	-	< 24
CaCO3	%	< 15	> 15	-
SAR	-	0 to 4.5	4.5 to 13	> 13
EC	dS/m	0 to 4	4 to 8	> 8
pH	s.u.	5.6 to 7.8	< 5.6 or > 7.8	< 4.5 or > 8.4
Coarse fragments	%	< 15	15 to 35	> 35
Clay	%	≤ 40	> 40	-
Silt	%	≤ 80	> 80	-
Sand	%	≤ 80	> 80	-

Note 1. Criteria are from MDEQ (1998), Schafer (1979), and Dollhopf (2006).

Figure 3.9-6. Reclamation Potential of Soils in the BNGPA



3.10 TRANSPORTATION AND ACCESS

This section describes the surface transportation system that provides access to and within the BNGPA. Surface transportation is the only transportation mode considered in this assessment; it is not anticipated that rail or air transport would be affected by the Proposed Action or alternatives. The existing surface transportation network includes federal and state highways, county, BLM, private and Operator-maintained roads and two-tracks. The existing transportation network is displayed in Figure 3.10-1.

Figure 2.2-1 in Section 2 of this EA is a map of the natural gas infrastructure within the BNGPA. Figure 3.10-2 displays the federal, state, county, and natural gas highway and road infrastructure by surface type.

Table 3.10-1 displays road and highway mileage within the BNGPA by surface ownership. Roads on private land comprise the largest category of roads within the BNGPA—almost 48 percent of total surface. Roads on BLM land make up the second-largest category with almost 26 percent of the total, and county roads are the third-largest category with about 14 percent of the total.

Table 3.10-1. Highway and Road Miles Within the BNGPA by Surface Ownership

Owner	Miles	Percent
U.S. Highway	74	2.21%
Montana State Highway	31	0.92%
County Roads	458	13.66%
Turtle Mountain Allotted Lands	35	1.06%
U.S. Bureau of Land Management	862	25.71%
U.S. Bureau of Reclamation	89	2.66%
U.S. Fish and Wildlife Service	23	0.69%
Montana DNR Water Projects	0.32	0.01%
Montana Fish, Wildlife and Parks	0.39	0.01%
Montana State Trust Lands	181	5.40%
Private Land	1,598	47.67%
TOTAL	3,352	100.00%

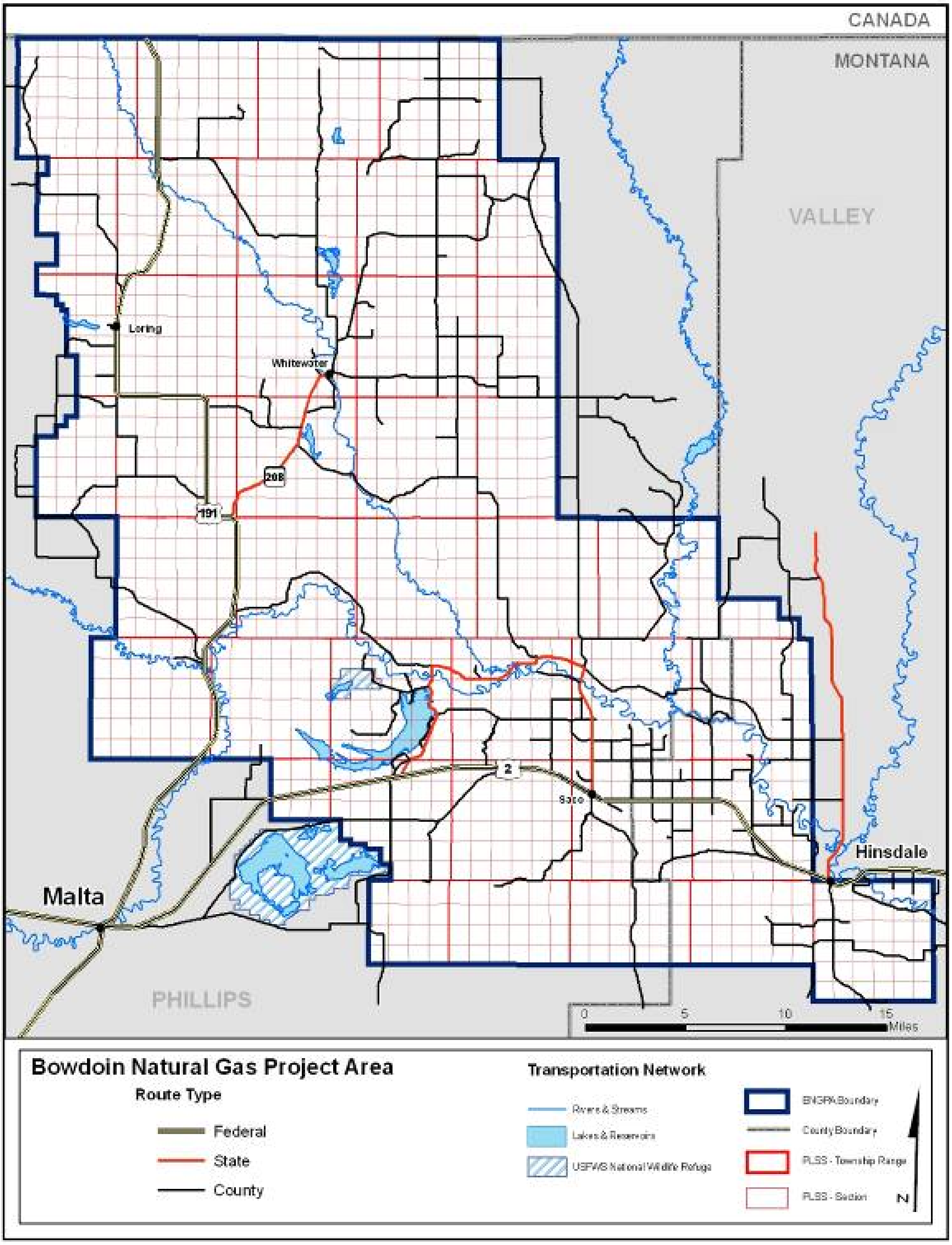
Source: 2005 aerial photograph

3.10.1 Federal and State Highways

The BNGPA is served by two 2-lane principal arterial highways; US 2, which travels west from the North Dakota border to Idaho and is the northern-most highway in the state, and US 191, which travels south from the Canadian border and provides access to Interstate 90 at Billings. US 2 and US 191 intersect at Malta.

Three Montana secondary highways also provide access to the BNGPA: MT 208 (Whitewater Road); MT 243, which provides access to Nelson Reservoir from US 2 and continues on to enter Saco from the north; and MT 537, which travels north from Hinsdale and provides access to the east side of the BNGPA.

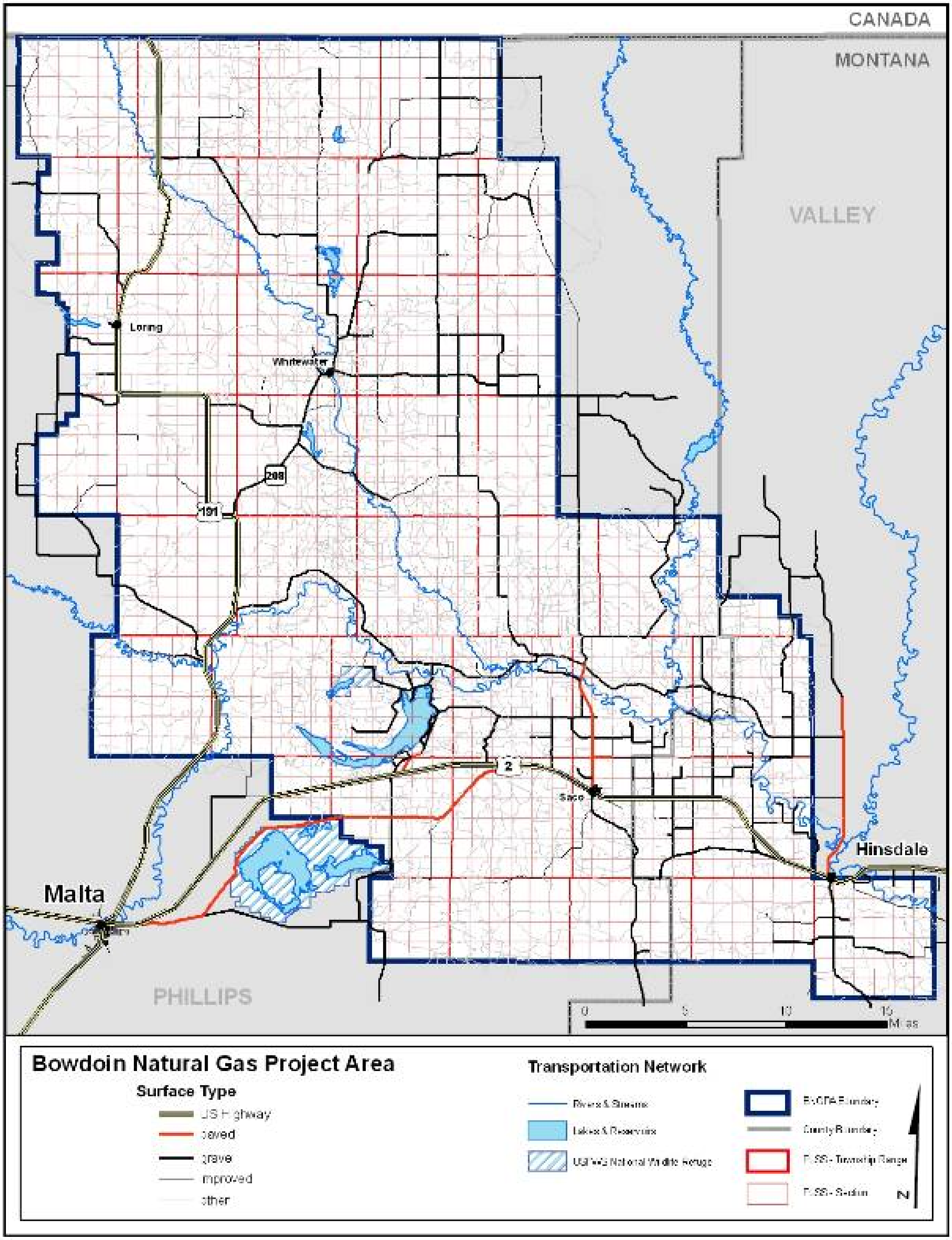
Figure 3.10-1. Highways and Roads Providing Access to and Within the BNGPA, by Ownership



Note: No warranty is made by the Bureau of Land Management for data uses purpose not intended by the BLM. Phillips County road coverages are preliminary and subject to change.

Sources: Montana Department of Transportation, Phillips County, Valley County, US BLM Montana Field Office, Bowdoin Area Operators

Figure 3.10-2. BNGPA Highway and Road Infrastructure by Surface Type



Source: 2005 aerial photograph

Table 3.10-2 displays Montana Department of Transportation (MDT) traffic counts for selected points on these highways within and near the BNGPA. Note that these traffic counts include the BNGPA-related traffic that occurred during each year.

Table 3.10-2. MDT Traffic Counts for Highways Within the BNGPA

Highway/Location	1999	2000	2001	2002	2003	2004	% Chg
US 2							
MP 470.5: 1.5 miles W of US 192, Malta	1,250	1,360	1,350	1,370	1,490	1,660	33%
MP 471.6: NW of Milk River Bridge	3,540	3,830	3,480	3,750	3,850	4,400	24%
MP 472: SE of US191 in Malta	2,370	2,520	2,290	2,460	2,360	2,810	19%
MP 488.5: I mile SW of MT 243	1,130	1,230	1,160	1,060	1,170	1,260	12%
MP 490.5: 1 mile SE of MT 243	1,100	1,170	1,170	1,010	1,130	1,340	22%
MP 511.5: 2 miles NW of Hinsdale	1,010	1,140	1,140	1,090	1,290	1,330	32%
MP 515: 2 miles E of Hinsdale	1,040	1,150	1,260	1,200	1,400	1,270	18%
US 191							
MP 154: 1.3 miles SW of MT 363 near Malta	530	490	560	680	620	580	9%
At BN RR tracks in Malta	4,270	4,360	4,040	4,490	4,500	4,980	17%
North of US 2	610	690	600	610	710	720	18%
6 miles NE of US 2	350	290	310	310	300	310	(11%)
0.7 miles W of MT 208 (Whitewater Rd)	150	130	170	150	150	140	(7%)
3 Miles S of Loring	160	170	170	170	160	130	(19%)
0.5 miles N of Loring	100	110	110	130	110	100	(0%)
At Canadian Border	80	110	110	100	80	70	(13%)
MT 208 (Whitewater Rd)							
0.5 miles N of MT 242	160	160	100	110	110	100	(38%)
MP 9: SW of Whitewater	160	160	150	150	150	110	(31%)
MT 243							
MP 1.5: 1.5 miles NE of US 2	280	260	220	300	260	260	(7%)
Between Elm and Vagg in Saco	1,190	520	520	540	540	530	(55%)*
MT 537							
MP .5: 0.5 miles NW of Hinsdale	130	210	230	230	190	170	31%
MP 10: 10 miles N of US 2/ Hinsdale	80	90	150	120	130	100	25%

* 1999 appears to be an anomaly; between 2000 and 2004 traffic at this location was relatively constant at under half the 1999 level.

Source: MDT traffic counts.

Traffic on US 2 has increased in recent years, with increases ranging from 12 to 33 percent between 1999 and 2004. Traffic on US 191 north of Malta decreased between 1999 and 2004 although there were increases in the intervening years on certain segments. Traffic on MT 208, which provides access to Whitewater from US 191 decreased during the period as did traffic on MT 243, which provides access to Nelson Reservoir and to Saco from the north. Traffic on MT 537 north of Hinsdale increased 25 to 31 percent over the five-year period.

Bid opening for a major reconstruction of MT 208 between US 2 and Whitewater was scheduled for March 2008 (Skinner 2006); potential construction dates and impacts are unknown at this time.

MDT assigns levels of service to highways in the state system. Levels of service (LOS A through LOS F) are assigned based on qualitative measures (speed, travel time, freedom to maneuver, traffic interruptions, comfort, and convenience) that characterize the operational conditions within traffic streams and the perceptions of those conditions by motorists. LOS A represents the best, or free-flowing, travel conditions and LOS F represents the worst, or total stoppage of traffic flows. The LOS ratings for the highway segments accessing the BNGPA are shown in Table 3.10-3. As shown by the table, all highways within the system currently have an LOS of A and anticipate maintaining that level for 20 years, except for US 2, which has an LOS of B.

Table 3.10-3. Level of Service Information for Highways Providing Access to the BNGPA

	Current	5 Year	10 Year	15 Year	20 Year
US 2	B	B	B	B	B
US 191	A	A	A	A	A
MT S -208	A	A	A	A	A
MT S-243	A	A	A	A	A
MT S-537	A	A	A	A	A

Source: Wilson 2006

3.10.2 County Roads

A variety of Phillips and Valley county roads provide access to and within the BNGPA. As shown in Table 3.10-4, about 360 miles of Phillips County roads and 97 miles of Valley County roads lie within the BNGPA. All but 12 miles of the county roads are constructed of gravel or native material. These roads were initially designed for use by farmers and ranchers, but have increasingly been used for gas field development and operations. County roads that access the more intensively developed areas of the BNGPA receive substantial use, which accelerates maintenance demands. Heavy truck traffic and the need to access wells and ancillary facilities when roads are muddy results in demand for higher and more frequent levels of road maintenance than would otherwise be required (Blunt 2006, Dunbar 2006). The costs associated with gas field road maintenance demand are offset by revenues from the counties' share of the gas production tax allocated to the counties for transportation purposes, by the counties' general purpose share of production tax revenues and by the counties' share of federal mineral royalties.

Table 3.10-4. Phillips and Valley County Roads Providing Access to the BNGPA

Total Miles/County		Total Miles/Surface			
Phillips	Valley	Paved	Gravel	Graded	Bladed
360.38	97.47	12.4	327.49	79.24	38.72

Sources: Phillips County and Valley County 911 mapping systems

3.10.3 BLM Roads

The BLM maintains a number of roads within the BNGPA, totaling 861.59 miles. These roads all have gravel or native-material surface.

3.10.4 Roads on Private Lands

A variety of private and Operator-developed/maintained roads and two-tracks on private lands provide access from county and BLM roads to wells and ancillary gas-field facilities. Operator roads have been specifically developed to access wells, pipeline corridors, compressor stations, and other well field facilities. In most cases these roads are two-track roads. Private roads are existing roads used by private land-owners, typically for range and cropland access. In some cases these existing roads provide access to natural gas wells and ancillary facilities. In some areas, two-track roads have proliferated as short-cuts to wells and facilities have developed. In all, roads on private lands total an estimated 1,597.83 miles within the BNGPA.

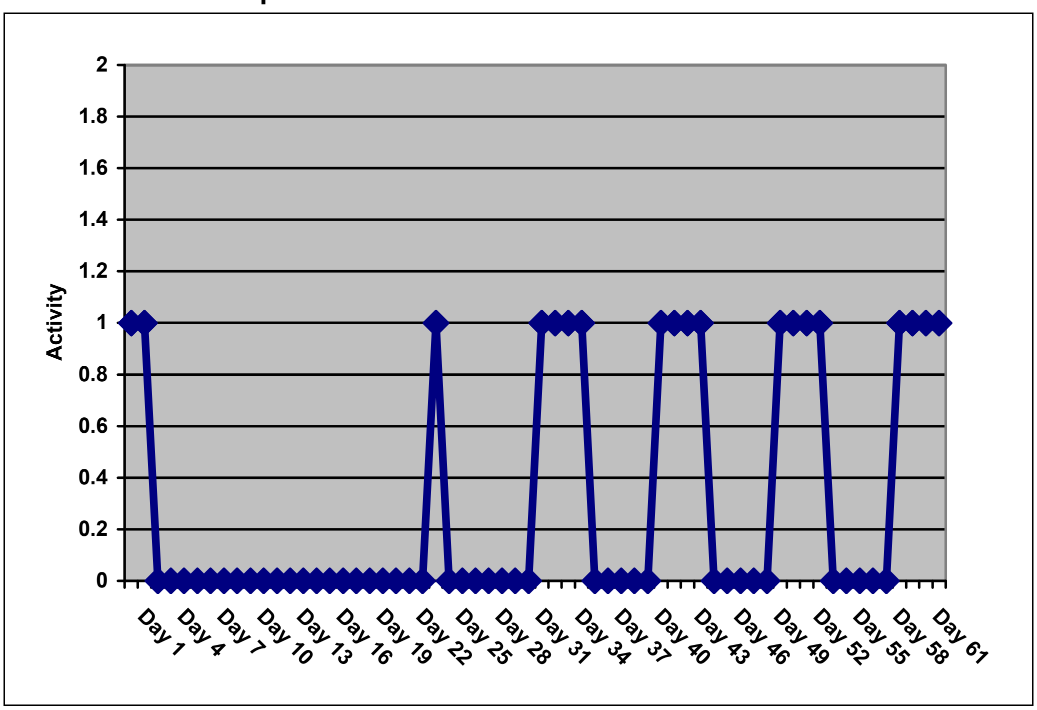
3.10.5 Current Natural Gas Drilling/Field-Development and Operations Traffic

Natural gas-related traffic within the BNGPA is associated with drilling, field development and operations.

Drilling/field-development includes well drilling and completion, gathering system construction, and occasional ancillary facility construction such as compressor stations, trunklines, roads and electrical power lines. Most drilling/field-development traffic occurs during July through November of each year.

Figure 3.10-3 displays the typical number of days that activity occurs on-site for a well completed in three zones. As shown in the figure, periods of fairly intensive activity for drilling (2 days), closed-hole logging (one day), completion (four days per zone) and installation of surface facilities and bringing the well on line (four days) are interspersed with periods of no activity at the well site.

Figure 3.10-3. Typical Days of Well Site Activity for a BNGPA Well Completed in 3 Zones



Source: FEPC 2006

Much of the large equipment for drilling and field development such as drilling rigs and pipeline construction equipment mobilizes to the BNGPA in July and remains within the area for the duration of that year's drilling/field-development season. Trips for transport of crews, supplies, and fuel, and for pipe, well site, and pipeline equipment occur on a regular basis for the duration of the drilling season. Drilling/field-development trips to the BNGPA occur on federal and state highways throughout the season. Trips within the BNGPA to well and pipeline work sites occur throughout the season and are localized, centered on that year's drilling targets. Consequently, although drilling and field development traffic is temporary and short-term, a substantial amount of traffic can occur on individual county, BLM, and private roads when adjacent wells within a lease are being drilled. Short-term, temporary periods of relatively high traffic volumes can also occur during construction of ancillary facilities such as compressor stations. Again, these periods typically last for a matter of months.

During gas-field operations, traffic volumes are substantially lower than during drilling/field-development but occur year-round and are dispersed throughout the BNGPA. Traffic-generating activities during operations primarily involve well, pipeline and compressor station operations and maintenance. Fieldmen, also known as pumpers, visit between 10 and 15 wells per day. They visit each well on a schedule ranging from twice each week to once every two weeks, depending on the well and the individual Operator's maintenance program. Wells that require off-site disposal of water comprise about 25 percent of the wells in the BNGPA. Typically a water hauler will collect produced water from two to five wells per day and make two trips to a produced-water disposal pond. Compressor stations are also visited several times per day.

3.10.6 BLM Road Standards

A Transportation Plan and the Surface Operations Section of the Master APD for Phillips County and all fields/units/leases (federal) west of Hinsdale in Valley County (USBLM undated) govern road and access issues in the BNGPA. The Plan and APD requirements include the following:

Maintenance of Existing Roads

- Guidelines for maintenance of existing roads, including repair of safety and erosion problems on roads and road features (culverts, ditches, water turnouts, etc.)
- Landowner concurrence for work on lease roads on private and state surface
- Snow removal
- Road closure

Construction of New Roads

- Operators are highly encouraged to establish working relationships with land-owners. In situations on private lands where new roads are built or old roads are reconstructed, written permission will be needed from the private land-owner.
- Future and systematic development of a transportation network that serves all Operators in north Phillips County may involve requiring Operators to look at locating roads with the philosophy of 'one road in / one road out' of each well location. This philosophy is an attempt to eliminate or curtail the 'spider-web roads' that are being made in the affected areas.
- New roads on level or nearly level ground will not be bladed unless required by the GFFS Supervisor. Once these roads are established, the Operator will be required to use these roads/trails for access. The Operator may also be responsible for drainage as specified by GFFS Supervisor. Shortcutting of roads/trails will not be allowed. Any

Operator found to be shortcutting established roads/trails will be required to obliterate the trail and compensate the private land-owner for damage.

- Road junctions will be located where sight distances are adequate for safe entry and exit. All turns, including junctions, will have radii large enough to handle anticipated truck traffic for both drilling and production. Maximum grades will generally not exceed 10 percent except for pitch grades (i.e. road sections less than 300 feet).
- When new access roads have sustained maximum grades steeper than 10 percent, on sections longer than 300 feet, or where roads cross side slopes steeper than 25 percent, the Operator will consult with the Lewistown Field Office Civil Engineer under advisement of the GFFS Supervisor. If deemed necessary, the Operator will secure the services of a licensed professional engineer to design a safe, stable road. Vertical alignment diagram, cross-sections and other engineering studies may be completed as necessary to assure sound engineering practices and proper road construction.

3.11 VEGETATION

The BNGPA lies within the EPA Level III Northwestern Glaciated Plains, Omernik Ecoregion 42 (Omernik 1987). This ecoregion is a transitional region between the generally more level, moister, agricultural Northern Glaciated Plains to the east and the generally drier Northwestern Great Plains to the west and southwest (EPA 2002). Montana is the only western state in which Ecoregion 42 occurs; encompassing approximately 37,000 square miles (95,830 km^2) in the north-central and northeastern portions of the state. Key environmental factors that govern the structure of plant communities in this ecoregion are climatic variation (particularly drought cycles), fire suppression, and herbivory. The northern portion of the BNGPA, especially north of the Milk River in Phillips County, includes a moderately high concentration of semi-permanent and seasonal wetland depressions, locally referred to as prairie potholes. This particular area has been further divided into an EPA Level IV ecoregion (42m–Cherry Patch Moraines) that extends to the International Boundary between the U.S. and Saskatchewan, Canada (Figure 3.11-1).

3.11.1 Vegetation Communities

Prairie potholes, short- and mid-grass prairie, and shrublands comprise the majority of vegetation communities within the BNGPA (Figure 3.11-2). Prairie potholes form in small, shallow glacial depressions, are ephemerally flooded, and usually are less than one acre in size (Jones 2003). Vegetation associated with the prairie potholes is structured primarily along a hydrological gradient and occurs as concentric zonal bands, depending on the relative period of inundation. Drier, temporarily flooded potholes are dominated by western wheatgrass (*Pascopyrum smithii*), and needle spikerush (*Eleocharis acicularis*). As the inundation period becomes longer and wetlands become seasonally flooded, foxtail barley (*Hordeum jubatum*) and common spikerush (*Eleocharis palustris*) become dominant. Prairie potholes receiving saline groundwater or located in more alkaline soils often are dominated by salt tolerant species including Nuttall's alkaligrass (*Puccinellia nuttalliana*), saltgrass (*Distichlis stricta*), spangletop (*Scolochloa festucacea*), and three-square bulrush (*Scirpus pungens*).

Native upland vegetation in the BNGPA is a mix of short- and mid-grass prairie communities intermixed with shrub steppe (Figure 3.11-2). Steppe vegetation is the result of a semi-arid continental climate where highly variable precipitation favors shallow-rooted, herbaceous perennial grasses and deep-rooted shrubs over forests or woodlands. Between 1905 and 1972, total annual precipitation at Malta ranged from 7.4 inches in 1956 to 22.4 inches in 1927 with an average of 12.7 inches per year (WRCC 2006). (Station metadata for Malta, NCDC COOP Station, is from 1 May 1905 to 31 May 1972). Shrub steppe vegetation in the area is characterized by open stands of plains silver sagebrush (*Artemisia cana* ssp. *cana*) with an herbaceous understory dominated by western wheatgrass, blue grama (*Bouteloua gracilis*), or needle-and-thread (*Hesperostipa comata*). Co-occurrence of short- and mid-grass prairies also is due to climatic variability. Shorter, drought-resistant species such as blue grama increase in abundance during periods of drought. Mid-grasses such as the rhizomatous western wheatgrass, bunch-forming prairie junegrass (*Koeleria macrantha*), and needle-and-thread, increase under more favorable, moister conditions (Jones 2003). Various shrubs and half-shrubs may occur within the BNGPA depending on chemical and physical properties of parent soils. Common species include Wood's rose (*Rosa woodsii*), rabbitbrush (*Ericameria* [formerly *Chrysothamnus*] *nauseosus*), greasewood (*Sarcobatus vermiculatus*), fringed sage (*Artemisia frigida*) and to a lesser extent western snowberry (*Symphoricarpos occidentalis*).

3.11.2 Vegetation Types

Plains silver sagebrush is the most common sagebrush taxa found throughout BNGPA, with big sagebrush (*Artemisia tridentata*) being more prevalent in the Saco or Larb Hills area. Silver sagebrush is a native perennial usually found growing on loamy and sandy soils. Silver sagebrush is capable of reproducing by seeds and re-sprouting from roots when top growth is destroyed allowing for a fairly rapid regeneration period (Whitson et al. 1992). Big sagebrush also is a native perennial shrub; however, reproduction is limited to seed production and the plants do not re-sprout following top-growth removal. Big sagebrush regeneration may take 50 to 75 years on harsher, more xeric sites. Consequently these two taxa are treated differently in reclamation efforts and are subject to a Condition of Approval when they are disturbed on BLM-administered lands.

Riparian vegetation in the BNGPA has been surveyed and described by the Montana Natural Heritage Program (MTNHP; Jones 2003). In general, riparian habitats along the Milk River are characterized by oxbow marshes, shrub-dominated terraces, and cottonwood gallery forests dominated by plains cottonwood (*Populus deltoides*), although narrowleaf cottonwood (*Populus angustifolia*) also is common (Jones 2003). Cottonwood stands range from open-canopy woodlands to closed-canopy forests. More mesic floodplain stands can be lush, with a well-developed and diverse shrub and small tree sub-canopy including box elder (*Acer negundo*), peachleaf willow (*Salix amygdaloides*), red-osier dogwood *(Cornus sericea*), yellow willow (*Salix lutea*), chokecherry (*Prunus virginiana*), western snowberry, Wood's rose, and silver buffaloberry (*Shepherdia argentea*; Jones 2003). Other riparian vegetation types include marsh communities associated with back channels and oxbows, including species such as broadleaf cattail (*Typha latifolia*) and hardstem bulrush (*Schoenoplectus acutus*). In addition, shrub communities associated with terraces support stands of plains silver sagebrush with an herbaceous layer dominated by western wheatgrass, and, on more alkaline sites, black greasewood with an herbaceous layer of saltgrass (Jones 2003).

Diversity of riparian and wetland-associated species is greater than upland-associated species based on a comparison of obligate and facultative species within Phillips and Valley counties (MTNHP 2007). All but one plant species listed as BLM Sensitive or Proposed Sensitive, and the one Plant Species of Concern are associated with wetland/riparian habitats (Table 3.11-1).

Figure 3.11-1. Topography and EPA Level III and IV Omernik Ecoregions Within the BNGPA

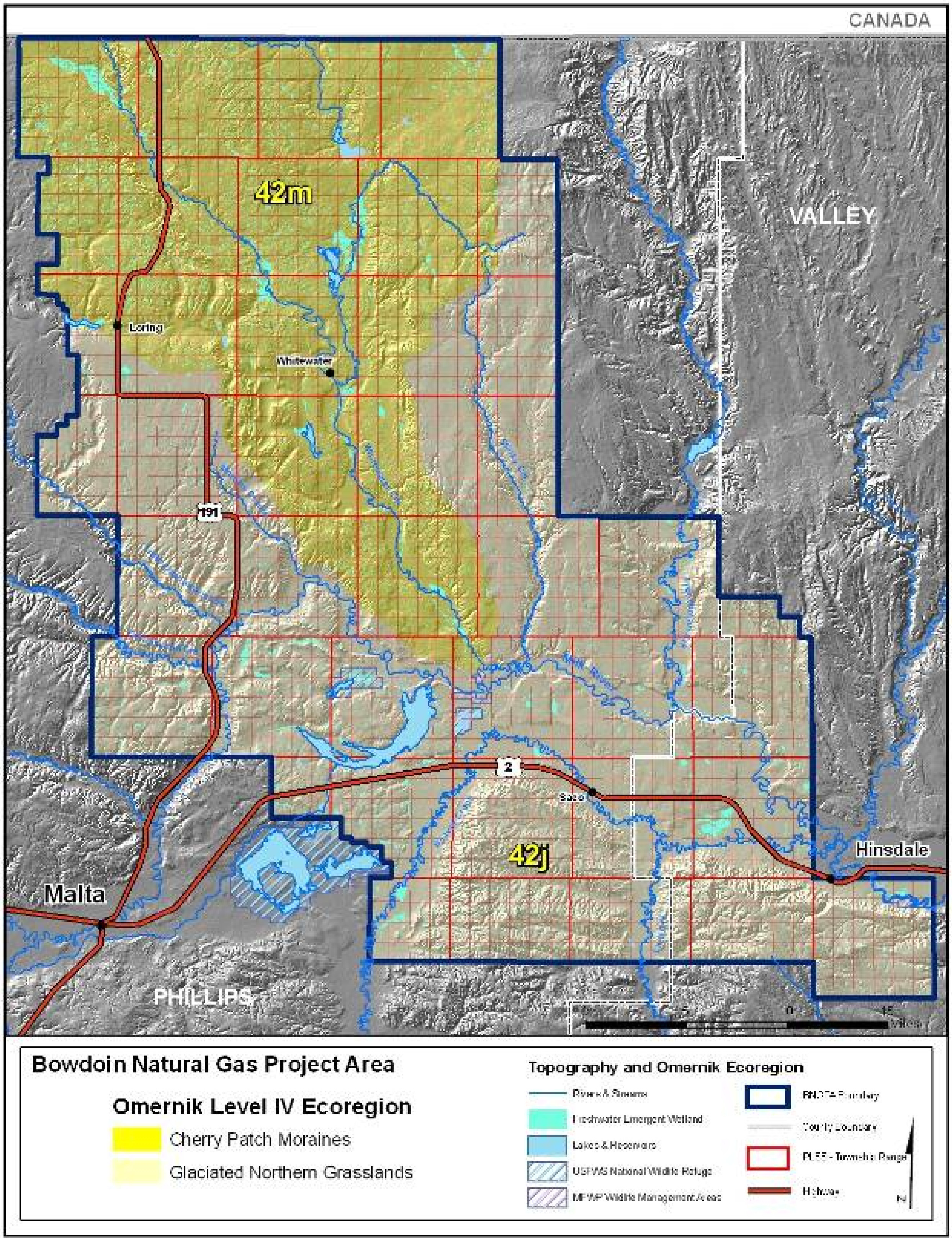
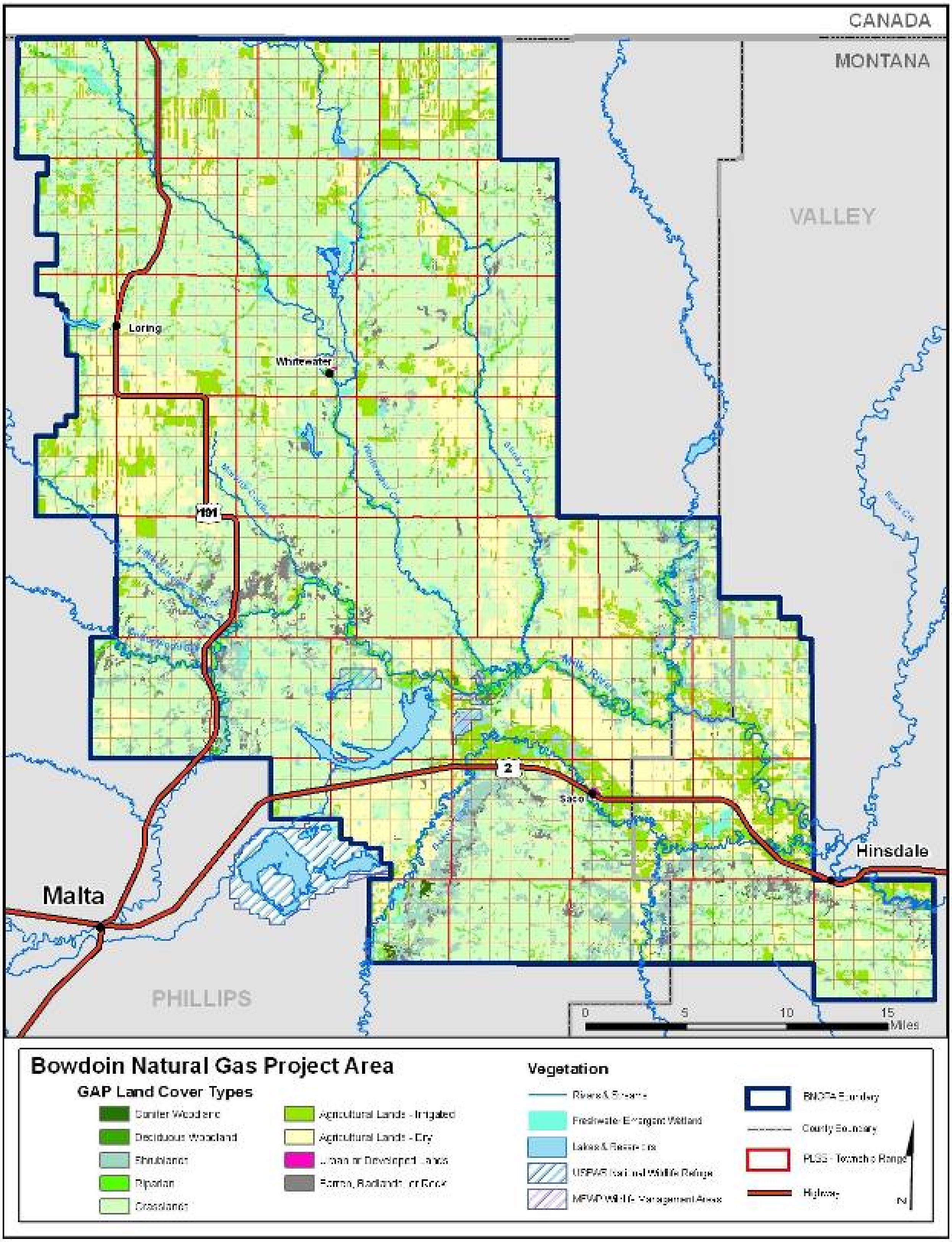


Figure 3.11-2. GAP Vegetation Land Cover Types Within the BNGPA



3.11.3 Wetland and Riparian Areas

According to National Wetland Inventory data, approximately 33,683 acres of wetlands occur within the BNGPA (Table 3.11.3-1). The vast majority of wetlands are comprised of temporarily, seasonally, and semi-permanently flooded freshwater emergent wetlands (palustrine, emergent [PEM]; Cowardin *et al.* 1979). Over 16,000 of these emergent wetland habitats are scattered across the BNGPA landscape—the majority concentrated in the Cherry Patch Moraines ecoregion north of the Milk River Valley. Several large lakes, including Nelson Reservoir, Whitewater Lake, and Pea Lake, constitute approximately 75 percent of lacustrine habitats within the BNGPA. Freshwater ponds and perennial and intermittent riverine habitats make up much of the remaining wetland surface acreage (Table 3.11.3-1). Other wetland habitats, including freshwater forested and scrub-shrub wetlands, also occur within the BNGPA but cover a much smaller proportion of total wetland area. The total surface area of all wetland habitats represents slightly more than four percent of the 812,389-acre BNGPA.

Table 3.11-1. Acreage and Proportion of Wetlands Within the BNGPA

General Wetland Description[1] • Water Regime	N	Acres	% of BNGPA Wetlands	% of BNGPA
Lakes	36	6,618	19.6	0.81
Freshwater ponds	1,145	2,296	6.8	0.28
Freshwater forested/shrub wetlands	93	174	0.5	0.02
• Temporarily flooded	85	161	0.5	
• Seasonally flooded	8	13	0.0	
Freshwater emergent wetlands	16,032	21,610	64.2	2.66
• Temporarily flooded	11,938	14,521	43.1	
• Seasonally flooded	3,972	6,280	18.6	
• Semipermanently flooded	122	810	2.4	
Other wetlands	139	552	1.6	0.07
• Temporarily flooded	120	533	1.6	
• Seasonally flooded	19	19	0.1	
Riverine	107	2,434	7.2	0.30
• Intermittent	75	1,128	3.3	
• Perennial	32	1,306	3.9	
TOTAL	**17,552**	**33,683**	**100.0**	**4.15**

[1] Wetland habitat classifications (Cowardin *et al*. 1979) include: lakes (L2ABF, L2ABG, L2UBG, L2USA, L2USC); freshwater ponds (PABF, PUBF, PUBG); freshwater forested/shrub (PFOA, PFOC, PSSA, PSSC); freshwater emergent (PEM/USA, PEMA, PEMC, PEMF); other (PUSA, PUSC); and riverine (R2UBG, R2USA, R2USC, R4USA, R4USC, R4USF).

Generally, wetlands are defined as lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin *et al.* 1979). Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. For regulatory purposes under the Clean Water Act (CWA), the term wetlands means "*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* [EPA Regulations listed at 40 CFR 230.3(t)]." To distinguish between the two major wetland ecosystems most often encountered in the semi-arid West, the terms lotic and lentic are commonly used.

Lotic wetlands are associated with running-water systems such as rivers, streams, and drainageways. Such wetlands contain a defined channel and floodplain. The channel is an open conduit which periodically or continuously carries flowing water with dissolved and suspended material. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the lotic wetland.

Lentic wetlands are associated with still-water systems. These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (e.g., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel. The majority of wetlands in the project area would be classified as lentic wetlands.

3.11.3.1 Jurisdictional Wetland Criteria

Jurisdictional wetlands are those wet areas that are protected by law through §404 of the CWA and the Swampbuster Provision of the Food Security Act. Currently, jurisdictional wetlands in the United States are those that meet the criteria defined in the 1987 Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and part 513 of the National Food Security Act Manual (3rd Ed.). These are not inclusive of all wetlands incorporated in the classification of Cowardin et al. (1979). Jurisdictional wetlands, as defined by the COE 1987 Manual, must have the following general diagnostic environmental characteristics:

- **Vegetation**—The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions. Hydrophytic species due to morphological, physiological, and/or reproductive adaptation(s) have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions.
- **Soil**—Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions.
- **Hydrology**—The area is inundated either permanently or periodically at-mean water depths $\leq$ 6.6 ft. or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.

In addition to the above criteria, for a wetland to be considered jurisdictional, it must also have a connection to a Traditionally Navigable Water (TNW) or demonstrate a "significant nexus" to a TNW. While the definitions of a wetland are fairly straightforward, whether or not a wetland is jurisdictional under the CWA is not. Jurisdictional definitions have gone through a number of legal challenges, and those definitions have been refined and revised through agency and Court decisions. The most recent Supreme Court decisions affecting the CWA jurisdictional issue include: Solid Waste Agency of Northern Crook County (SWANCC v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001), and the consolidated cases Rapanos v. United States and Carabell v. United States, presently referred to as simply Rapanos (Argued February 21, 2006—Decided June 19, 2006). The EPA and COE issued a memorandum providing guidance to EPA regions and U.S. Army Corps of Engineers districts on June 5, 2007, on implementing the Supreme Court's Rapanos decision.[2] If there is a question as to whether a wetland is

[2] Available at <www.usace.army.mil/cw/cecwo/reg/cwa_guide/rapanos_guide_**memo**.pdf>

jurisdictional or not, it should be considered jurisdictional or be otherwise indicated that the site has a high potential for jurisdictional status. If for some reason it is important to conclusively determine whether the site is jurisdictional or not, the COE should be contacted.

3.11.3.2 Functional Wetland Criteria

The biological, chemical, and physical operations and attributes of a wetland are known as *wetland functions*. Some typical wetland functions include wildlife habitat and food chain support, surface-water retention or detention, ground water recharge, and nutrient transformation. Distinct from these intrinsic natural functions are human uses of and interaction with wetlands. Society's utilization and appraisal of wetland resources are referred to as *wetland values*, which include support for commercially valuable fish and wildlife, flood control, supply of drinking water, enhancement of water quality, and recreational opportunities.

Functional definitions have generally been difficult to apply to the regulation of wetland dredging or filling. Although the intent of legislation is to protect wetland functions, delineation of jurisdictional wetlands has relied largely on structural features or attributes. The prevailing view among many wetland scientists is that functional wetlands need to meet only one of the three criteria as outlined by Cowardin *et al.* (1979) (e.g., hydric soils, hydrophytic plants, and wetland hydrology). On the other hand, jurisdictional wetlands need to meet all three criteria, except in limited situations. Even though functional wetlands may not meet jurisdictional wetland requirements, they certainly perform wetland functions resulting from the greater amount of water that accumulates on or near the soil surface relative to the adjacent uplands. Currently, many of these sites fail to meet jurisdictional wetland criteria. Nevertheless, these sites do provide important wetland functions and may warrant special managerial consideration.

Potential non-jurisdictional wetlands within the project area include the numerous “prairie potholes” on the glaciated plains of Phillips and Valley Counties. The Judith Valley Phillips RMP (1992) recognizes these potholes as wetland sites because they support vegetation “adapted for life in saturated soil conditions.” The typical pothole is not flooded every year, but when it is, it supports wetland vegetation (RMP, p. 117). If a non-jurisdictional prairie pothole is located on BLM-managed lands, it is subject to BLM jurisdiction and management.

3.11.3.3 Proper Functioning Condition

The BLM, as a land management agency, manages wetlands and riparian areas in accordance with BLM Land Health Standards (BLM 1995) to maintain their proper functioning condition (PFC). PFC is a qualitative method for assessing the condition of riparian wetland areas. The term PFC is used to describe both the assessment process and a defined, on-the-ground condition of a riparian/wetland area. This role is different from and not duplicative of the COE responsibility over jurisdictional wetlands. Hansen *et al*. (2000) point out that the current interpretation, at least in the western United States, is that not all functional wetlands are jurisdictional wetlands, but all jurisdictional wetlands are functional wetlands. The BLM Land Health Standards for riparian/wetland management provide for PFC when the following criteria are met (Prichard *et al.* 1994; Prichard *et al.* 1998):

Adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality;

- Conditions are present to filter sediment, capture bedload, and aid floodplain development;
- Conditions are present to improve flood-water retention and ground-water recharge;

- Conditions are present that favor the development of root masses that stabilize streambanks against cutting action; and
- Conditions are present that favor the development of diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses.

3.11.4 Invasive, Non-Native Species

Invasive and noxious weed species and their continued spread and establishment on private, state, and federal lands represent a serious threat to the long-term productivity, diversity, and aesthetic values of lands within the BNGPA as well as within the state of Montana. Executive Order (EO) 13112 ("Invasive Species") was signed by President W. J. Clinton on February 3, 1999. The primary purpose of this EO is to prevent the introduction of invasive species and minimize the economic, ecological, and human health impacts that invasive species cause.

The Montana County Noxious Weed Act (MCA §§7-2101 through 2153, enacted 1948, as amended) defines noxious weeds as plant species that are not indigenous to the state of Montana and meet at least one of several criteria regarding negative impacts on crops, native plant communities, livestock, and the management of natural or agricultural systems. This definition applies to species listed by both the state and local governing bodies (Table 3.11-2).

Noxious weed species recognized by Montana are grouped into three Noxious Weeds categories:

Category 1. Species in Montana that are currently established and are generally widespread in many counties of the state. Management criteria include awareness and education, containment and suppression of existing infestations, and prevention of new infestations. These weeds are capable of rapid spread and of rendering land unfit or greatly limiting beneficial land uses.

Category 2. Species that have been recently introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and establishment, and render affected lands unfit for beneficial uses. Management criteria include awareness, education, and monitoring and containment of known infestations along with eradication where possible.

Category 3. Species that have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria include awareness, education, and immediate action to eradicate infestations. These species are known pests in nearby states and are capable of rapid spread and of rendering land unfit for beneficial uses.

Table 3.11-2. Montana Noxious Weed Species[1]

Common Name	Taxonomic Name	Common Name	Taxonomic Name
Category 1		**Category 2**	
Canada thistle	*Cirsium arvense*	Dyers woad	*Isatis tinctoria*
Common tansy	*Tanacetum vulgare*	Orange hawkweed	*Hieracium aurantiacum*
Dalmatian toadflax	*Linares dalmatica*	Perennial pepperweed	*Lepidium latifolium*
Diffuse knapweed	*Centaurea diffusa*	Purple loosestrife	*Lythrum salicaria*
Field bindweed	*Convolvulus arvensis*	Tall buttercup	*Ranunculus acris)*
Houndstongue	*Cynoglossum officinale L.*	Tamarisk [Saltcedar]	*Tamarix* spp
Leafy spurge	*Euphorbia esula*	Tansy ragwort	*Senecio jacobaea*
Oxeye daisy	*Chrysanthemum leucanthemum* L.	Purple loosestrife or lythrum	*Lythrum salicaria, L. virgatum,* and any hybrid crosses thereof
Russian knapweed	*Centaurea repens*	Meadow hawkweed complex	*Hieracium pratense, H. floribundum, H. piloselloides*
St. Johnswort	*Hypericum perforatum*	**Category 3**	
Spotted knapweed	*Centaurea maculosa*	Common crupina	*Crupina vulgaris*
Sulfur (Erect) cinquefoil	*Potentilla recta*	Eurasian watermilfoil	*Myriophyllum spicatum*
Whitetop or Hoary cress	*Cardaria draba*	Rush skeletonweed	*Chondrilla juncea*
Yellow toadflax	*Linaria vulgaris*	Yellow flag iris	*Iris pseudacorus*
		Yellow starthistle	*Centaurea solstitialis*

[1] Center for Invasive Plant Management

The most common weeds of concern within the BNGPA include spotted knapweed, diffuse knapweed, Russian knapweed, and leafy spurge. Canada thistle, houndstongue, and hoary cress also occur within the BNGPA, and are included in each county's weed control district treatment and monitoring plans. Any area of surface disturbance created by project-related activities is especially vulnerable to weed invasion and establishment.

Biological control of leafy spurge using *Aphthona lacertosa* beetles in sensitive and riparian areas was initiated by the BLM Glasgow Field Station and the Valley County Weed District in the early 1900s. Results to date are encouraging, and time-series photographs depicting changes at various treatment locations are striking (BLM 2007). The Malta Field Office and the Phillips County Weed District have used this procedure from 2000 to 2007 for leafy spurge *(Apthonia nigriscutis)*, spotted knapweed *(Larinus obtusus)* and Canadian thistle *(Ceutorhynchus litura)*.

3.12 WILDLIFE

3.12.1 Introduction

The BNGPA is located within the BLM – Malta Field Office. The project area comprises approximately 14 percent of the 5.8 million acres within the field office. Objectives for wildlife management in the field office are directed by the ROD of the Judith Valley Phillips RMP (BLM 1994). The RMP provides for multiple-use planning and management of public lands and resources in a combination designed to meet present and future needs. Information concerning current and historical wildlife observations and distribution were obtained from various sources. Location and occurrence records for vertebrate species within and nearby the BNGPA were obtained from the MTNHP, and information compiled from personal communications and unpublished data from BLM, MFWP, and USFWS biologists. The MTNHP website (www.mtnhp.org) is one of the primary repositories of wildlife observation and distribution information for Montana. In addition, avian observation records are maintained on the Montana Bird Distribution Database website (http://nhp.nris.mt.gov/mbd). Information from annual Breeding Bird Surveys (www.mbr-pwrc.usgs.gov/bbs) and Christmas Bird Counts (www.audubon.org/bird/cbc) provided additional species occurrences.

3.12.2 Wildlife Habitat

A wide variety of wildlife habitats and their associated species occurs in the BNGPA. Wildlife habitats that could be affected by the project include the areas that would be physically disturbed by the construction of gas wells, related roads, pipelines, and production facilities, as well as zones of influence surrounding them. Zones of influence are defined as those areas surrounding or associated with project activities where impacts to a given species or its habitat could occur. The shape and extent of such zones varies with species and circumstances.

The BNGPA is located in the Northwestern Glaciated Plains Omernik Level III Ecoregion and includes portions of the Cherry Patch Moraines and Glaciated Northern Grasslands Level IV Ecoregions (Woods et al. 2002; Figure 3.11-1). Topography in the BNGPA varies from level, rolling prairie to steep, irregularly dissected plains broken by moraines, rocky knolls, gravelly ridges, and coulees. Short-grass prairie habitat predominates throughout the BNGPA with shrubs mostly restricted to moist depressions. Seventy-five percent of the BNGPA is "critical native prairie wildlife habitat" (Gunderson 2006). The northern portion of the BNGPA is pocked with a high concentration of semi-permanent and seasonal wetlands or prairie potholes. Cottonwoods and riparian habitat are found in the southern portion of the BNGPA along the Milk River, Cottonwood Creek, Little Cottonwood Creek, Stinky Creek, and Frenchman Creek; otherwise, trees are rare. Several large lakes and reservoirs in and nearby the BNGPA provide an array of lacustrine and wetland habitats. Bowdoin National Wildlife Refuge (NWR), located southwest of the BNGPA, consists of over 15,000 acres of resting, feeding, and breeding habitat for migratory birds and wildlife. Over 7,000 acres of Bowdoin NWR support saline and freshwater wetlands. Additional protected wetlands exist in the 1,677- acre Hewitt Lake NWR which is located within the BNGPA and is administered from Bowdoin NWR. Detailed descriptions of vegetation types within the BNGPA are provided in section **3.11**, **Vegetation**.

3.12.3 General Wildlife

At least 342 wildlife species occur in and around the BNGPA including 47 mammal species, 280 bird species (**Appendix B**), and 15 species of amphibians and reptiles. All wildlife species are important members of a functioning ecosystem and wildlife community, but most are common and have wide distributions in the region. Consequently, the relationship of most of these species to the proposed project are not discussed in the same depth as species that are threatened, endangered, rare, of special concern, of special economic interest, or are otherwise of high interest or unique value.

3.12.4 West Nile Virus

The USDA Centers for Disease Control and Prevention (CDC) states that West Nile Virus (WNV) is a mosquito-borne disease that can cause encephalitis and other brainstem diseases in humans and may impact certain vertebrate wildlife populations. WNV is spread when mosquitoes feed on infected birds, then on people, other birds and animals. WNV is not spread by person-to-person contact, and there is no evidence people can contract the virus by handling infected animals (CDC 2006). Currently the CDC has identified 43 mosquito species that may transmit the virus. Many of those species are common to Montana (e.g., *Culex tarsalis*)(CDC 2006). WNV has been detected in dead birds of at least 138 species. Although birds, particularly crows and jays, infected with WNV can die or become ill, most infected birds do survive (CDC 2006). Greater sage-grouse are very susceptible to WNV (F. Prellwitz, BLM, unpublished data).

Mosquitoes can potentially breed in any standing water that lasts for more than four days. As well densities increase, the amount of produced surface water increases and along with it, the incidence of mosquitoes and WNV.

In Montana, the first confirmed case of the disease was found in a horse in 2002. Since then, the state has had a total of 262 confirmed cases of WNV in humans, resulting in four deaths, and 349 cases in horses, with 98 deaths (Montana Department of Public Health & Human Services 2006). The risk of receiving a bite by an infected mosquito increases with work that requires being outdoors (e.g., construction and equipment operators, laborers, well tenders, etc.). The risk is also increased in areas such as Phillips and Valley counties where prairie potholes, ponds, lakes, reservoirs, and rivers are numerous and irrigation is common.

Research is continuing on the relation of WNV and wildlife populations by the Wyoming Veterinary Lab, Montana State University, University of Montana, USDA, and the University of Alberta.

3.12.5 Big Game Species

Six big game species have the potential to occur in the BNGPA, including pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), moose (*Alces alces*), and bison (*Bos bison*). Pronghorn, mule deer, white-tailed deer, and elk populations are managed by the MFWP within areas designated as hunting districts or management units. The BNGPA has traditionally supported higher-than-average densities of pronghorn, mule deer, and white-tailed deer (Gunderson 2006). In addition, moose and bison potentially can occur in the BNGPA as they move south across the international border from adjacent Grasslands National Park (NP) in Canada. A rapidly expanding moose presence in the BNGPA has been noted in recent years (D. Prellwitz, BLM, personal communication). In addition, recent releases of wild bison in Grasslands NP raise the potential for their occurrence in the BNGPA from dispersal through livestock fences into the Frenchman Creek Breaks (D. Prellwitz, BLM, personal communication).

Pronghorn is the most abundant big game species within the BNGPA. The BNGPA is located in MFWP Region 6 and includes parts of Antelope Hunting Districts 600, 620, 630, and 670. The BNGPA provides year-round habitat for resident pronghorn and vital winter habitat for pronghorn that migrate south from Canada (Gunderson 2006, Sullivan 2006). Approximately 18.5 percent of the BNGPA is classified as winter/year-round pronghorn range, primarily located in the southern portion of the BNGPA around the Milk River (BLM, unpublished data; Figure 3.12-1). The remainder of the BNGPA is classified as year-round pronghorn range (MFWP 2002; Table 3.12-1). Ten pronghorn counting units (CU) are partially or entirely within the BNGPA (Gunderson 2006). Count data collected over the last 20 years indicates that six of the 10 CUs have pronghorn densities 40 percent higher than the regional average (Gunderson 2006).

Mule Deer are common year-round residents within the BNGPA. The BNGPA is located in MFWP Region 6 and includes parts of Deer Hunting Districts 611, 620, 630, and 670. Approximately 27.6 percent of the BNGPA is classified as winter/year-round range (BLM, unpublished data; Figure 3.12-2). The remainder of the BNGPA is classified as year-round mule deer range (MFWP 2004; Table 3.12-1). Rough terrain along Cottonwood Creek, Little Cottonwood Creek, and Frenchman Creek, and near Conservation Reserve Program (CRP) lands provides winter habitat for resident and migrant mule deer populations (Sullivan 2006). Trend data collected over the last 20 years indicates that mule deer winter at extremely high densities in the Frenchman Creek drainage (D. Prellwitz, BLM, unpublished data; Gunderson 2006). Radio-collar data reveals that many mule deer travel up to 50 miles to these wintering areas (Gunderson 2006).

White-tailed Deer are quite common year-round residents within the BNGPA where suitable habitat exists. The BNGPA is located in MFWP Region 6 and includes parts of Deer Hunting Districts 611, 620, 630, and 670. White-tailed deer are distributed across over 30 percent of the BNGPA, primarily along the Milk River, and various tributaries including Cottonwood Creek, Little Cottonwood Creek, Whitewater Creek, Stinky Creek, and Frenchman Creek (MFWP 1996; Table 3.12-1, Figure 3.12-3). White-tailed deer occur in small pockets in the northern portion of the BNGPA in CRP lands and shelter belts found primarily on private land (Sullivan 2006). MFWP annually conducts a white-tailed deer trend survey along the Milk River in the BNGPA, and data collected over the last 20 years indicate population densities at nearly 50 deer per square mile (Gunderson 2006).

Elk are uncommon within the BNGPA. The BNGPA is located in MFWP Region 6 and includes parts of the Hi-Line and Missouri River Breaks Elk Management Units. An isolated pocket of summer range is located around Rock Creek Canyon approximately three miles east of the BNGPA (MFWP 1999; Figure 3.12-1). Because elk habitat within the BNGPA is marginal, the MFWP does not intensively manage elk in the area, but concentrates most of its efforts to encourage elk use in the Missouri River Breaks (Sullivan 2006).

Moose are increasingly becoming more common and may be even more abundant than elk in the BNGPA. Moose dispersing across the border from Grasslands NP in Canada account for the majority of sightings in the BNGPA (Figure 3.12-4). The incidence of moose sightings has increased significantly since 2004 primarily along the Milk River. Moose are most likely to be found along the Milk River, Frenchman Creek, or Whitewater Creek where perennial water supports abundant riparian vegetation. Individual moose may remain in an area for up to several weeks, but the majority of moose dispersing into the BNGPA continue south toward the Missouri River or east to the Ft. Peck Indian Reservation. Dispersal might be the result of young animals looking for territories, or a result of disease organisms affecting the brain (D. Prellwitz, BLM, personal communication). Moose had not previously been hunted in the BNGPA. However, in order to limit the potential for spread of Chronic Wasting Disease from Saskatchewan to Montana, a recent Fish and Game Commission meeting in Helena approved two permits for moose in this area for the 2008 hunting season (Ibid.).

Bison were reintroduced in Saskatchewan, Canada, in May 2006 after being extirpated for 120 years. Seventy-two wild plains bison were released in the west unit of Grasslands NP where Frenchman River in Canada crosses the international border and becomes Frenchman Creek in the United States. No changes were made in the fence on the international border and any bison might easily escape their fenced pastures and enter the United States (Figure 3.12-4). Bison in Montana would become the responsibility of the MFWP who would have no means of moving them back, other than allowing the animals to return on their own. BLM Wildlife

Biologists and Technicians are already looking for bison in the Frenchman Breaks whenever they visit that area. A bison bull sighting north of Loring in April 1998 may have been an animal dispersing from other locations in Canada. Nevertheless, the origin of this bison remains unexplained.

Big Game Summary. Overall, the BNGPA is regularly used year-round by at least three big game species (i.e., pronghorn, mule deer, and white-tailed deer). The entire BNGPA is used by resident pronghorn and mule deer, and provides winter habitat for resident populations of these species as well as populations migrating south from Canada. Important habitat for mule deer, white-tailed deer, and wintering pronghorn exists along the Milk River and its tributaries in the central and southern portion of the BNGPA. MFWP has identified a small patch of elk summer range outside the BNGPA; however, regular use of the BNGPA by elk has not been documented or encouraged. Elk and moose sightings are sporadic and unpredictable within the BNGPA. Moose and bison sightings are likely to increase as animals from Grasslands NP disperse south into the BNGPA.

Table 3.12-1. Seasonal Ranges (acres) of Big Game Species Within the BNGPA

Species	Winter/Year-long	Year-long
Pronghorn	150,760	649,060
Mule Deer	223,870	624,120
White-tailed Deer	--	248,050

Figure 3.12-1. Seasonal Ranges of Pronghorn and Elk Within and Near the BNGPA

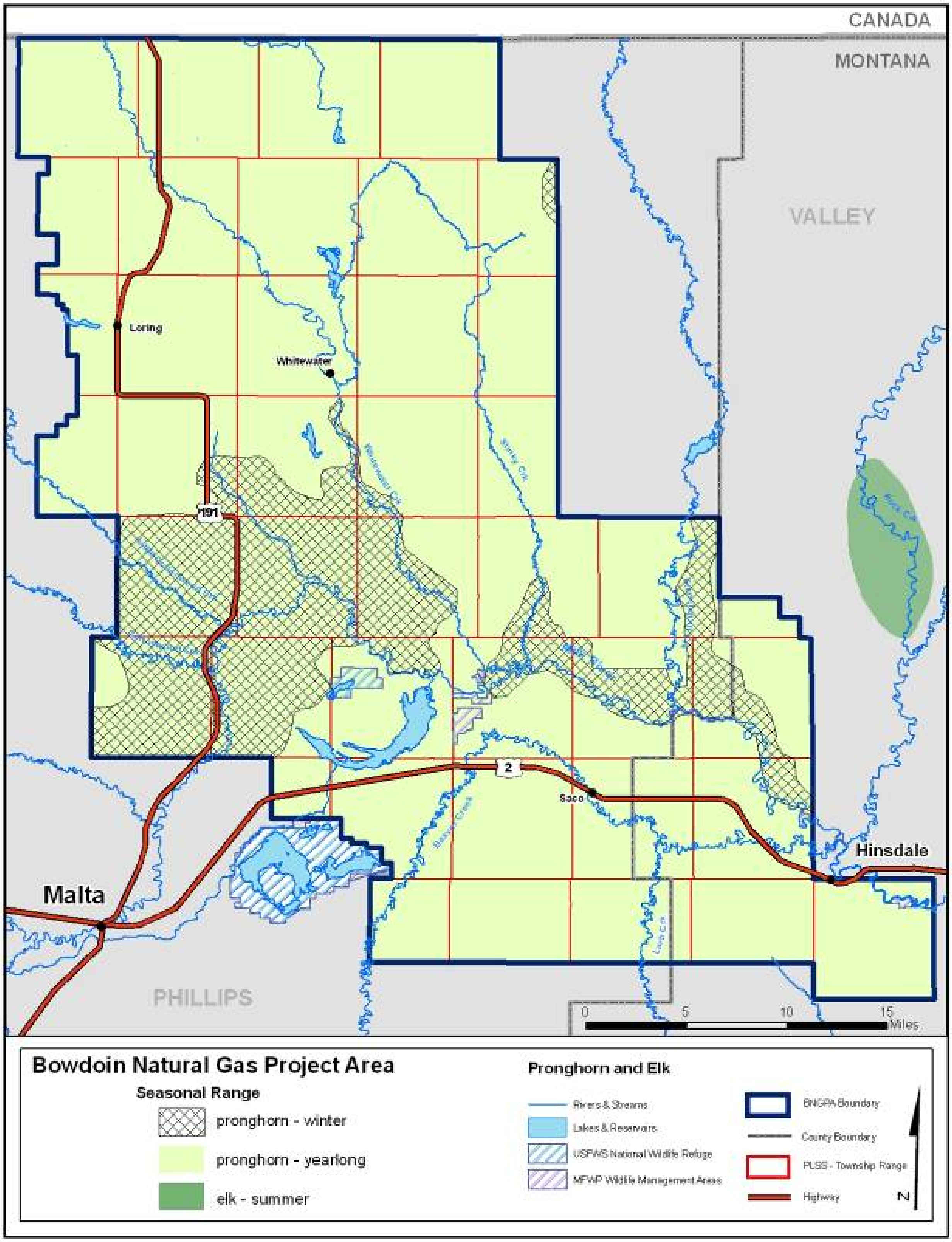


Figure 3.12-2. Seasonal Ranges of Mule Deer Within the BNGPA

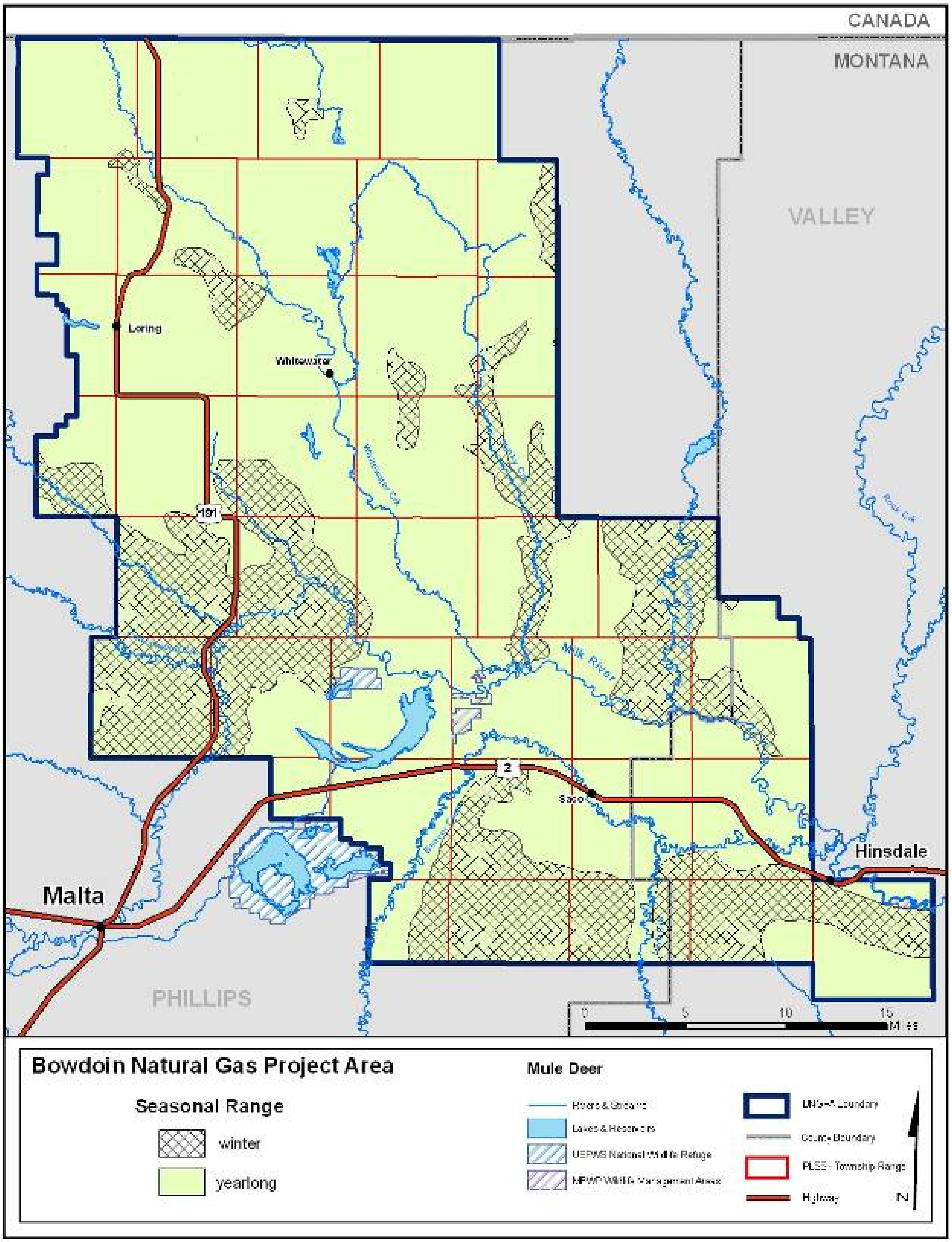


Figure 3.12-3. Range of White-tailed Deer Within the BNGPA

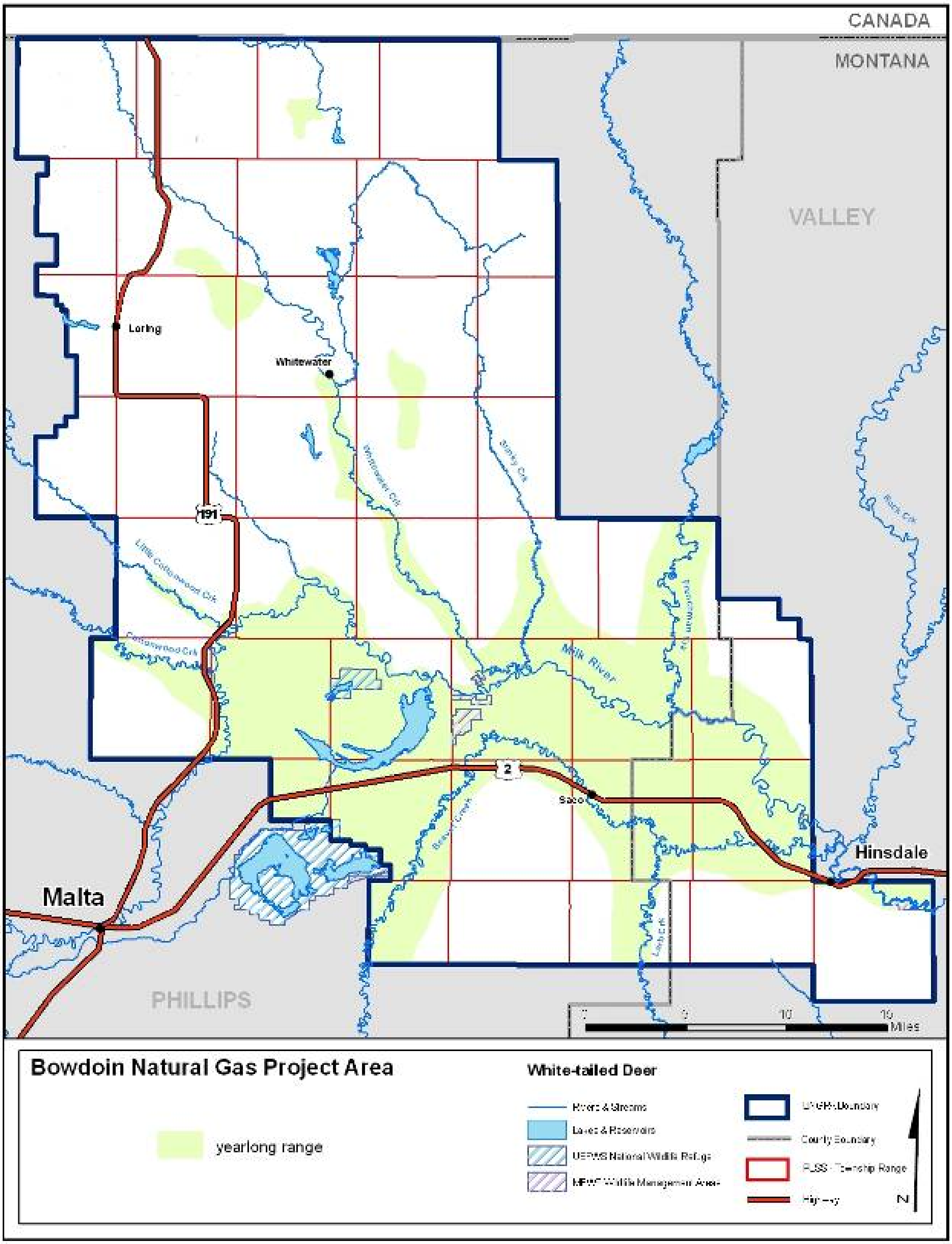
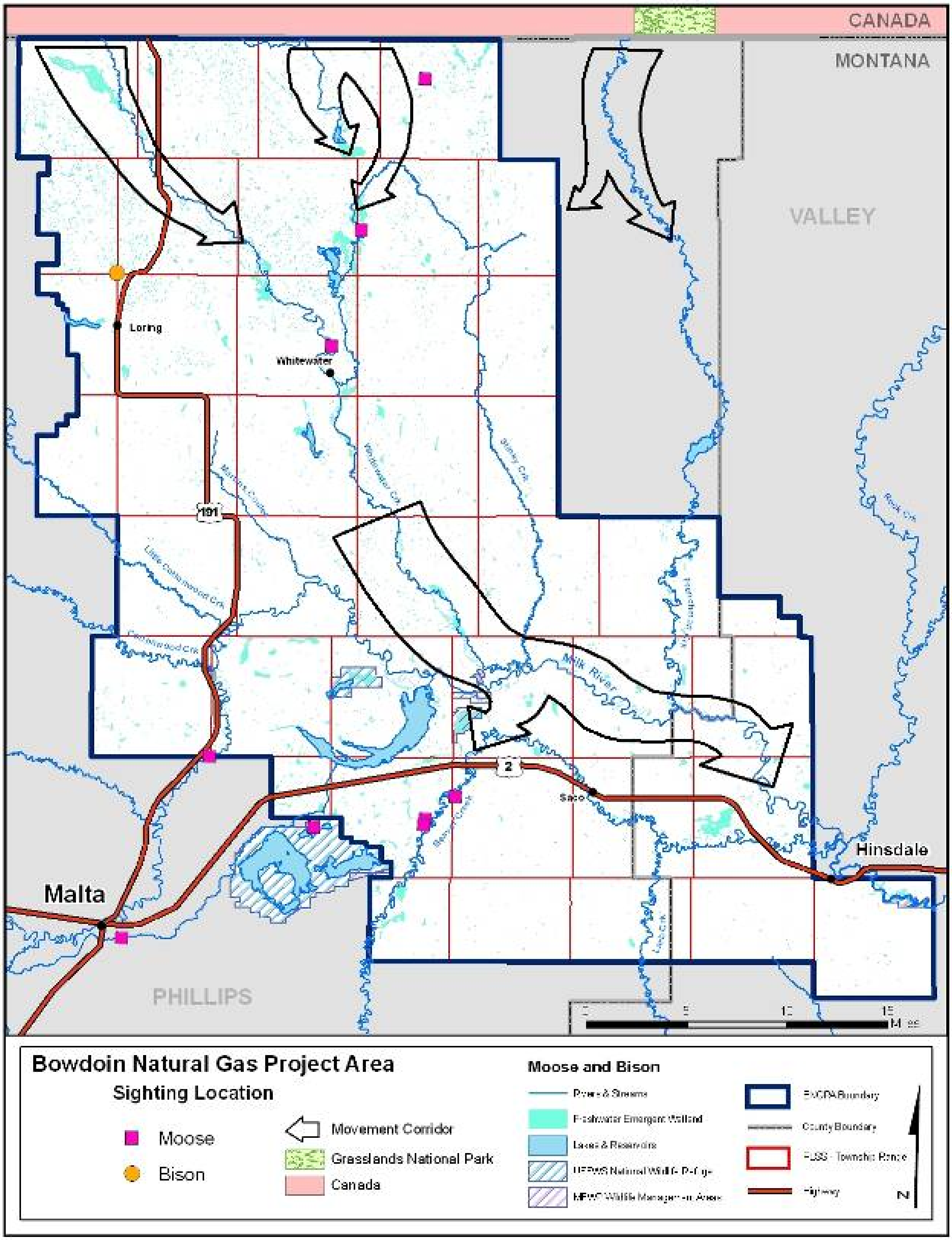


Figure 3.12-4. Locations and Potential Movement Corridors of Moose and Bison Within and Near the BNGPA



3.12.6 Upland Game Birds

Five upland game bird species occur in the BNGPA, including ring-necked pheasant (*Phasianus colchicus*), wild turkey (*Meleagris gallopavo*), gray partridge (*Perdix perdix*), sharp-tailed grouse (*Tympanuchus phasianellus*), and greater sage-grouse (*Centrocercus urophasianus*). Upland game bird populations in the BNGPA are managed by the MFWP Region 6.

Ring-necked Pheasant is a widely distributed, introduced upland game bird species primarily found in open grasslands and cropland habitats near riparian areas. Scattered trees and brushy cover along watercourses near grain crops are preferred habitat (MTNHP 2006*b*). Ring-necked pheasant are found all along the Milk River and its tributaries where suitable habitat exists (Sullivan 2006; Figure 3.12-5). Ring-necked pheasants frequently are found near gas wells in the Milk River Valley where they have adapted to living in proximity to human activities (D. Prellwitz, BLM, personal communication).

Wild Turkeys occur in open forest habitats with rugged terrain, grasslands, and brushy draws. Canyon bottoms and grain fields provide suitable fall and winter habitats. Wild turkeys occupy small pockets of habitat along the Milk River; however, wild turkey habitat in the BNGPA is marginal (Sullivan 2006; Figure 3.12-5). Wild turkeys occasionally are observed in the McNeil Slough and Cree Crossing areas north of Nelson Reservoir. More suitable habitat and higher population numbers occur outside the BNGPA along the Milk River below Hinsdale (Sullivan 2006).

Gray Partridge is an introduced upland game bird species and is common in mixed cultivated and non-cultivated habitats, often with patches of little bluestem grass. Grain fields interspersed with grasslands, weed patches, and brushy cover nearby provide escape and winter cover. Gray partridge populations are highly variable, but currently are relatively high in the BNGPA (Sullivan 2006).

Sharp-tailed Grouse primarily occupy grassland habitats with some shrub cover and access to brushy coulees and scattered trees. Sharp-tailed grouse are common within the BNGPA, and currently are exhibiting population numbers at or above management levels (Sullivan 2006; Figure 3.12-6). Sharp-tailed grouse are very common in the area north of the Milk River and in the Martin's Coulee area. An intensive aerial lek survey was conducted in the early 1980s (Grensten 1987). At least 107 leks were located within the BNGPA during the survey. Approximately 65 percent of the possible leks identified during aerial surveys in Phillips County were confirmed as active. The number of current leks probably has changed little since the 1980s, and although exact lek locations may have changed slightly in recent years, lek locations probably are in the same general areas. Forbs and insects are just as important as shrubs for providing sharp-tailed grouse food. Sharp-tailed grouse are less abundant near the Canadian border where shrub cover and rough topography is less common.

Greater Sage-grouse is a Montana Animal Species of Concern, and is designated as sensitive by the BLM. The species is discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

Figure 3.12-5. Habitat of Ring-necked Pheasant and Wild Turkey Within the BNGPA

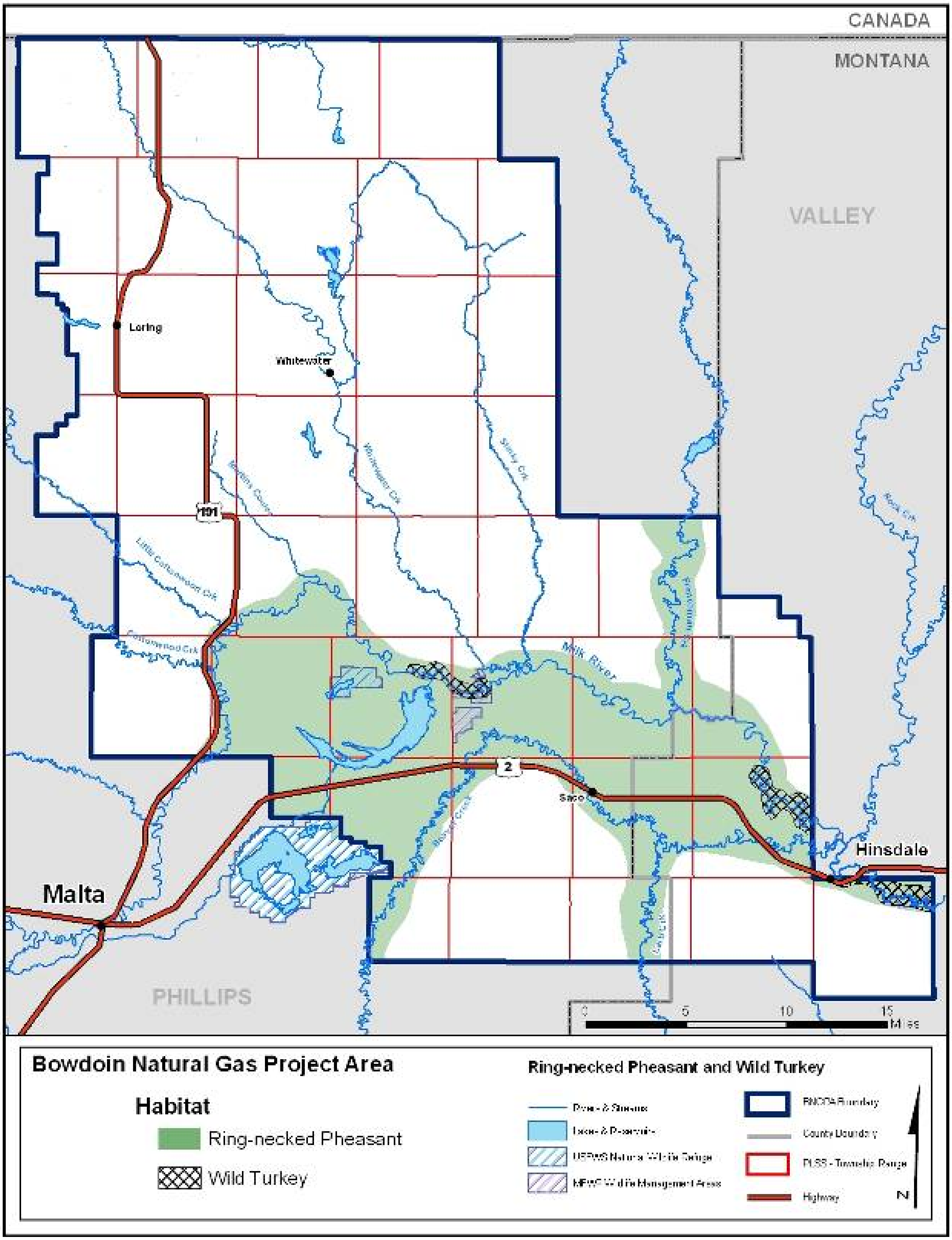
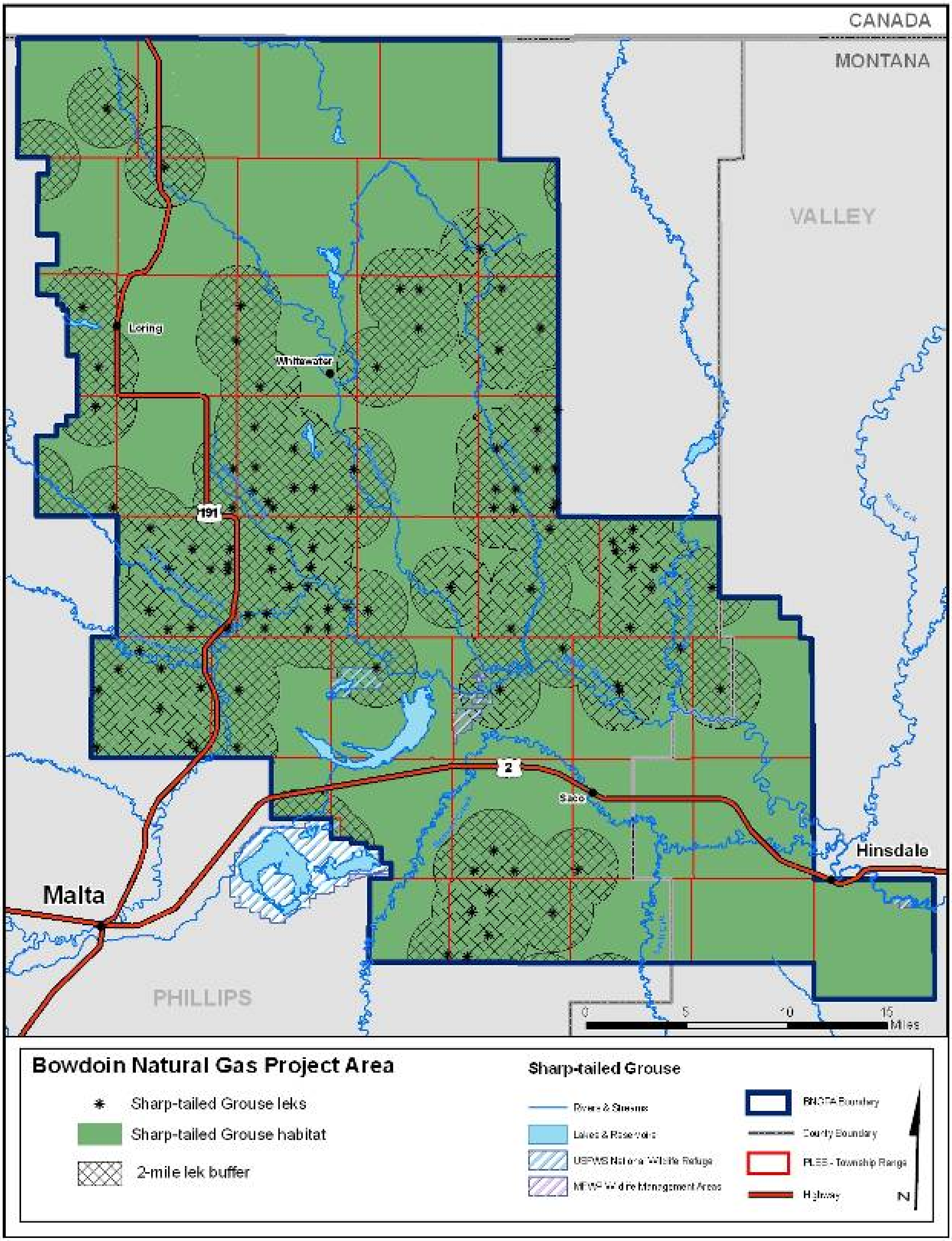


Figure 3.12-6. Habitat, Lek Locations, and Two-mile Lek Buffers of Sharp-tailed Grouse Within the BNGPA



3.12.7 Raptors

Twenty-five raptor species are known to occur in or around the BNGPA, including 13 that breed or potentially breed, three that over-winter, and nine that have been recorded as transients or migrants (Table 3.12-2). Seven species are designated as Montana Animal Species of Concern (MTNHP 2006*a*; Table 3.13-3), and are discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

A variety of raptor breeding, hunting, and winter habitats occur within the BNGPA. Grasslands, shrublands, trees in riparian areas, and cliffs, rocky outcrops, and badland breaks all provide suitable nest substrates throughout the BNGPA; however, most species are found at low densities. The Milk River and other drainages that support trees and other riparian habitats (i.e., Cottonwood Creek, Little Cottonwood Creek, Stinky Creek, and Frenchman Creek, in particular) provide habitat for tree-nesting species and provide potential roosting sites for wintering raptors.

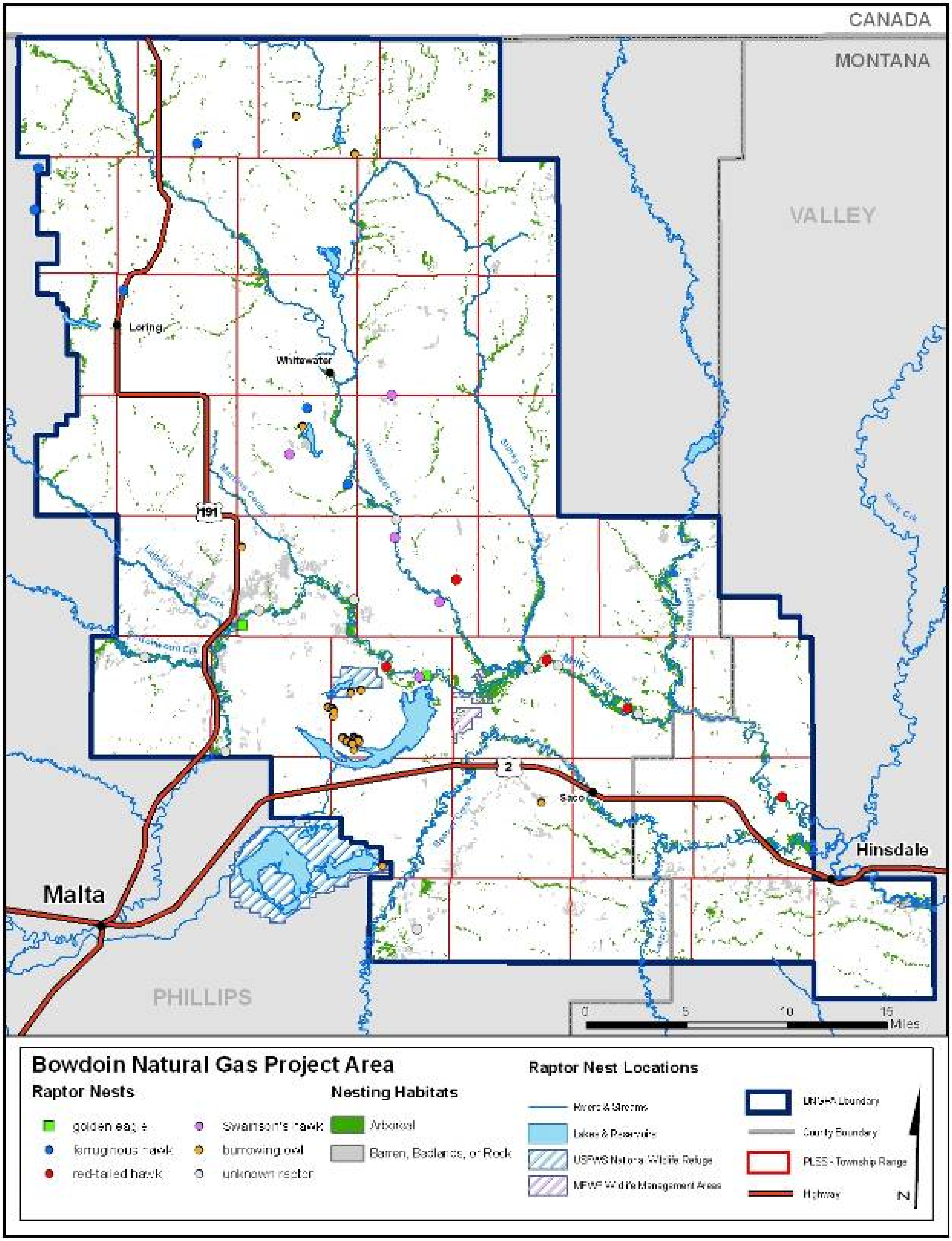
Wildlife biologist from the BLM, MFWP, USFWS, and Hayden-Wing Associates (HWA) have located at least 43 raptor nests belonging to five species in or within one mile of the BNGPA (HWA, unpublished data; BLM, unpublished data; Figure 3.12-7). In addition, biologists have located 12 unknown raptor nests within the BNGPA. The majority of nests are located in riparian areas or in cottonwoods scattered in upland areas. Most burrowing owl nests have been located in the prairie-dog colonies near Hewitt Lake and Nelson Reservoir. Turkey vultures are present throughout the summer within the BNGPA, and the population size has significantly increased in the past decade, especially around Nelson Reservoir (D. Prellwitz, BLM, personal communication).

Table 3.12-2. Occurrence Potential of Raptor and Vulture Species Within the BNGPA

Common Name[1]	Scientific Name	Occurrence Potential[2]
American Kestrel	*Falco sparverius*	pB
Bald Eagle*	*Haliaeetus leucocephalus*	t
Broad-winged Hawk	*Buteo platypterus*	t
Burrowing Owl*	*Athene cunicularia*	B
Cooper's Hawk	*Accipiter cooperii*	t
Eastern Screech-owl	*Otus asio*	B
Ferruginous Hawk*	*Buteo regalis*	B
Golden Eagle	*Aquila chrysaetos*	B
Great Horned Owl	*Bubo virginianus*	B
Gyrfalcon	*Falco rusticolus*	W
Long-eared Owl	*Asio otus*	B
Merlin	*Falco columbarius*	B
Northern Goshawk*	*Accipiter gentiles*	W
Northern Harrier	*Circus cyaneus*	B
Northern Saw-whet Owl	*Aegolius acadicus*	t
Osprey	*Pandion haliaetus*	t
Peregrine Falcon*	*Falco peregrinus*	t
Prairie Falcon	*Falco mexicanus*	B
Red-tailed Hawk	*Buteo jamaicensis*	B
Rough-legged Hawk	*Buteo lagopus*	W
Sharp-shinned Hawk	*Accipiter striatus*	t
Short-eared Owl	*Asio flammeus*	B
Snowy Owl	*Nyctea scandiaca*	W
Swainson's Hawk*	*Buteo swainsoni*	B
Turkey Vulture	*Cathartes aura*	t

[1] Special-status species indicated by asterisk.
[2] Occurrence potential of raptor species includes: known breeding (B); known to be present during breeding season and potentially breed (pB); known to over-winter (W); and known transient or migrant (t).

Figure 3.12-7. Location of Raptor Nests and Potential Arboreal, Cliff, and Badland Nesting Habitat Within and Immediately Adjacent to the BNGPA



3.12.8 Colonial Nesting Waterbirds

Colonial nesting waterbirds include species belonging to the following avian orders: Pelecaniformes (pelicans and cormorants), Ciconiiformes (herons, egrets, and ibises), and Charadriiformes (gulls and terns). Eared grebes are known to nest in large, dense aggregations in association with other colonial nesting species. They are discussed in this section although species in the order Podicipediformes (grebes) are not conventionally classified as colonial nesting waterbirds. Twenty-one species of colonial nesting waterbirds potentially could occur within or nearby the BNGPA (Reichel 1996, Feigley 1998, USFWS 1999, MBDD 2006*a*, *b*; Table 3.12-4). Fifteen species nest or potentially nest within or nearby the BNGPA, and all occasionally, if not regularly, feed within the BNGPA. Six species are rarely observed as transients or migrants. Nine colonial nesting waterbird species are designated Montana Animal Species of Concern due to their sensitivity to disturbance (MTNHP 2006*a*; Table 3.13-3), and are discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

Table 3.12-3. Occurrence Potential and Preferred Wetland Type of Colonial Nesting Waterbird Species Within or Near the BNGPA

Common Name[1]	Scientific Name	Occurrence Potetial[2]	Wetland Type[3]
American White Pelican*	*Pelecanus erythrorhynchos*	b	L
Arctic Tern	*Sterna paradisaea*	pB, b	L
Black Tern*	*Chlidonias niger*	pB, b	M
Black-crowned Night-heron*	*Nycticorax nycticorax*	b	M
Bonaparte’s Gull	*Larus philadelphia*	t	M
California Gull	*Larus californicus*	B, b	L
Caspian Tern*	*Sterna caspia*	B, b	L
Cattle Egret	*Bulbucus ibis*	t	M
Common Tern*	*Sterna hirundo*	B, b	L
Double-crested Cormorant	*Phalacrocorax auritus*	pB, b	L, M, R
Eared Grebe	*Podiceps nigricollis*	B, b	M
Forster's Tern*	*Sterna forsteri*	t	M
Franklin's Gull*	*Larus pipixcan*	b	M
Great Blue Heron	*Ardea herodias*	pB, b	R
Great Egret	*Ardea alba*	t	M, R
Herring Gull	*Larus argentatus*	t	L
Interior Least Tern*	*Sterna antillarum athalassos*	pB, t	L
Ring-billed Gull	*Larus delawarensis*	B, b	L, M
Sabine’s Gull	*Xema sabini*	t	L
Snowy Egret	*Egretta thula*	pB, b	M
White-faced Ibis*	*Plegadis chihi*	b	M

[1] Special-status species indicated by asterisk.
[2] Occurrence potential of colonial waterbird species includes: known breeding colony within BNGPA (B); present during breeding season and potential breeding colony (pB) within the BNGPA; known breeding colony within Bowdoin NWR (b) just outside of the BNGPA; and known transient or migrant (t).
[3] Preferred general wetland type in Montana includes: large lakes, reservoirs, or rivers with islands, sparse vegetation (L); marsh complexes, small ponds with emergent vegetation (M); and riparian zone (R).

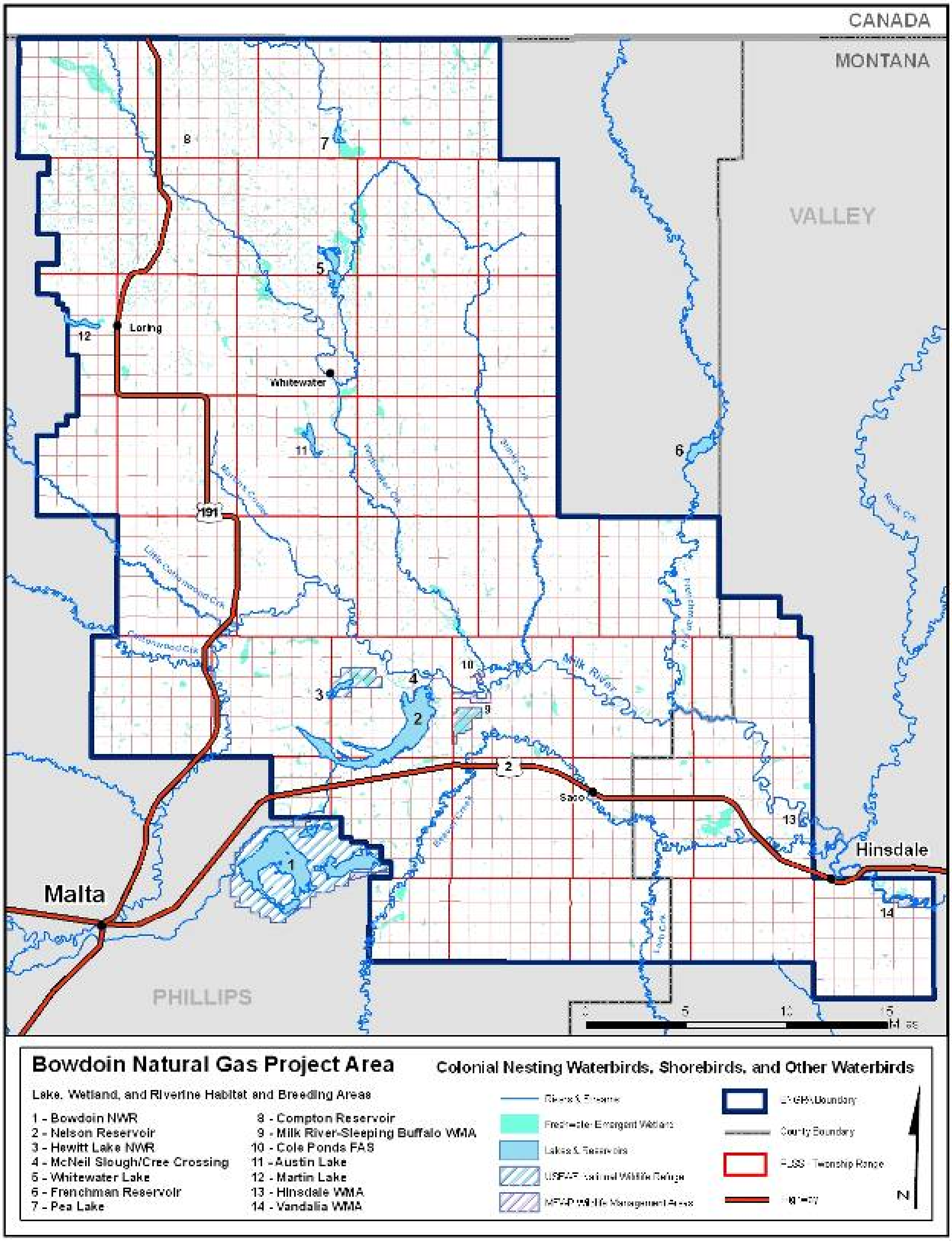
Colonial nesting waterbirds include species that form nesting colonies as small as a few pairs of individuals to large aggregations of several hundred pairs of birds. Several species display nesting colony associations including black-crowned night herons, eared grebes, Franklin's gulls, and white-faced ibises; black-crowned night herons and great blue herons; California gulls and ring-billed gulls; and Caspian terns and double-crested cormorants (Baird 1976, Trost 1989, Casey 2000). American white pelicans nesting colony islands often include other colonial nesting species such as double-crested cormorants, great blue herons, black-crowned night herons, common terns, and California and ring-billed gulls (MTNHP 2006*b*).

Colonial nesting waterbirds in the BNGPA tend to occupy sites with permanent bodies of water larger than 100 acres and sites with emergent vegetation along the shoreline (Feigley 1998). Several large lakes and reservoirs within and nearby the BNGPA provide nesting and foraging habitat for a variety of colonial nesting waterbirds. Nelson Reservoir, Whitewater Lake, and Hewitt Lake within the BNGPA may support nesting colonies of Caspian terns, common terns, California gulls, eared grebe, and ring-billed gulls (Feigley 1998, D. Prellwitz, BLM, personal communication; Table 3.12-3, Figure 3.12-8). Numerous ephemeral and semi-permanent potholes in the northern portion of BNGPA occasionally are used by colonial nesting waterbirds in wet years.

Important foraging and nesting habitat exists in adjacent Bowdoin NWR, located southwest of the BNGPA, and Frenchman Reservoir, located northeast of the BNGPA. Bowdoin NWR supports breeding colonies of at least 14 species (Table 3.12-3). Bowdoin NWR is one of the few locations in Montana where American white pelicans, Caspian terns, and Franklin's gulls breed, and it supports some of the largest colonies of black-crowned night herons and common terns in the state (Casey 2000, MTNHP 2006*b*). Frenchman Reservoir supports breeding colonies of double-crested cormorants, great blue herons, and various other colonial nesting species.

Colonial nesting waterbirds are susceptible to disturbance due to the large aggregation of nests built in a small area (Feigley 1998). Effects of fluctuating water levels, mammalian predators, and anthropogenic disturbance on nesting colonies are the primary reasons these species are a management concern.

Figure 3.12-8. Potential Breeding Areas and Habitat of Colonial Nesting Waterbirds, Shorebirds, and Other Waterbirds within and near the BNGPA



3.12.9 Shorebirds and Other Waterbirds (excluding colonial nesting species)

Shorebirds and other waterbirds include species belonging to the following avian orders: Gaviiformes (loons), Podicipediformes (grebes), Anseriformes (ducks, geese, and swans), Gruiformes (rails), and Charadriiformes (avocets, plovers, and sandpipers). Over 80 shorebird and waterbird species (excluding species discussed in previous sections) potentially could occur within the BNGPA, at least 50 of which breed within or nearby (USFWS 1999, MBDD 2006*a*, *b*; **Appendix B**). Seven shorebird and waterbird species are designated as Montana Animal Species of Concern (MTNHP 2006*a*; Table 3.13-3), and are discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

Shorebirds and other waterbird species are locally abundant in suitable habitats throughout the BNGPA. Large lakes and reservoirs, prairie potholes and wetlands, and various rivers and streams in the BNGPA provide foraging and nesting habitat for many species of ducks, geese, swans, phalaropes, plovers, sandpipers, and cranes (Figure 3.12-8). Grasslands in the BNGPA provide nesting habitat for long-billed curlews, marbled godwits, mountain plovers, willets, and Wilson's phalaropes (MBDD 2006*a*). The waterfowl nesting season (April 15–July 15) generally begins earlier than the primary breeding season for most other migratory birds (May 1–August 1).

Many species of waterfowl nest within the BNGPA, including several species with noted population declines throughout North America. Northern pintail and canvasback populations have suffered marked declines in the last 30 years and have not recovered as expected despite recent favorable wetlands conditions and management modifications (Miller and Duncan 1999, CWSWC 2005). The northern portion of the BNGPA is located in the prairie pothole region which provides important nesting habitat for both species. Northern pintails nest in upland grasslands, and canvasbacks nest in emergent vegetation in wetlands or on BLM constructed nesting islands within the BNGPA (Prellwitz 1989, MTNHP 2006*b*).

Adjacent wetland habitat in Bowdoin NWR provides additional important foraging and breeding habitat for many of these species; at least 36 waterbird species nest within the refuge (USFWS 1999, MBDD 2006*a*).

3.12.10 Migratory Birds

The Migratory Bird Treaty Act, enacted in 1918, made it unlawful to pursue, hunt, kill, capture, possess, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition, Executive Order 13186 (January 2001, President W. J. Clinton) set forth the responsibilities of federal agencies to implement further the provisions of the Act by integrating bird conservation principles and practices into agency activities and by ensuring that federal actions evaluate the effects of actions and agency plans on migratory birds.

The BNGPA supports a variety of habitats suitable for nesting migratory birds, including many grassland, sagebrush steppe, and riparian species. Over 140 migratory species (excluding species discussed in previous sections) potentially could occur within the BNGPA, at least 60 of which breed within or nearby (USFWS 1999, MBDD 2006*a*, *b*; Appendix B). Many are widespread prairie species, some are sagebrush obligates, and various species are endemic to the Northern Great Plains. Nineteen migratory bird species are designated as Montana Animal Species of Concern (MTNHP 2006*a*; Table 3.13-3), and are discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

Lenard et al. (2006) conducted a breeding bird survey of grassland birds in northern Valley County adjacent to the BNGPA, and found at least 35 migratory bird species (excluding species in previous sections). Chestnut-collared longspurs, western meadowlarks, horned larks, Sprague's pipits, Baird's sparrows, and lark buntings accounted for 75 percent of all birds detected (Lenard et al. 2006). D. Prellwitz and M. Triska (BLM) summarized non-game bird transect data for various habitat types within the BNGPA for the period 1979 through 2006. Bird species were most abundant in riparian areas along the Milk River where two transects had 71 and 68 bird species present, respectively. The site with 71 species was dominated by mallard, European starling, and western meadowlark (34.47 percent). The site with 68 species was dominated by western meadowlark, European starling and common grackle (33.05 percent). Grasslands were next in terms of bird diversity. Fifty-five species were detected on one grassland site, dominated by chestnut-collared longspur, horned lark, and northern pintail (50.3 percent). Thirty-eight species were detected on another grassland site, led by McCown's longspur, horned lark, and chestnut-collared longspur (74.02 percent). Breaks/Badlands habitat had the lowest diversity, with two transects having 27 and 14 bird species present, respectively. The site with 27 species was dominated by rock wren, spotted towhee, and western meadowlark (55.6 percent). The site with 14 species was led by rock wren, western meadowlark, and chipping sparrow (67.2 percent).

3.12.11 Amphibians and Reptiles

The BNGPA provides a variety of habitats for amphibian and reptile species. Lakes, prairie potholes, rivers, streams, and other wetlands provide breeding and foraging habitat for amphibian, turtle, and snake species. Grasslands, rocky outcrops, and glacial till, especially with sandy and/or gravelly soils, support lizards and snakes including greater short-horned lizards, western hog-nosed snakes, bullsnakes, and western rattlesnakes. Sixteen amphibian and reptile species occur or potentially could occur within the BGNPA (Werner et al. 2004, D. Prellwitz, BLM, personal communication; Table 3.12-4). Five amphibian and reptile species are designated as Montana Animal Species of Concern (MTNHP 2006*a*; Table 3.13-3), and are discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

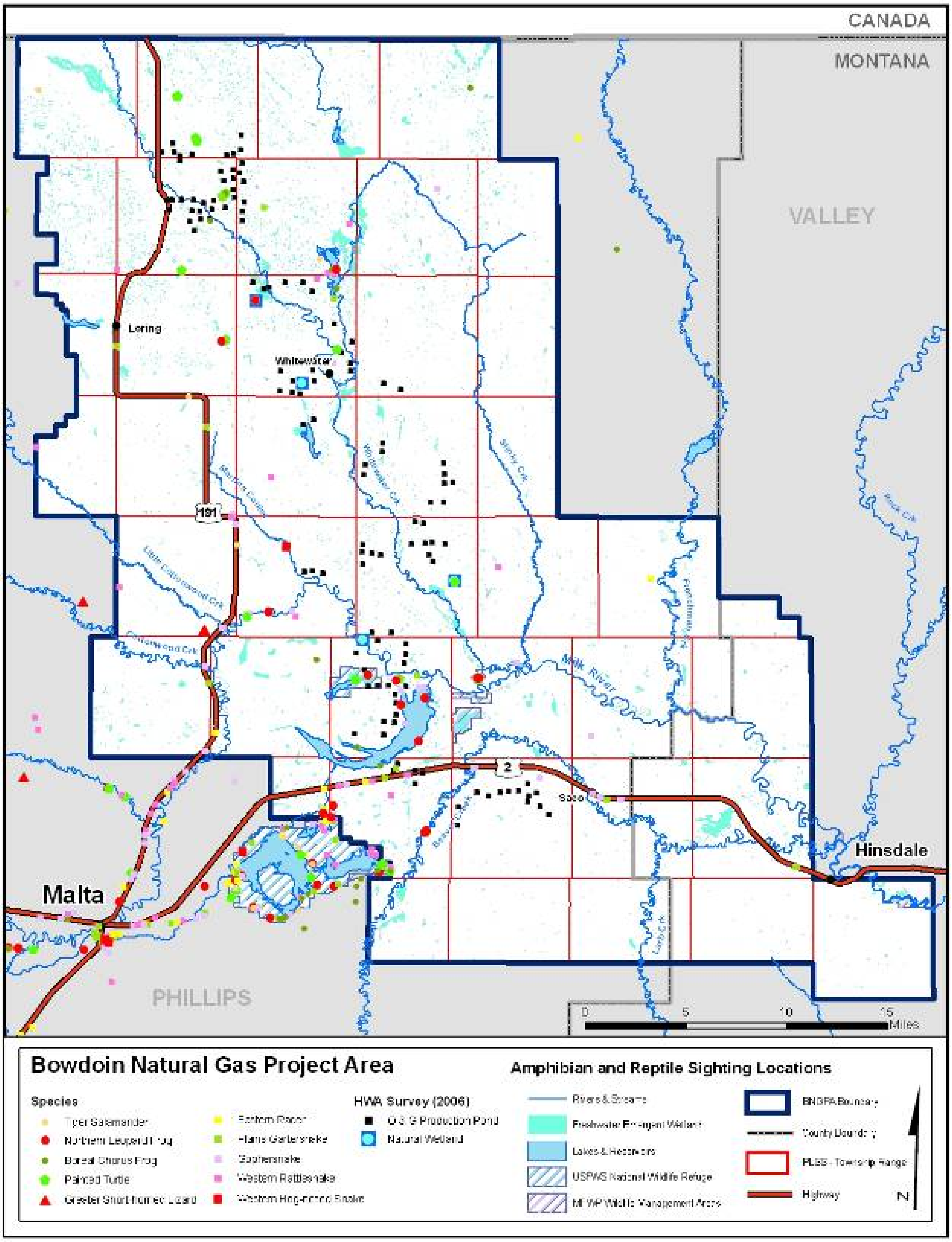
Various amphibian and reptile surveys have been conducted within and nearby the BNGPA over the last several decades (Hendricks and Reichel 1998; BLM, unpublished data; HWA, unpublished data). Surveys indicate that amphibian and reptile species are widely distributed throughout the BNGPA (Figure 3.12-9). Boreal chorus frogs, northern leopard frogs, and a painted turtle were detected during a survey conducted at several natural wetlands in the BNGPA in May 2006 (HWA, unpublished data). In addition, evidence of breeding northern leopard frogs was documented in a wetland in the northern portion of the BNGPA. No amphibians or reptiles were captured or observed in over 120 natural gas well production ponds sampled during the same survey, indicating that herpetafauna do not appear to be utilizing production ponds for breeding or foraging (HWA, unpublished data; Figure 3.12-9).

Table 3.12-4. Occurrence Potential of Amphibian and Reptile Species Within the BNGPA

Common Name[1]	Scientific Name	Occurrence Potential[2]
Tiger Salamander	*Ambystoma tigrinum*	P
Plains Spadefoot*	*Spea bombifroms*	pp
Great Plains Toad*	*Bufo cognatus*	pp
Boreal Chorus Frog	*Pseudacris maculata*	P
Northern Leopard Frog*	*Rana pipiens*	P
Painted Turtle	*Chrysemys picta*	P
Spiny Softshell*	*Apalone spinifera*	U
Greater Short-horned Lizard*	*Phrynosoma hernandesi*	P
Sagebrush Lizard*	*Sceloporus graciosus*	VU
Eastern Racer	*Coluber constrictor*	P
Western Hog-nosed Snake*	*Heterodon nasicus*	P
Milksnake	*Lampropeltis triangulum*	VU
Gophersnake	*Pituophis catenifer sayi*	P
Plains Gartersnake	*Thamnophis radix*	P
Common Gartersnake	*Thamnophis sirtalis*	pp
Western Rattlesnake	*Crotalus viridis*	P

[1] Special-status species indicated by asterisk.
[2] Occurrence potential include: present (P), potentially present (pp), unlikely (U), and very unlikely (VU).

Figure 3.12-9. Location of Amphibian and Reptile Sightings Within the BNGPA



3.12.12 Fish

A variety of ephemeral, intermittent, and perennial streams are present in the BNGPA and support many native and non-native species (Table 3.12-5). Five fish species are designated as Montana Animal Species of Concern (MTNHP 2006*a*; Table 3.13-3) and will be discussed in detail in section **3.13**, **Special Status Wildlife, Fish, and Plants Species**.

The Milk River and Nelson Reservoir are the most notable surface waters in the BNGPA and also are regionally important fisheries (MFWP 2006*a*). Frenchman Creek is a locally important fishery. Milk River tributaries within the BNGPA that do not sustain sport fisheries, but support a variety of non-game and game species, include Little Cottonwood Creek, Cottonwood Creek, Whitewater Creek, and Stinky Creek. Roads and pipelines associated with the Proposed Action traverse these streams and portions of wetland and riparian areas that provide aquatic habitat in the BNGPA.

The present-day Milk River results from a history of dams, channelization, flow modification, and expansion of land use, as well as natural development. The Milk River Basin has provided water for agricultural communities since the 1880s. East of Havre in the segment that flows through the BNGPA, the Milk River is paralleled by U.S. Highway 2 and marks the northern boundary of the Fort Belknap Indian Reservation. Below Vandalia Diversion Dam downstream of the BNGPA, the Milk River has well-developed riparian stands along its banks, deeper habitat, and cobble riffles. Perhaps the river's most important contribution to the area's fishery resource is its alliance with the Missouri River. In its lower-most 73 miles, the Milk River provides critical spawning and rearing habitat for migratory and resident fishes, including native species of the Missouri River such as blue sucker, channel catfish, freshwater drum, paddlefish, sauger, shorthead redhorse, and shovelnose sturgeon (MFWP 2006*b*).

Table 3.12-5. Occurrence Potential of Fish and Mussel Species Within the BNGPA and Adjacent Waters

Common Name[1]	Scientific Name	Game Status[2]	Native Status[3]	Occurrence Potential[4]					
				Milk River	Nelson Reservoir	Whitewater Creek	Cottonwood Creek	Frenchman Creek	Compton Reservoir
Bigmouth buffalo	*Ictiobus cyprinellus*	NG	N	x	x			x	
Black bullhead	*Ameiurus melas*	NG	N	x					
Black crappie	*Pomoxis nigromaculatus*	G	nn	x	x				
Blue sucker	*Catostomus discobolus*	NG	N	x					
Brassy minnow	*Hybognathus hankinsoni*	NG	N	x			x	x	
Brook stickleback	*Culaea inconstans*	NG	N	x		x	x		
Brook trout	*Salvelinus fontinalis*	G	nn	x					
Brown trout	*Salmo trutta*	G	nn	x					
Burbot	*Lota lota*	G	N	x	x			x	
Channel catfish	*Ictalurus punctatus*	G	N	x	x				
Cisco	*Coregonus artedii*	G	N	x					
Common carp	*Cyprinus carpio*	G	nn	x	x	x		x	
Creek chub	*Semotilus atromaculatus*	NG	N	x					
Emerald shiner	*Notropis aterinoides*	NG	N	x					
Fathead minnow	*Pimephales promelas*	NG	N	x		x	x	x	x
Flathead chub	*Hybopsis gracilis*	NG	N	x				x	
Freshwater drum	*Aplodinotus gruneins*	G	N	x					
Goldeye	*Hiodon alosoides*	NG	N	x	x			x	
Iowa darter	*Etheostoma exile*	NG	N	x		x			
Lake chub	*Couesius plumbeus*	NG	N	x			x	x	
Lake whitefish	*Coregonus clupeaformis*	G	nn	x	x				
Largemouth bass	*Micropterus salmoides*	G	nn	x					
Longnose dace	*Rhinichthys cataractae*	NG	N	x			x	x	
Longnose sucker	*Catostomus catostomus*	NG	N	x					
Mountain sucker	*Catostomus platyrhynchus*	NG	N	x					
Northern pike	*Esox lucius*	G	N	x	x	x		x	x
Northern redbelly dace	*Phoxinus eos*	NG	N	x		x	x		
Paddlefish*	*Polyodon spathula*	G	N	x					
Pallid Sturgeon*	*Scaphirhynchus albus*	G	N	x					
Pearl dace*	*Margariscus margarita*	NG	N	x					

Common Name[1]	Scientific Name	Game Status[2]	Native Status[3]	Occurrence Potential[4]					
				Milk River	Nelson Reservoir	Whitewater Creek	Cottonwood Creek	Frenchman Creek	Compton Reservoir
Plains minnow	*Hybognathus placitus*	NG	N	x				x	
Rainbow trout	*Oncorhynchus mykiss*	G	nn	x					
River carpsucker	*Carpiodes carpio*	NG	N	x				x	
Sauger*	*Stizostedion canadense*	G	N	x					
Sauger X walleye hybrid		G		x					
Shorthead redhorse	*Moxostoma macrolepidotum*	NG	N	x	x			x	
Shortnose gar*	*Lepisosteus platostomus*	NG	N	MR					
Shovelnose sturgeon	*Scaphirhynchus platorynchus*	G	N	x					
Smallmouth bass	*Micropterus dolomieu*	G	nn	x					
Smallmouth buffalo	*Ictiobus bubalus*	NG	N	x				x	
Spottail shiner	*Notropis hudsonius*	NG	N	x	x				
Stonecat	*Noturus flavus*	NG	N	x				x	
Walleye	*Stizostedion vitreum*	G	N	x	x			x	
Western silvery minnow	*Hybognathus argyritus*	NG	N	x					
Western silvery/plains minnow		NG	N	x				x	
White crappie	*Pomoxis annularis*	G	nn	x					
White sucker	*Catostomus commersoni*	NG	N	x	x	x	x	x	
Yellow perch	*Perca flavescens*	G	N	x	x	x			x
Black sandshell	*Ligumia recta*	NG	N	x					
Giant floater	*Anodonta grandis*	NG	N	x					

[1] Special-status species indicated by asterisk.
[2] Game status includes: game species (G), and non-Game species (NG).
[3] Native Status includes: native species (N), and non-native species (nn).
[4] Occurrence potential (L. Leslie, MFWP, personal communication, MFWP 2006*a*) includes: present or potentially present (x), and only known to be present downstream in the Missouri River (MR).

3.13 SPECIAL-STATUS WILDLIFE, FISH, AND PLANT SPECIES

Special-status species include: (1) threatened, endangered, candidates, or those petitioned for listing as threatened or endangered by the USFWS under the Endangered Species Act (ESA) of 1973, as amended; (2) those designated by the BLM State Director as sensitive (BLM 2004, 2005); and (3) Forest Service sensitive species, MFWP and MTNHP Animal Species of Concern.

3.13.1 Threatened, Endangered, Candidate or Proposed Species of Wildlife, Fish, and Plants

Five species listed by the USFWS as threatened, endangered, candidate, or proposed under the ESA may potentially be found or be affected by activities conducted within the BNGPA (USDI-FWS 2004; Table 3.13-1). There are no known FWS threatened, endangered, proposed, candidate, or experimental plant species documented on the BNGPA (Taylor 2006).

Table 3.13-1. Occurrence Potential of Threatened and Endangered Animal Species Within the BNGPA

Common Name[1]	Scientific Name	Occurrence Potential[2]	ESA Status[3]
Black-footed ferret	*Mustela nigripes*	U	E, XN
Piping Plover	*Charadrius melodus*	P	T
Interior Least Tern	*Sterna antillarum athalassos*	P	E
Whooping Crane	*Grus americana*	P	E
Pallid Sturgeon*	*Scaphirhynchus albus*	UPA	E

[1] Presence in Milk River downstream of BNGPA near confluence with Missouri River is indicated by asterisk.
[2] Occurrence potential includes: present (P); unlikely (U); and very unlikely but potentially affected (UPA).
[3] ESA status includes: Endangered (E); Threatened (T); and Experimental Non-essential (XN).

Mammal Species

Black-footed Ferret is considered the most endangered mammal species in the United States. The original distribution of black-footed ferrets in North America closely corresponded to that of prairie dogs (*Cynomys* spp.; Hall and Kelson 1959, Fagerstone 1987). Black-footed ferrets depend almost exclusively on prairie dogs for food, and they also use prairie dog burrows for shelter, parturition, and raising young (Hillman and Clark 1980, Fagerstone 1987). Black-footed ferrets historically ranged throughout most of the prairies of eastern Montana (MTNHP 2006*c*). Today, the only known population of black-footed ferrets in Montana is the result of the reintroduction of captive-bred ferrets. Reintroductions have occurred annually in Montana on federal and tribal lands since 1994. The reintroduced population is classified as nonessential experimental and, to date, is not self-sustaining (USDI-USFWS 1994, MTNHP 2006*c*).

The northern-most point of the designated reintroduction area is approximately 12 miles southwest of the BNGPA. The actual reintroduction sites are located over 50 miles away in the Fort Belknap Indian Reservation, Charles M. Russell NWR, and Beauchamp Creek (formerly the 40 Complex and Pea Ridge) in southern Phillips County (BLM 1992, USDI-USFWS 1994; D.

Prellwitz, BLM, personal communication). Black-footed ferrets currently exist in the Charles M. Russell NWR, where nine were sighted during a spotlight survey in April 2007 (R. Matchett). However, only one ferret was detected during surveys near Beauchamp Creek in September 2006 (D. Prellwitz, BLM, unpublished data). No ferrets were observed during surveys conducted by MFWP wildlife biologists in prairie-dog colonies adjacent to reintroduction areas during fall and early winter of 2006-2007 (R. Rauscher, MFWP unpublished data). Various formidable barriers exist between the black-footed ferret population and the BNGPA, including the Milk River, highways (e.g., U.S. 2, U.S.191), and the lack of an adequate prairie-dog colony complex.

Bird Species

Interior Least Terns are colonial nesting waterbirds found along the large river systems (i.e., Mississippi River and Missouri River) in the central United States. Montana defines the western edge of the interior least tern's range. Interior least terns are present in Montana from mid-May through mid-August. Breeding and nesting generally occurs along sparsely vegetated sand and gravel bars within large reservoirs and along riverine systems (Casey 2000, MTNHP 2006*b*). Interior least tern nesting sites are often associated with those of piping plovers (MPPRC 1994). Nesting has not been documented within the BNGPA although interior least terns have been observed on Nelson Reservoir, and recently on Whitewater Lake (D. Prellwitz, BLM, personal communication). The nearest nesting records for interior least terns have been documented along the Missouri River and islands in the Fort Peck Reservoir (Casey 2000, MTNHP 2006*b*). It is possible that interior least terns could expand their breeding range into the BNGPA due to the existence of suitable nesting habitat, proximity of known nesting sites, and breeding piping plovers. Interior least tern populations have declined throughout their range primarily as a result of the loss of its preferred nesting habitat. In addition to loss of habitat to development, interior least terns are particularly susceptible to fluctuations in water levels (Casey 2000, MTNHP 2006*b*). Consequently, they currently are listed as endangered by the USFWS.

Piping Plover is a shorebird species that breeds in south-central Canada and the Great Plains in the United States. Piping plovers are generally found in northern and northeastern Montana. Piping plovers are present in Montana from late April until late August and are limited to open shorelines of freshwater or alkaline bodies of water (Haig 1992, MTNHP 2006*b*). Piping plovers prefer wide, sparsely vegetated sand or pebble beaches, and gravel is the most suitable substrate for nesting (Haig 1992, MPPRC 1994). Piping plovers are known to breed in Bowdoin NWR and Nelson Reservoir within the BNGPA, and have been observed on Whitewater Lake (Prellwitz et al. 1989, MPPRC 1994, MBDD 2006*a*, D. Prellwitz, BLM, personal communication). Most piping plover observations within the BNGPA are either breeding birds or birds engaged in behavior suggesting breeding (Prellwitz et al. 1989, MBDD 2006*a*). Portions of Bowdoin NWR, most of Lake Bowdoin, and the western portion of the Dry Lake Unit have been designated as piping plover critical habitat (USFWS 2003). Although breeding occurs in the area, Nelson Reservoir was not designated as piping plover critical habitat as a result of an agreement reached among the U.S. Fish and Wildlife Service, the BOR, and local irrigation districts (USFWS 2003). Piping plover populations have declined throughout their range as a result of development and subsequent loss of their preferred beach-nesting habitat (Casey 2000). Consequently, they are currently listed as threatened by the U.S. Fish and Wildlife Service.

Whooping Cranes are large wading birds with only one migratory flock composed of approximately 236 individuals (WCEP 2008). Whooping cranes are not known to nest in Montana, but do migrate through the state en route between wintering areas in Aransas NWR in Texas and their breeding area in Wood Buffalo NP in Canada (Johnsgard 1986, Sibley 2000, MTNHP 2006*b*). Observations of migrating or transient whooping cranes over the last 20 years have been limited to northeastern Montana and Red Rocks Lake NWR (MBDD 2006*d*). However, whooping cranes have not been observed at Red Rocks Lake NWR since 2002 (MTNHP 2006*b*). Whooping cranes have been recorded passing through Montana as early as late March during the spring migration and as late as the end of October during fall migration (MBDD 2006*d*). Whooping cranes prefer grain fields, shallow lakes and lagoons, and alkaline marshy areas during migration and in winter. Transient or migrating whooping cranes have been observed on various occasions within the BNGPA from late March to early April from 1990 to 2005 (D. Prellwitz, BLM, personal communication). All sightings were south or southwest of Whitewater, and included two reservoirs where cranes roosted over night (D. Prellwitz, BLM, personal communication). Whooping cranes have not been observed on Whitewater Lake, but sandhill cranes do stop there, and whooping crane use could be expected.

Fish Species

Pallid Sturgeon are considered to be year-round residents of the Milk River. They are known to occur downstream of the project area in the Milk River near its confluence with the Missouri River. A population is present in the Missouri River both upstream and downstream of Fort Peck Reservoir (MTNHP 2006*d*). Pallid sturgeon are native to major rivers in eastern Montana including the Missouri River below Fort Benton and the Yellowstone River below the Carterville Diversion Dam near Forsyth. Pallid sturgeon use the lower Yellowstone River primarily during spring and summer, but during fall and winter they use the Missouri River below the confluence with the Yellowstone. Some pallid sturgeon use the Fort Peck tailrace year-round, but others move downstream in spring (in one case more than 300 kilometers) (MTNHP 2006*d*). They inhabit large, turbid rivers over sand and gravel bottoms, usually in strong current, as well as impoundments on these rivers. They use all channel types but primarily straight reaches with islands. They primarily use areas with substrates containing sand (especially bottom sand dune formations) and fines (93 percent of observations). Preferred stream-bottom velocities range between 0.0 and 1.37 meters per second, with an average of 0.65 meter per second. Depths used were 0.6 to 14.5 meters and averaged 3.30 meters, and they appeared to move deeper during the day. Channel widths from 110 to 1,100 meters are used and average 324 meters (Bramlett 1996). Water temperatures used ranged from 2.8 to 20 ºC. Water turbidity ranged from 12 to 6,400 NTU (Turbidity Units) (MTNHP 2006*d*). The BNGPA does not contain any potential habitat for this species.

3.13.2 BLM Sensitive Species and Montana Animal and Plant Species of Concern

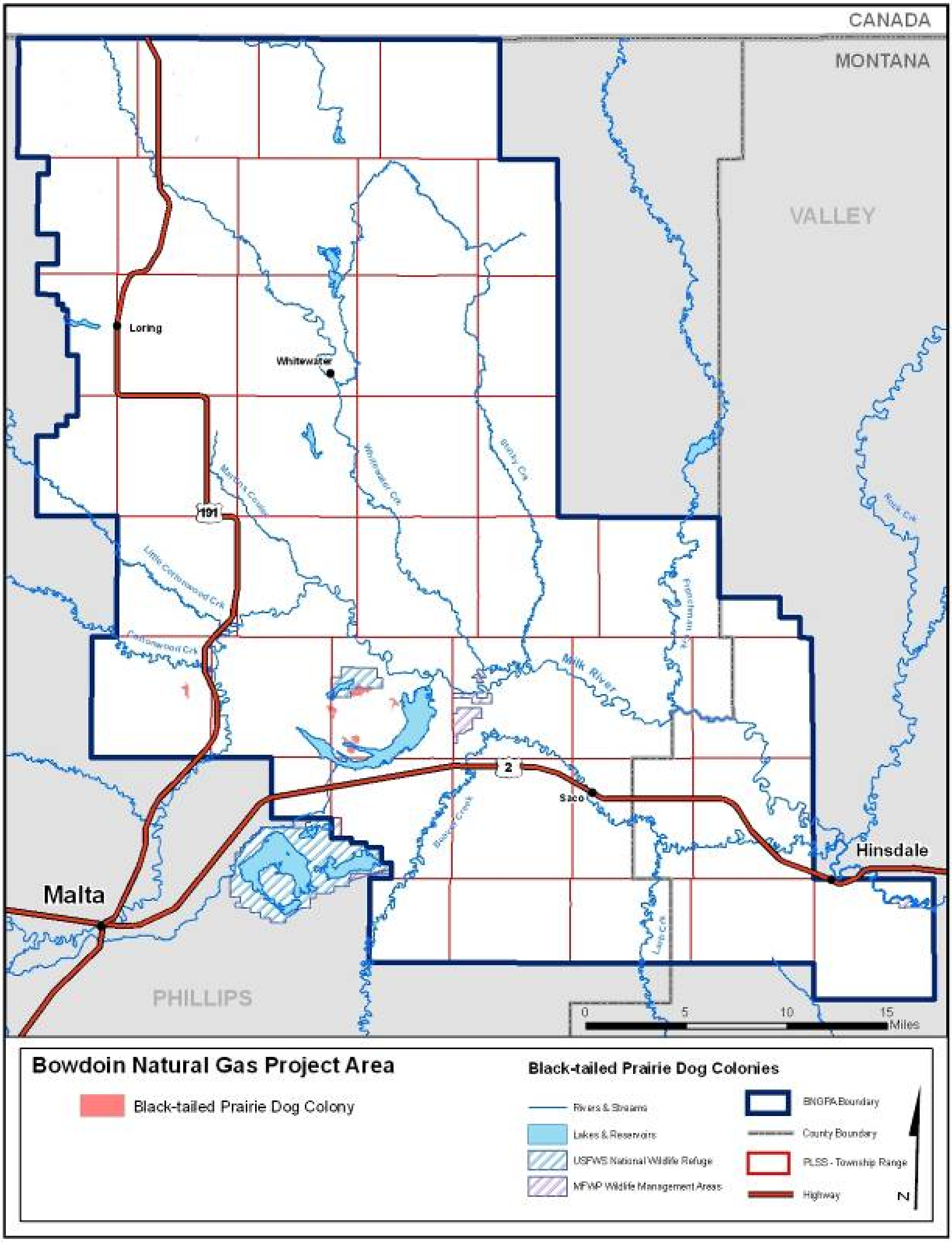
Sixty-one species designated by the BLM as sensitive or by the MTNHP and MFWP as Montana Animal Species of Concern are present, potentially present, or historically documented within the BNGPA, or potentially could be affected by the Proposed Action (BLM Manual 6840, MTNHP 2006*a*; Table 3.13-3).

Mammals

Black-tailed Prairie Dogs were once distributed widely throughout the grassland east of the Continental Divide (Burroughs 1961), and were found historically throughout the eastern two-thirds of Montana (MAFG 2005). However, black-tailed prairie dog populations have declined sharply from their historical levels both nationally and within Montana (Knowles 1999). There are many reasons for this decline, but the most common causes include eradication programs, the conversion of rangelands into agricultural land, recreational shooting, and sylvatic plague

(Knowles 1999). Partially as a result of these population declines, prairie dogs had been classified as ‘non-game wildlife in need of management’ (Montana HB492) and were managed under the Region Six Prairie Dog Abundance and Distribution Objectives Plan (MFWP 2006*c*). This management status changed with the “sunset” of prior legislation during the 2007 legislative session. Black-tailed prairie dogs are no longer considered a species in need of management; however, the prairie dog is recognized as a keystone species that greatly affects or alters the ecosystem in which it lives (Miller et al. 2000). Many other species have adapted to live within prairie-dog colonies, and some, such as the black-footed ferret, are prairie dog obligates (Knowles 1999). Three species associated with prairie-dog complexes—black-footed ferrets, burrowing owls, and mountain plovers—are species with special status and are classified as either endangered or sensitive (Table 3.13-3). There are seven black-tailed prairie-dog colonies in the BNGPA (BLM, unpublished data; Figure 3.13-1). However, these colonies do not support a Category 1 complex (i.e., 1.5 km rule) based on inter-colony distances and cumulative area of colonies (CBSG 2004, MFWP 2006*a*). Currently, no 1.5 km-rule complexes exist within MFWP Region 6 (MFWP 2006*a*).

Figure 3.13-1. Black-tailed Prairie Dog Colonies Within the BNGPA



Preble's Shrews have not been studied intensively, and relatively little is known about their distribution and ecology. Preble's shrews have been collected from Washington, Oregon, California, Idaho, Montana, Nevada, Colorado, and Utah, and appear to exist in disjunct populations, although this may be the result of an uneven sampling effort (Cornely et al. 1992). Preble's shrews have been collected from 14 localities within Montana, including one in Phillips County and one in Valley County (Hendricks and Roedel 2001). Preble's shrews are generally rare, where present, and have not been collected within the BNGPA (Hendricks and Roedel 2001). Nevertheless, distribution maps indicate that Preble's shrew have the potential to occur in suitable habitat within the BNGPA (MTNHP 2006*c*).

Swift Fox historically were common throughout the open plains of Canada, Wyoming, North and South Dakota, Colorado, Kansas, Nebraska and portions of Texas, Oklahoma, and New Mexico, and were once common throughout the eastern plains of Montana (Hoffmann et al. 1969, Scott-Brown et al. 1987). Swift fox experienced rapid population declines across their range from the 1900s to 1950s as the result of trapping; unintentional poisoning from coyote, wolf, rodent, and prairie dog eradication programs; and loss of prairie habitat (Samuel and Nelson 1982). Swift fox were declared extirpated from Montana in 1969 (Hoffmann et al. 1969). Sporadic sightings of swift fox persisted after 1969 in eastern Montana but were attributed to animals dispersing from reintroduction efforts in northwestern Montana and Canada (MTNHP 2006*c*). Swift fox reintroduction efforts in southern Alberta from 1983 to 1991 have been very successful, and populations in north-central Montana are established and expanding (Zimmerman 1998, Moehrenschlager and Moehrenschlager 2001). Swift fox are extremely common in the northern portion of the BNGPA and probably occur throughout the BNGPA. Den sites are known to be close to existing gas wells, and swift fox have been observed sleeping in the wind shadow of a gas well building (D. Prellwitz, BLM, personal communication). The population continues to increase as trapping surveys conducted in 2005-2006 found a far greater number of swift fox than were found in 2000–2001 (R. Rauscher, MFWP, unpublished data).

Townsend's Big-eared Bats have been documented in 20 counties in Montana (MTNHP 2006*c*). However, bat survey efforts have been limited, and detailed distribution maps for Montana cannot be drawn. Nevertheless, it is likely that Townsend's big-eared bats are distributed statewide (Hoffmann et al. 1969, Swenson and Shanks 1979, Foresman 2001, MTNHP 2006*c*). Townsend's big-eared bats commonly use caves and abandoned mines for maternity roosts and hibernacula (Foresman 2001). Five maternity colonies and several hibernucula are known to exist in Montana (MTNHP 2006*c*). Townsend's big-eared bats have not been documented within the BNGPA, and due to the lack of caves or abandoned mines that could serve as maternity roosts and hibernacula, their presence in the BNGPA is possible but unlikely.

Birds

Alder Flycatcher is primarily a boreal species that breeds in Canada and the northern United States and winters in northern South America (Lowther 1999). Scattered observations of alder flycatchers have been recorded throughout Montana during the breeding season, and only indirect evidence of breeding has been recorded to date (MTNHP 2006*b*). Alder flycatchers are present in Montana from May through July. Their preferred breeding habitat is wet thickets, and they commonly build nests in shrub thickets at the edge of wooded areas, along wetlands, or within damp fields and meadows (Peck and James 1987, Payne 1991, Lowther 1999). Alder flycatchers have been documented in Bowdoin NWR outside the BNGPA (MBDD 2006*a*). The Alder flycatcher is of management and conservation concern because Breeding Bird Survey data indicates this species has declined across its range. Additionally, the rate of population decline for alder flycatchers is faster in Montana than it is nationally or across Canada (Sauer et al. 2005).

American White Pelicans breed in colonies located on bodies of water throughout central Canada and the north-central and northwestern portions of the United States. They winter in Mexico and coastal states in the southern United States (Evans and Knopf 1993, Sibley 2000). Five breeding colonies occur in Montana, and American white pelicans are seen throughout the state during summer (Casey 2000). American white pelicans are present within Montana from late March through the middle of October and breed from the beginning of May through the middle of August. American white pelicans in Montana as elsewhere can be found in a variety of aquatic habitats including rivers, lakes, and reservoirs (MTNHP 2006*b*). They are ground nesters and are particularly vulnerable to a variety of mammalian predators. Consequently, they tend to select breeding locations on islands or peninsulas that afford some protection from these hazards (Evans and Knopf 1993, Casey 2000, MTNHP 2006*b*). American white pelicans experienced population declines throughout the United States during the early 1970s. However, populations currently appear to have stabilized or be recovering (Evans and Knopf 1993). The Breeding Bird Survey indicates that American white pelican populations in the United States and Montana have been increasing slowly since 1980 (Sauer et al. 2005). The American white pelican remains a species of management and conservation concern because its colonies are very sensitive to disturbance during the breeding season (Evans and Knopf 1993, Casey 2000). Breeding adults may completely abandon a colony if disturbed during courtship and early incubation. Even after eggs have been laid and young have hatched, disturbed parents may leave nests, exposing eggs or young to the elements or predators. Other potential hazards include exposure to chemicals and pollutants, changes in water levels, and West Nile virus (Evans and Knopf 1993, D. Prellwitz, BLM, personal communication).

A breeding colony at the Bowdoin NWR just outside of the BNGPA has existed continuously for over 65 years, and American white pelicans regularly occur within the BNGPA (MTNHP 2006*b*). Breeding as well as non-breeding birds from Bowdoin NWR frequently feed on the Milk River, Whitewater Creek, and in stock ponds containing fish in the BNGPA (D. Prellwitz, BLM, personal communication). American white pelican mortalities due to West Nile virus are an emerging concern as they have been documented in Bowdoin NWR in recent years (D. Prellwitz, BLM, personal communication).

Bald Eagles are large North American fish eagles normally found near water. Bald eagles are found throughout North America, but primarily breed in Canada, Alaska, the Pacific Northwest, the Rocky Mountains, and the Great Lakes region. Bald eagle breeding is concentrated in the western third of Montana and along the Missouri River in the eastern prairies, but records of transient or migrant bald eagles have been documented throughout the state (MBEWG 1991, Casey 2000, MBDD 2006*c*). Most reproductive activity in Montana occurs from March through November, although bald eagles may be found in the state at all times of the year (MTNHP 2006*b*). Bald eagle nest site selection most likely depends upon availability of food in the early nesting season (Swenson et al. 1986). Nests typically are built of sticks and situated in the tops of coniferous or deciduous trees along streams, rivers, or lakes.

Breeding activity has not been documented within the BNGPA even though large perennial bodies of water are present. Nevertheless, observations of transient or migrant bald eagles are not unusual (MBDD 2006*c*, D. Prellwitz, BLM, personal communication). Documentation of bald eagles over-wintering within the BNGPA is extensive (MBDD 2006*c*). Roosting bald eagles are common during the winter in Bowdoin NWR, McNeil Slough/Nelson Reservoir area, and along the Milk River within the BNGPA. Bald eagles consistently are observed during annual Christmas Bird Counts in McNeil Slough (every year from 2000-2006) and Bowdoin NWR (19 of 22 years from 1985-2006; Audubon 2006*a*, *b*). In addition, bald eagles are observed every year in the McNeil Slough/Nelson Reservoir area during the National Wildlife Federation's mid-winter bald eagle survey in early January. Gas well development in the winter frequently receives a timing stipulation and a condition of approval to protect roosting bald eagles within a half mile of the Milk River. These are slightly extended in the McNeil Slough/Nelson Reservoir area where bald eagle use is most likely to occur in early April (D. Prellwitz, BLM, personal communication). Consequently, bald eagle over-wintering within the BNGPA remains a concern.

Bald eagle populations in the Rocky Mountain States declined sharply during the late 1960s and 1970s, and consequently the species was listed as threatened. Bald eagle populations have recovered substantially since that time, and on August 9, 2007, the USFWS removed the bald eagle from the federal list of threatened and endangered species. Nevertheless, bald eagles are still afforded protection under the Migratory Bird Treaty Act and the Golden Eagle Protection Act. Montana had over 225 occupied nesting territories in 1999, and continues to be important for the recovery of bald eagles (Casey 2000). Breeding success must continue to be monitored within the state as part of the delisting process.

Baird's Sparrows breed in portions of Alberta, Saskatchewan, Manitoba, Montana, North Dakota, and South Dakota, and winter in portions of Arizona, New Mexico, Texas, and Mexico (Sibley 2000, Green et al. 2002). Baird's sparrows primarily are found in the eastern two-thirds of Montana, and are most common in the northeastern corner of the state (MTNHP 2006*b*). Baird's sparrows are present in Montana from the mid-May through the end of September; breeding occurs during the same time period. High-quality intermediate to tall native grassland prairie is the preferred habitat of Baird's sparrows (Green et al. 2002, Casey 2000, Lenard et al. 2006). However, recent research has shown that non-native vegetation may be acceptable provided the form and structure of the vegetation resemble that of native species (Sutter et al. 1995). Baird's sparrows are common in the BNGPA, and nest in the vicinity of many gas wells. Baird's sparrows nest in crested wheatgrass (*Agropyron cristatum)* adjacent to cropland and heavily grazed native prairie in the northern portion of the BNGPA (D. Prellwitz, BLM, personal communication). Bowdoin NWR has a large database on Baird's sparrow nesting since 1994; data from Bowdoin and other parts of northern Phillips County were instrumental in determining that listing the Baird's sparrow was not warranted (D. Prellwitz, BLM, personal communication). Baird's sparrows continue to be of management and conservation concern because of widespread population declines. They may be locally abundant in some areas, but are now considered rare throughout their range even though they were once considered one of the most abundant of the native prairie birds (Green et al. 2002, Sauer et al. 2005). Montana is considered particularly important for the conservation of this species because the state supports a large portion of the overall population of Baird's sparrows. The primary reason for the decline of this species is believed to be the removal or conversion of native prairies or non-native structural and functional equivalents to agricultural or other anthropogenic uses (Casey 2000, Green et al. 2002).

Black Terns are semi-colonial waterbirds that breed throughout Canada and the northern portions of the United States, and winter along coastal Mexico and Central and South America (Dunn and Agro 1995, Sibley 2000). The core of the black tern breeding range is within the Prairie Pothole region in the northern Great Plains of the United States and southern Canada (Casey 2000). Breeding has been documented in 12 counties in Montana, and unconfirmed sightings have been made in five additional counties located primarily in the northern part of the state (MTNHP 2006*b*). Black terns are present in Montana from mid-May through mid-

September. Breeding occurs from the first of June through the end of August. Black terns nest in shallow freshwater wetlands with emergent vegetation including marshes, prairie potholes, sloughs, and small ponds (Dunn and Agro 1995, MTNHP 2006*b*). Black terns in Montana select wetlands or wetland complexes with 30 to 50 percent emergent vegetation (MTNHP 2006*b*). They nest in Bowdoin NWR just outside of the BNGPA, and immature terns have been observed feeding on Nelson Reservoir (D. Prellwitz, BLM, personal communication). Black terns are of management and conservation concern because of widespread population declines during the 1960s (Casey 2000). These population declines most likely were caused by the draining of wetlands throughout the Prairie Pothole region and the conversion of these habitats to agricultural uses (Dunn and Agro 1995, Casey 2000). However, Breeding Bird Survey data indicate that black tern populations have stabilized and appear to be slightly increasing in some areas of their range in recent years (Sauer et al. 2005). Some breeding areas within the BNGPA have been dry for several years recently, and drought is a major concern (D. Prellwitz, BLM, personal communication).

Black-and-white Warblers are Neotropical migrants that breed throughout most of the eastern United States and across much of southern Canada They winter in Florida, throughout Mexico, Central and South America, and the Caribbean (Kricher 1995). Transient black-and-white warblers have been observed across Montana, and indirect evidence of breeding has been reported on a few occasions (MTNHP 2006*b*). Black-and-white warblers are present in Montana from the first of May through the middle of October, but breeding and brood-rearing dates are poorly documented. Information regarding the habitat requirements of black-and-white warblers in Montana is limited, but existing data indicate a preference for riparian habitats and woody draws (MTNHP 2006*b*). Generally, black-and-white warblers prefer mature deciduous or mixed forests (Kricher 1995). Black-and-white warblers are relatively uncommon, but they potentially could be found within the riparian and wooded portions of the BNGPA. Black-and-white warbler populations appear to be stable throughout most of their range compared to many other Neotropical migrant species (Kricher 1995, Sauer et al. 2005). However, because of their preference for mature forests, they are sensitive to logging or other activities which remove mid- and late-successional forests.

Black-crowned Night-heron is a widespread, colonial nesting species that breeds and/or is a year-round resident throughout much of the United States, and winters and/or is a year-round resident throughout Mexico and Central America (Davis 1993, Sibley 2000). This species has been observed throughout much of Montana, but most observations are restricted to the eastern part of the state, particularly the northeast corner (MTNHP 2006*b*). Records of breeding black-crowned night-herons are sparse, but occurrences are scattered throughout the state (MTNHP 2006*b*). Black-crowned night-herons are present in Montana from the first part of April through the end of September. Breeding and brood-rearing occurs from the first part of May through the end of August. Black-crowned night-herons breed in marshes, swamps, other wetland habitats (Davis 1993, Casey 2000, MTNHP 2006*b*). Nest sites often are located on islands, within swamps and wetland areas, or in areas which are otherwise not easily assessable; this nesting preference generally is believed to be a predator avoidance strategy (Davis 1993, Casey 2000).

The largest breeding colony of black-crowned night-herons in Montana is located in the Bowdoin NWR just outside of the BNGPA (MTNHP 2006*b*). Black-crowned night-herons should be considered present in the BNGPA with feeding possible wherever minnows are present. Other rookeries occur farther south and southwest of the BNGPA on larger BLM reservoirs (D. Prellwitz, BLM, personal communication). Declines in populations of black-crowned night herons were noted during the 1960s, presumably because of DDT use (Davis 1993). Currently their populations have stabilized and may be increasing slightly in some areas (Sauer et al. 2005).

However, the black-crowned night-heron remains a species of management and conservation concern because it is a colonial nesting species whose colonies are susceptible to disturbance (Davis 1993, Casey 2000).

Bobolinks breed throughout the northern United States and southern Canada and winter in the grasslands of Brazil, Paraguay, and Argentina (Martin and Gavin 1995). Bobolinks breed widely throughout Montana (MTNHP 2006*b*). They are present in Montana from the middle of May through the middle of September and reproduce during the same period. Bobolinks are grassland nesting birds that traditionally nested in the tall-grass or mixed-grass prairies in the United States and Canada (Bent 1958). Bobolinks prefer areas with high grass-to-forb ratios, but avoid habitats with high legume (i.e., alfalfa) components (Bollinger 1995). Bobolinks occur during the breeding season in irrigated hay land adjacent to Bowdoin NWR, some of which is within the BNGPA. They have also been observed at Pea Lake north of Whitewater Lake, and at other locations in the Milk River Valley (MBDD 2006*b*, D. Prellwitz, BLM, personal communication). Bobolink populations continue to decline throughout most of their range. However, Bobolink populations appear to have stabilized or be on the increase throughout North Dakota, South Dakota, and the eastern third of Montana (Sauer et al. 2005). These declines are primarily the result of grassland being converted to other uses (Martin and Gavin 1995). Bobolinks are sensitive to any activity that reduces the amount of grassland available, and they continue to be of management and conservation concern.

Brewer's Sparrows are sagebrush obligates and breed throughout the intermountain west of the United States. They winter in the southern portions of California, Arizona, New Mexico, western Texas and down through the central part of Mexico (Rotenberry et al. 1999, Sibley 2000). Brewer's sparrows breed throughout Montana (MTNHP 2006*b*). Brewer's sparrows are present in Montana from the middle of May through the end of September and reproduce during the same period. They will breed in a variety of shrubland habitats but prefer areas dominated by big sagebrush (*Artemisia tridentata*; Rotenberry et al. 1999). Brewer's sparrows prefer to nest in shrubs that are taller and denser than average (Petersen and Best 1985). Breeding has been recorded in and around the BNGPA (MBDD 2006*a*). Brewer's sparrows probably breed within the BNGPA, and the absence of direct evidence of breeding is due more to a lack of observers and survey efforts than to a lack of birds (D. Prellwitz, BLM, personal communication). Optimal Brewer's sparrow habitat in the BNGPA exists in the big sagebrush communities in the Larb Hills (locally known as the Saco Hills) in the southern portion of the BNGPA. Brewer's sparrows are of management and conservation concern because of widespread population declines throughout their range (Rotenberry et al. 1999, Sauer et al. 2005). These population declines are believed to be the result of habitat degradation/conversion (Rotenberry et al. 1999). This species also appears to be particularly sensitive to habitat fragmentation, as it is affected more by changes in landscape-level attributes than changes at a local level (Knick and Rotenberry 1995).

Burrowing Owls are found throughout the plains and prairies of the western United States (Haug et al. 1993). They have been reported throughout Montana, but most observations and breeding activity are limited to the eastern two-thirds of the state (MTNHP 2006*b*). Burrowing owls are present in Montana from the beginning of May through mid-September and breed and raise young during the same time period. Burrowing owls have the capacity to excavate their own burrows but seldom do relying instead on mammals such as prairie dogs, ground squirrels, and badgers (Thomsen 1971, Casey 2000). The burrowing owl's close association with burrowing mammals suggests dependence on them (Haug et al. 1993). Knowles (1999) suggested that burrowing owls are near prairie-dog obligates because their distribution is so closely tied to that of prairie dogs in Montana. Nevertheless, burrowing owls probably use prairie-dog colonies because they are available. Burrowing owls also use isolated ground-squirrel and badger burrows in hillsides and roadside borrow ditches long distances from prairie-dog colonies. At least 25 nest burrows with breeding burrowing owls have been documented within or immediately adjacent to the BNGPA (BLM, unpublished data; Figure 3.12-7). Burrowing owls are known to nest on well pads adjacent to gas well buildings. Burrowing owls nest in a prairie-dog colony in Hewitt Lake NWR and near Nelson Reservoir within the BNGPA where several gas wells are present (E. Atkinson, MFWP, unpublished data). Burrowing owls are listed as threatened, endangered, or of special concern across most of their range, including Montana, as a consequence of long-term population declines (Haug et al. 1993). Because of the strong association between burrowing owls and prairie dogs, declines in the burrowing owl population have been linked to many of the same factors associated with declining prairie dog populations (i.e., rodent-eradication programs and habitat loss). Furthermore, long-term conservation of burrowing owls will likely be closely linked to the conservation and preservation of prairie-dog complexes, Richardson's ground squirrels, and other burrowing mammals (Casey 2000).

Caspian Tern is an uncommon, colonial nesting species that breeds in the western and northern United States and Canada (Sibley 2000). It can be found year-round along the coasts of the southern United States, Mexico, and Central America where populations that breed in the interior of North America join them in the winter (Sibley 2000). Caspian terns have been documented throughout Montana, but most observations are of transient individuals. Breeding colonies are known to occur at less than a dozen locations in Montana (MTNHP 2006*b*). Caspian terns are present in Montana from the middle of April through the end of September. Reproduction occurs from mid-May through mid-August. Caspian terns normally nest colonially, but may nest in very low numbers, even singly in Montana (MTNHP 2006*b*). Sandy or gravelly beaches on islands within large lakes or reservoirs are their preferred nesting habitat (Casey 2000, MTNHP 2006*b*). Caspian terns occasionally nest on the same islands as double-crested cormorants and pelicans (MTNHP 2006*b*, D. Prellwitz, BLM, personal communication). Caspian terns are known to breed on the pelican islands in Lake Bowdoin just outside the BNGPA. In addition, Caspian terns are observed every summer on Nelson Reservoir within the BNGPA where a breeding colony is suspected (D. Prellwitz, BLM, personal communication). Caspian tern is a species of management and conservation concern because little is known about its nesting status, distribution, and habitat requirements; like other colonial nesting species, its colonies are susceptible to disturbance (Casey 2000).

Chestnut-collared Longspurs are native prairie specialists and breed in the northern prairies of the northern Great Plains of the United States and southern Canada. They winter in the southwest and south-central portions of the United States and down through the central portions of Mexico (Hill and Gould 1997). Chestnut-collared longspurs are common and breed throughout the eastern two-thirds of Montana. They are present in Montana from the beginning of May through mid-October, concurrent with breeding and brood-rearing. Chestnut-collared longspurs have been described as native prairie specialists (Anstey et al. 1995). Historically they bred in the mid- and short-grass prairies and preferred areas that had been grazed by bison (*Bos bison*) and disturbed by fire (Hill and Gould 1997). Anstey et al. (1995) reported that densities of breeding birds were greater in native grasslands than pastures. Within native grasslands, bird densities were greater in grazed areas than ungrazed areas (Maher 1973). Chestnut-collared longspur nests are quite common when well pads and gas pipeline routes are nest-dragged prior to construction during the migratory-bird nesting season. Their nest success rate is very high in Phillips County. Bowdoin NWR has had a large database of longspur nests since 1994, and many birds have been banded in the refuge. The species is the most common bird found on BLM non-game bird linear transects conducted since 1979 (D. Prellwitz, BLM, personal communication). Chestnut-collard longspur populations have declined substantially from historic levels throughout their range (Hill and Gould 1997). Short-term population trends are less clear, but indicate that populations may have stabilized in many portions of their range, including Montana (Sauer et al. 2005). However, this species remains of management and conservation concern because of its reliance upon native prairie habitats. Montana and adjacent states, which retain much of the remaining native prairies, are particularly important for the conservation of native prairie species (Casey 2000).

Common Loons are solitary and reclusive waterbirds whose preferred habitats are secluded lakes or estuaries across much of its range. Common loons have been documented throughout most of Montana. However, most observations are of transient/migrant birds. Breeding occurs mostly in the western third of the state with few exceptions (MTNHP 2006*b*). Common loons are present in Montana from mid-April through mid-November; reproduction occurs during the same period. Common loons in Montana nest on relatively large lakes (>13 acres) below 5,000 feet in elevation, with suitable nesting (i.e., small islands, herbaceous shorelines) and nursery (i.e., sheltered, shallow coves) areas (MTNHP 2006*b*). Common loons occur on large bodies of water within the BNGPA, most commonly on Nelson Reservoir (D. Prellwitz, BLM, personal communication). Up to a hundred loons have been observed during the spring migration season in April, and lesser numbers during the fall migration within the BNGPA. A small number of loons remain on Nelson Reservoir through the summer with frequent territorial calling. A brood was observed in the early 1990s, but water-level fluctuations and recreational use make nesting difficult and improbable in most years (D. Prellwitz, BLM, personal communication).

Common Tern is a colonial nesting species that breeds in the northern United States and Canada (Sibley 2000). Nesting common terns may form colonies of tens, hundreds, and sometimes thousands of pairs. Common terns have been documented throughout Montana, but most breeding occurs in the northern plains (MTNHP 2006*b*). Common terns are present in Montana from mid-April through the end of September. Breeding and brood-rearing occur from mid-May through the end of August. Common tern colonies in Montana normally are formed of less than 50 pairs, but numbers may range from less than 10 to several hundred. Sparsely vegetated sandy, pebbly, or stony beaches surrounded by matted or scattered vegetation on islands within large lakes or reservoirs comprise their preferred nesting habitat. Common terns occasionally nest on the same islands as double-crested cormorants and pelicans (MTNHP 2006*b*, D. Prellwitz, BLM, personal communication). Common terns nest on Nelson Reservoir, Whitewater Lake, and possibly on other large waterbodies in wet years. Bowdoin NWR, just outside of the BNGPA, is one of the areas in Montana with the highest recorded number of nesting common terns. Common terns also nest on Nice Pond southwest of the BNGPA. Stock ponds and pools in Whitewater Creek where minnows are present attract common terns for feeding. The common tern is of management and conservation concern because like other colonial nesting species, its colonies are susceptible to fluctuating water levels and human disturbance (Casey 2000).

Ferruginous Hawks are primarily found in mixed-grass prairie and sagebrush steppe habitats. The breeding population in Montana is migratory, and most birds winter in Texas and northern Mexico (MTNHP 2006*b*). Ferruginous hawks are present in Montana from mid-March through the end of September with breeding occurring during the same period. Breeding occurs in and around the BNGPA. Suitable nesting habitat for ferruginous hawks exists in the breaks of the Cottonwood Creek, Little Cottonwood Creek, and Frenchman Creek drainages. At least six ferruginous hawk nest sites are located within or immediately adjacent to the BNGPA (Figure 3.12-7). Ferruginous hawk populations appear to be increasing in Montana; however, they are of special concern due to their sensitivity to habitat change and disturbance (Casey 2000).

Forster's Tern is a colonial nesting species that breeds in the intermountain west across the northern United States and southern Canada, the Great Plains, and south into Texas (Sibley 2000). Forster's terns normally migrate in small groups through the interior of North America, and arrive earlier and depart later than common terns. Scattered reports of Forster's Tern have been recorded throughout Montana. Some breeding does occur within the state though most sightings are of transient/migrant birds (MTNHP 2006*b*). Forster's terns are present in Montana from the beginning of May through the end of September. Reproductive activity occurs from mid-May through mid-August. Forster's terns in Montana generally prefer large marsh complexes with sizeable reed beds occasionally along the borders of lakes and reservoirs. Direct evidence of breeding Forster's terns has been reported west of the BNGPA (Casey 2000, MBDD 2006*a*). It is possible that an occasional Forster's tern nesting in Bowdoin NWR outside the BNGPA, or on Nelson Reservoir and Whitewater Lake within the BNGPA, has gone unnoticed due to the similarity between them and common terns (D. Prellwitz, BLM, personal communication). Forster's tern is of management and conservation concern because little is known about its nesting status, distribution, and habitat requirements, and because like other colonial nesting species, its colonies are susceptible to fluctuating water levels and human disturbance (Casey 2000).

Franklin's Gull is a colonial nesting species that breeds in the intermountain west and the Great Plains of the northern United States and Canada. Franklin's gulls primarily migrate through the Great Plains to wintering grounds along the Pacific coast of South America (Casey 2000). Observations of Franklin's gull are widely distributed across Montana, and although most of these sightings have been of transient/migrant birds, isolated observations of breeding activity have been documented (MTNHP 2006*b*). Franklin's gulls are present in Montana from mid-April through mid-October. Reproductive activity occurs from mid-May through mid-August. Franklin's gulls build floating nests in marshy areas in colonies of a few pairs to several hundred pairs. The size of the breeding colony at Bowdoin NWR just outside of the BNGPA can vary greatly depending upon water conditions. Large numbers of migrating immature birds also can be present during migration in August. Franklin's gulls use Nelson Reservoir for feeding, but nesting is not known in that location (D. Prellwitz, BLM, personal communication). Franklin's gull is a species of management and conservation concern because like other colonial nesting species, its colonies are susceptible to fluctuating water levels and disturbance, and significant population declines have been noted over the past 30 years (Casey 2000).

Grasshopper Sparrow is a grassland species that breeds throughout the United States and southern Canada. Grasshopper sparrows primarily breed in the Great Plains in the eastern two-thirds of the state (MTNHP 2006*b*). Grasshopper sparrows are present in Montana from the beginning of May through mid-September; reproductive activity occurs during the same period. Grasshopper sparrows prefer grasslands of intermediate height which include patches of sparse woody vegetation, somewhat deep litter, and bunchgrasses interspersed with bare ground. Grasshopper sparrows also use CRP plantings and croplands, but are sensitive to grazing and are found at much lower densities than in native habitats (Casey 2000). Bowdoin NWR has a large database of nest data for the grasshopper sparrow since 1994. Grasshopper sparrows can be locally abundant in short-grass habitat throughout much of the BNGPA (D. Prellwitz, BLM, personal communication). Grasshopper sparrow populations have experienced declines across their range; however, populations in the northern Great Plains and Montana appear to be doing well (Casey 2000).

Gray-crowned Rosy-finches breed from Alaska to the northern Rockies and winter in large flocks in the Great Plains and intermountain west (Sibley 2000). Gray-crowned rosy-finches have been observed throughout most of the state of Montana. Though wintering populations have been recorded throughout most of Montana, breeding activity is restricted to the western third of the state (MTNHP 2006*b*). Gray-crowned rosy-finches are present year-round in Montana, but breeding and brood-rearing activity occurs from the beginning of June through the middle of August. Gray-crowned rosy-finches prefer to nest in crevices in cliffs and talus slopes above timberline and winter in open areas including fields, cultivated lands, brushy areas, and occasionally, short-grass prairie (MTNHP 2006*b*). No breeding has been reported within or near the BNGPA, but winter sightings in the Cottonwood Creek breaks have been documented. Gray-crowned rosy-finches appear to utilize available tree and shrub habitat, and occasional use of gravel roadsides was also observed in the BNGPA (D. Prellwitz, BLM, personal communication). Loss of traditional winter roost sites in abandoned mine shafts appears to be a risk factor for this species (MTNHP 2006*b*).

Greater Sage-grouse are sagebrush obligates found entirely in the western United States, primarily in the intermountain west (Sibley 2000). Greater sage-grouse breed throughout most of the southeastern two-thirds of Montana, but are largely absent in the northwestern portions of the state (MTNHP 2006*b*). They are present year-round in Montana, but reproductive activity occurs from mid-April through the end of July. Greater sage-grouse depend upon extensive areas of sagebrush for food and cover throughout the year. Typically, strutting grounds or leks are located in open patches within sagebrush habitat, and the surrounding area is considered potential nesting habitat. Nesting habitat tends to have higher sagebrush density, taller live and residual grasses, more live and residual grass cover, and less bare ground than areas favored for leks (Connelly et al. 2004).

The entire BNGPA is classified as occupied greater sage-grouse habitat of varying conditions (Table 3.13-2, Figure 3.13-2). The majority of the BNGPA is comprised of vast grassland prairies and is considered sub-optimal habitat because it is sagebrush- and understory-limited. Silver sage is the predominant sage species intermixed in the prairies in the northern portion of the BNGPA. Variable and fragmented habitat is mostly concentrated around the Milk River Valley and the U.S. Highway 2 corridor where the majority of human habitations are concentrated. Some winter habitat in sagebrush exists along the Milk River on the western side of the BNGPA, although it may not be occupied by sage-grouse during mild winters. Only small numbers of birds have been observed in the area in recent years during winter (D. Prellwitz, BLM, unpublished data). Habitat with adequate understory cover but sagebrush-limited cover exists in the northeastern part of the BNGPA around the Thoeny Hills area. Excellent habitat with adequate sagebrush and understory cover is located in the far southeastern corner of the BNGPA.

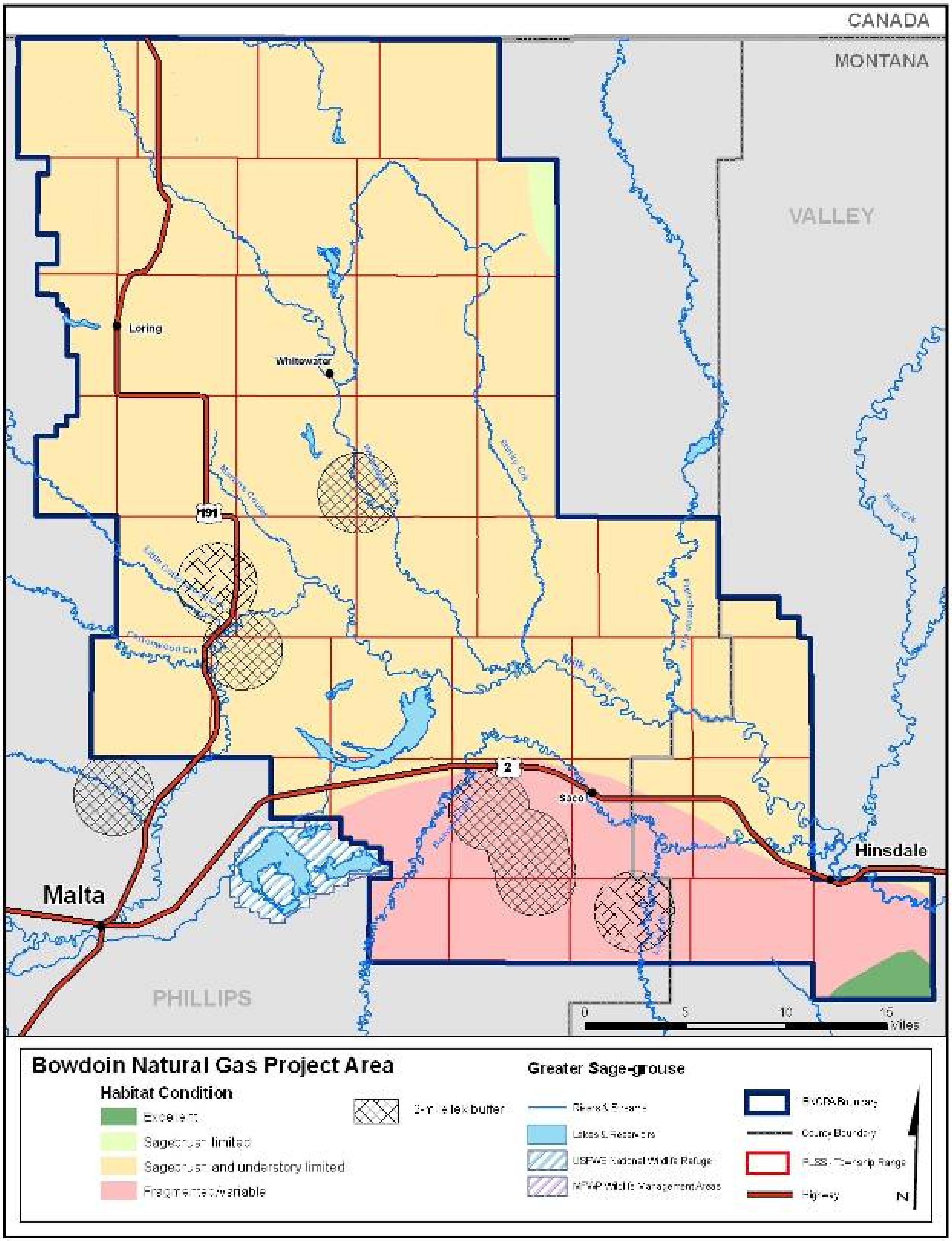
Table 3.13-2. Condition of Greater Sage-grouse Habitat Within the BNGPA

Habitat Condition	Acres of Habitat	Percentage of BNGPA
Excellent	5,385	0.7
Sagebrush limited	3,891	0.5
Sagebrush & Understory limited	669,081	82.3
Fragmented/Variable	134,358	16.5

Greater Sage-grouse leks are located in and around the BNGPA (Figure 3.13-2). Seven active leks are located within the BNGPA. One lek south of Whitewater is located near several gas buildings, access roads, and a power line. The number of males attending leks over the last eight years has remained relatively stable according to MFWP lek count data (M. Sullivan, MWFP, unpublished data). Greater sage-grouse reproduction occurs within the BNGPA, and broods have been observed in recent years.

Sage-grouse exhibit site fidelity to leks, winter and summer areas, and nesting areas (Schroeder et al. 1999). Sage-grouse may be susceptible to sagebrush community disturbance and removal, as well as to construction of fences, above-ground power lines, and other above-ground structures. They tend to avoid areas that may provide perching or roosting opportunities for raptors (i.e., fence posts, power lines). Human activities during the breeding season may disrupt normal use of leks, and subsequently affect local breeding success. Therefore, steps should be taken to ensure that impacts to sage-grouse habitats, especially leks and nesting areas, are minimized. Populations across the west have declined from historic levels due to a wide range of factors including drought, habitat loss, and habitat degradation (Connelly and Braun 1997, Braun 1998, Connelly et al. 2000). Recently, the USFWS conducted a status review of greater sage-grouse throughout its range in response to petitions requesting the listing of this species under the ESA. Recently, the USFWS conducted a status review of Greater sage-grouse throughout its range in response to petitions requesting the listing of this species under the ESA. On January 7, 2005, the USFWS determined that the Greater sage-grouse did not warrant protection under the ESA. Nevertheless, on December 4, 2007, U.S. District Court Judge B. Lynn Winmill reversed the USFWS decision and remanded the case to the agency for further consideration. A decision from the USFWS is expected in late 2008 or early 2009.

Figure 3.13-2. Habitat Condition Classes and Two-mile Lek Buffers of Greater Sage-grouse Within the BNGPA



Harlequin Ducks breed in the northern Rocky Mountains in the contiguous United States and winter along the Pacific Coast (Sibley 2000). Observations and breeding records of Harlequin ducks within Montana are limited primarily to the northwestern portions of the state (MTNHP 2006*b*). Harlequin ducks are present in Montana from the middle of April through the end of September. Breeding and brood-rearing occur from the beginning of May through the end of August. Harlequin ducks prefer clear, fast-moving steams and extremely turbulent water. They nest on the ground, on rocks, in piles of woody debris, and in tree and cliff cavities (MTNHP 2006*b*). Observations of transient/migrant individuals have been reported near the BNGPA. Records exist for two separate sightings at Bowdoin NWR just outside of the BNGPA. Harlequin ducks, if present within the BNGPA, most likely would be observed on Nelson Reservoir (D. Prellwitz, BLM, personal communication). Harlequin ducks are of management and conservation concern because of their dependence on clean headwater streams for nesting and brood-rearing (Casey 2000).

Lark Bunting is a conspicuous and gregarious species of the short-grass and mixed-grass prairies. Lark buntings breed in the Great Plains and central United States and winter in the southern United States and Mexico (Sibley 2000). They have been recorded throughout Montana, but breeding activity is limited to the eastern two-thirds of the state (MTNHP 2006*b*). Lark buntings are present in Montana from mid-May through mid-September. Breeding and brood-rearing activity occur during the same period. Lark buntings build nests on the ground or in shrubs in areas with high grass cover, very little bare ground, and a moderate shrub or tall forb cover (Casey 2000). They breed within the BNGPA and are the most abundant of all birds listed on the South Malta Breeding Bird Survey conducted just south of the BNGPA. Lark buntings in the BNGPA usually build nests in short shrubs or near shrubs such as sagebrush or greasewood. Two nests were found near a gas well pad southwest of Whitewater in 2005. Huge flocks of fledgling buntings are observed foraging on sunflower seeds along county roads in August and early September throughout the BNGPA (D. Prellwitz, BLM, personal communication). Lark bunting populations have experienced declines across their range primarily due to loss of habitat and grasshopper-control practices. Habitat remaining in Montana is important for lark bunting conservation because a large percentage of the existing population breeds in the state (Casey 2000).

Le Conte's Sparrows breed throughout the grasslands of central Canada, eastern North Dakota, northern Minnesota, and the Upper Peninsula of Michigan. They winter from southern Missouri down through the Gulf Coast states (Lowther 1996, Sibley 2000). The primary breeding range of the Le Conte's sparrow is peripheral to Montana (Lowther 1996), but several isolated breeding populations do exist in northwestern (Flathead County) and northeastern (Sheridan County) Montana (Casey 2000, MTNHP 2006*b*). Le Conte's sparrows are present in Montana from mid-May through the end of September. Reproductive activity occurs throughout the same time period. Le Conte's sparrows prefer wet grasslands and marshes with a strong sedge component (Lowther 1996). They appear only to be occasional visitors to the BNGPA, and only transient/migrant birds have been observed at Bowdoin NWR (MBDD 2006*a*). A Le Conte's sparrow was reported within the BNGPA near the Canadian border in May of 2006 (D. Prellwitz, BLM, unpublished data). Population trend surveys indicate that populations of Le Conte's sparrows are remaining stable. However, they are very elusive and secretive and are poorly surveyed by both the Breeding Bird Survey and the Christmas Bird Count, and these results should be viewed with caution (Lowther 1996). Le Conte's sparrows are of management and conservation concern in Montana primarily because they are relatively rare and have such a limited distribution within the state.

Loggerhead Shrikes breed and winter throughout the United States in a wide variety of open habitats with some shrub or scattered-tree component. Loggerhead shrikes have been observed throughout most of Montana, but reproductive activity is limited primarily to the eastern two-thirds of the state (MTNHP 2006*b*). Loggerhead shrikes are present in Montana from mid-April through the end of September with reproductive activity occurring during the same period. They usually build nests within large shrubs such as sagebrush, bitterbrush, or greasewood (Woods and Cade 1996). Loggerhead shrikes are known to breed within the BNGPA, and nests are usually in Russian olives, buffaloberry, or similar shrubs. Known nest sites are near Nelson Reservoir and north of Bowdoin NWR. Loss of the larger shrub component from many side drainages is negatively impacting the species. Drought, when combined with livestock grazing on an annual basis, is a major factor in the decline. Loggerhead shrike populations have experienced declines across much of their range primarily due to loss of habitat. In addition, loggerhead shrikes are predators whose diet consists largely of insects; therefore, they are prone to the negative effects of pesticide use. Nevertheless, populations in Montana appear to be stable (Casey 2000).

Long-billed Curlews are North America's largest shorebird. They breed in the prairies and grasslands of the northwestern interior of the United States and southwestern Canada and winter on the gulf coast, southern California, and western Mexico (Casey 2000). Long-billed curlews breed throughout Montana (MTNHP 2006*b*). They are present in Montana from mid-April through mid-September, and reproductive activity occurs during the same time period. They prefer gentle, rolling topography in native grasslands, sagebrush, and agricultural lands that can be arid as long as a water source is relatively nearby. Vegetation species composition appears to be less limiting than does vertical structure (Casey 2000). Long-billed curlews breed within the BNGPA and nest in short- and mid-grass areas from Nelson Reservoir north past Whitewater and Loring to the Canadian border. Immature birds have been banded near Nelson Reservoir, Hewitt Lake, and Whitewater Lake. An immature long-billed curlew that had been banded at Hewitt Lake was observed near Nelson Reservoir as an adult in a subsequent year. Long-billed curlew was formerly a candidate species for the threatened and endangered list; it is of management and conservation concern because of population declines attributed to the loss of suitable nesting habitat. Breeding habitat in Montana is considered fragmented and remains largely unprotected (Casey 2000).

McCown's Longspurs are short-grass prairie specialists and breed primarily in the short-grass prairies of Wyoming, Montana, southern Alberta and Saskatchewan and winter primarily in west Texas and north central Mexico (With 1994). McCown's longspurs breed throughout the eastern two-thirds of Montana (MTNHP 2006*b*). They are present in Montana from mid-April through mid-November, and breeding and brood-rearing occurs during the same time period. McCown's longspurs prefer open habitats with sparse vegetation and do well in areas that have been grazed (With 1994). They are present consistently on linear songbird transects conducted since 1979 in northern Phillips County, but distribution within transects is highly correlated to areas of intense grazing. Territorial males frequently are heard or observed during gas well staking tours in proximity to proposed and existing gas wells; however, no nests have been discovered during nest-dragging prior to well and pipeline development. Nevertheless, adult McCown's longspur behavior has indicated probable nests or broods quite close to some wells. Though populations of McCown's longspurs have decreased substantially since historic levels in the early 20th century, short-term population trends indicate populations may have stabilized over much of their range (With 1994, Sauer et al. 2005). Population declines were most likely caused by the conversion of native short-grass prairies to other uses (With 1994). McCown's longspur remains a species of management and conservation concern because of the continued pressure to convert native prairies. Montana is particularly important to the conservation of this species as it provides a large portion of the existing breeding habitat (Casey 2000).

Mountain Plovers are dependent on short-grass prairie and also are considered near prairie-dog obligates (Knowles et al., 1982). Mountain plovers breed on the plains of southern Canada, central Montana, Wyoming, and eastern Colorado and winter in the central valley of California and northern Mexico (Sibley 2000). Mountain plovers are found east of the continental divide primarily in north-central Montana (MTNHP 2006*b*). Mountain plovers are present within Montana from the beginning of April through September, and reproductive activities occur from mid-May through the end of August. Mountain plovers nest on the ground in large grassland areas with short, sparse vegetation and substantial amounts of bare ground (Casey 2000). The distribution pattern of mountain plovers in Montana is associated with blue grama grass and black-tailed prairie-dog colonies (Knowles et al. 1982). They have been observed at Hewitt Lake NWR within the BNGPA, and at Bowdoin NWR just outside of the BNGPA (Prellwitz 1993). The mountain plover observed at Hewitt Lake was in a black-tailed prairie-dog colony with natural gas wells, but was most likely a transient bird migrating through the area (Figure 3.13-1). The mountain plover observed in Bowdoin NWR was not in a prairie-dog colony. Additional black-tailed prairie-dog colonies near Nelson Reservoir might also attract mountain plovers on occasion. Mountain plovers may breed within the BNGPA where suitable habitat exists. However, direct evidence of breeding only exists to the south and southwest of the BNGPA, which is consistent with the extent of the black-tailed prairie-dog complex in the area. Mountain plover was formerly a candidate species for the threatened and endangered list. Mountain plovers are of management and conservation concern because of population declines attributed to the loss of habitat across their range (Casey 2000).

Nelson's Sharp-tailed Sparrows breed throughout portions of Alberta, Saskatchewan, Manitoba, North Dakota, and Montana and winter along the coastal areas of the southeastern United States (Greenlaw and Rising 1994). In Montana, Nelson's sharp-tailed sparrows have a very limited distribution. Nelson's sharp-tailed sparrows have been documented only in the northeastern corner of the state, though transient/migrant birds have been observed around the Bozeman vicinity (MTNHP 2006*b*). Information on the presence of Nelson's sharp-tailed sparrows in Montana is limited. They have been observed within Montana in May, June, July, and August. They nest in colonies and prefer freshwater wetlands with dense, emergent vegetation comprised of prairie cordgrass and common reed stands (Murray 1969). Nelson's sharp-tailed sparrow have not been observed within the BNGPA. A recent sighting in Valley County, although outside of the BNGPA, is the closest known occurrence of the species. Potential habitat for the species is very uncommon within the BNGPA but may exist at Bowdoin NWR outside of the BNGPA. It is possible, but unlikely, that Nelson's sharp-tailed sparrows could be found within the BNGPA based on their habitat preference and extremely limited distribution within Montana. Nelson's sharp-tailed sparrows are of management and conservation concern in Montana primarily because they are relatively rare and have such a limited distribution within the state.

Northern Goshawks are uncommon but widespread birds of prey found throughout Canada and the northern and western United States. Northern goshawks have been observed throughout much of Montana, but most observations and breeding activity occur in the western third and the southern edge of the state. They are present in Montana year-round but breed and rear young from mid-May through mid-August. The preferred habitat of northern goshawks is coniferous forest. Nest sites in the drier Rocky Mountains are located in predominantly even-aged stands with higher stem densities and lower shrub cover than nest sites in mature or old-growth forests of the moister Pacific Northwest (Hayward and Escano 1989). Northern goshawks do not breed in the BNGPA and are absent during the summer months. They are present in the fall and winter months within and just outside of the BNGPA where they are observed regularly. Northern goshawks have been observed during annual Christmas Bird Counts conducted at McNeil Slough (three of seven years from 2000–2006) and Bowdoin NWR (18 of 22 years from 1985–2006; Audubon 2006*a*, *b*). Goshawks at Bowdoin NWR feed on ring-necked pheasants during fall and winter. Northern goshawks are of management and conservation concern in Montana because of nesting habitat fragmentation. Goshawk populations in Montana are currently stable or increasing (Casey 2000).

Northern Hawk Owls are almost entirely restricted to Canada and Alaska, but incidental observations of transient birds occur in the northern United States (Sibley 2000). Northern hawk owls have a very limited distribution in Montana. Observations are restricted primarily to northern Montana, and the majority of sightings are of transient/migrant birds (MTNHP 2006*b*). Northern hawk owls inhabit northern coniferous forests, a habitat type that does not exist in the BNGPA. A sighting of a northern hawk owl during winter in the BNGPA would be very unusual, but not impossible. Northern hawk owls are of management and conservation concern in Montana primarily because they are very rare.

Olive-sided Flycatchers breed in the mountains of western North America and the boreal forest of Canada (Casey 2000, Sibley 2000). Olive-sided flycatchers breed throughout the western third of Montana but are seldom seen in the eastern part of the state except as transients or migrants (MTNHP 2006*b*). They are present in Montana from mid-May through the end of August and breed during the same time period. Olive-sided flycatchers nest in montane or boreal forests. Suitable nesting habitat does not occur within the BNGPA, and olive-sided flycatchers would not be expected to breed in or near the BNGPA. They have been observed around the BNGPA, but the few sightings are from Bowdoin NWR just outside of the BNGPA. Olive-sided flycatchers are of management and conservation concern because of population declines, and loss and fragmentation of suitable nesting habitat (Casey 2000).

Peregrine Falcons breed throughout North America, including the arctic, the Pacific coast and Rocky Mountains, and scattered areas across the eastern United States. They have been seen throughout Montana, and records of breeding are scattered across the state (MTNHP 2006*b*). Peregrine falcons are present in Montana year-round, but reproductive activity occurs from the beginning of May through mid-September. They nest on large cliffs near riparian habitats with abundant, medium-sized avian prey. It is unlikely that peregrine falcons breed within the BNGPA. However, transient or migrant individuals are observed occasionally. Peregrine falcons are found around large water areas such as Nelson Reservoir during the migration seasons, and occasionally during winter. They have been observed on Christmas Bird Counts at Bowdoin NWR and McNeil Slough (Audubon 2006*a*, *b*). A peregrine falcon spent the summer in Bowdoin NWR a number of years ago, and more than likely hunted within the BNGPA. A sick, banded bird that had been captured at Bowdoin NWR, rehabilitated and released, was recaptured two weeks later in Texas. Peregrine falcons formerly were classified as endangered but were delisted in 1999. They are of management and conservation concern because of historic population declines due to negative effects of pesticides. Peregrine falcon populations have rebounded and are increasing in areas due to reintroduction efforts and protection of nest sites (Casey 2000).

Red-headed Woodpeckers are found primarily in the eastern United States, but also occur in riparian and wooded areas across the Great Plains (Sibley 2000). Red-headed woodpeckers have been observed throughout most of Montana, but breeding activity is restricted to the eastern half of the state (MTNHP 2006*b*). Red-headed woodpeckers are present in Montana from mid-May through the end of August, and reproductive activity occurs during the same period. They prefer open and park-like areas of forest with abundant decadent trees or snags for nesting. Red-headed woodpeckers are known to breed within the BNGPA. Observations in the spring within the BNGPA usually occur in late May or early June. Nesting activity once was quite active along the Milk River in the Milk River Unit, but suitable nesting habitat has been reduced in recent years. Human disturbance, such as gas well development and activity, could be a factor in declining nesting activity along the Milk River. Red-headed woodpecker is a species of management and conservation concern due to the loss of mature trees in riparian areas for nesting and because the populations have been largely unmonitored (Casey 2000).

Sage Thrashers are sagebrush obligates found throughout the intermountain west. They breed throughout much of southern Montana with only scattered observations in northern portions of the state (MTNHP 2006*b*). Sage thrashers are present in Montana from the middle of April through the end of August. Reproductive activity occurs during the same period. They build nests in shrub steppe communities dominated by big sagebrush. Suitable habitat is limited within the BNGPA, and it is unlikely that sage thrasher breeding occurs there. Most breeding observations of sage thrasher are entirely outside of the BNGPA and were recorded during the South Malta Breeding Bird Survey along a route that runs from six miles south of Malta southeast to the Content Area. Sage thrashers occur mostly in dense stands of big sagebrush about 16 miles south of the BNGPA. A few individuals have been observed at other locations farther south in Phillips County, but population density is so sparse that it is difficult to find sage thrashers in some years. Sage thrasher is a species of management and conservation concern because of the loss and fragmentation of big sagebrush communities (Casey 2000).

Sedge Wrens breed in central Canada and the upper Midwest and Great Lakes region of the United States. They have primarily been documented as transients or migrants in Montana although indirect evidence of breeding has occurred in the far northeastern portion of the state (MBDD 2006*e*). Sedge wrens have been recorded in Montana from April to September (MBDD 2006*e*, MTNHP 2006*b*). They prefer damp areas with dense grass and scattered shrubs either in, or adjacent to, wetlands (Sibley 2000, MTNHP 2006*b*). Sedge wrens display low nest-site tenacity and variability in breeding area occupancy because of the relatively high instability (due to flooding or drought) of their preferred habitat (MTNHP 2006*b*). Sedge wrens have been documented in Bowdoin NWR, but should be considered rare transients (USFWS 1999). Sedge wren is of management and conservation concern in Montana primarily because it is a wetlands-associated species, is relatively rare, and has such a limited distribution within the state.

Sprague's Pipits breed in central Canada, Montana, and North Dakota and migrate through the interior United States to winter in Texas and Mexico (Sibley 2000). They have been documented breeding throughout much of the eastern two-thirds of Montana (MTNHP 2006*b*). Sprague's pipits are present in Montana from the beginning of May through the end of August. Breeding and brood-rearing activities occur during the same period. Sprague's pipits prefer native prairie grasslands of intermediate density and moderate height and variation, but also will use pastures subjected to light to moderate grazing (Casey 2000). Sprague's pipits nest throughout the BNGPA, and territorial males often display above participants in gas-well staking tours. Their nests are encountered regularly when well pads and pipeline routes are being nest-dragged prior to construction during the summer nesting season. One nest was found while a pipeline was being nest-dragged near the Canadian border during 2005. Bowdoin NWR just outside of the BNGPA possesses a large data set for Sprague's pipit nests for the period of 1994 through 2006. Sprague's pipit remains a species of management and conservation concern because of continued pressure to convert native prairies. Montana is particularly important to the conservation of this species as it provides a large portion of the existing breeding habitat (Casey 2000).

Swainson's Hawks are birds of prey that are known for their long-distance migratory behavior. They breed throughout the western United States and winter in South America. Swainson's hawks have been documented breeding throughout Montana (MTNHP 2006*b*). They are present in Montana from mid-April through mid-September, and reproductive activity occurs during the same period. They prefer open habitats and nest in isolated tree groves or solitary trees. At least five Swainson's hawk nests are located within the BNGPA (Figure 3.12-7). Four nests were found during aerial surveys in 2006, and another is located along the county road southwest of Whitewater (HWA, unpublished data; BLM, unpublished data). Several Swainson's hawk nest sites are located around Bowdoin NWR just outside of the BNGPA. Populations seem to be increasing in Montana and across the species' range; however, high mortality on winter range in South America remains a concern (Casey 2000).

White-faced Ibises are colonial nesting waterbirds that breed in localized colonies found scattered across the western United States (Casey 2000, Sibley 2000). They have a very limited distribution in Montana, and breeding records exist for only four counties (MTNHP 2006*b*). White-faced ibises are present in Montana from the beginning of April through mid-September, and breeding occurs from the beginning of May through mid-August. The white-faced ibis' preferred habitat consists of permanent, shallow wetlands with emergent vegetation, but this species also will use irrigated croplands for foraging. No breeding colonies are known to exist within the BNGPA. However, white-faced ibises do breed in Bowdoin NWR and often feed in irrigated pastures near the refuge and occasionally within the BNGPA during late summer during the brood-rearing period. White-faced ibis is a species of management and conservation concern because like other colonial nesting species, its colonies are susceptible to fluctuating water levels and disturbance. In addition, only a few nesting colonies are known to exist in Montana, and populations are declining throughout the United States (Casey 2000).

Yellow Rail is a small, secretive species that breeds in Canada and the northern United States and winters in California and on the gulf coast (Sibley 2000). Yellow rails are considered rare in Montana with fewer than 20 observations in the state (MTNHP 2006*b*). Yellow rails have occurred in Montana from May to late October. Most observations are of transient/migrant birds, but indirect evidence of breeding has been recorded in extreme northeastern Montana. Yellow rails have been observed on several occasions at Bowdoin NWR, and have the potential to occur in the BNGPA. An individual was caught in a duck-banding trap in late summer, and another was observed at close range in a marsh in early fall at Bowdoin NWR just outside of the BNGPA. Most of the BNGPA does not have large enough areas of marsh habitat to attract yellow rails. They are of management and conservation concern in Montana primarily because they are relatively rare, have a limited distribution within the state, and are susceptible to fluctuating water levels and disturbance (Casey 2000).

Yellow-billed Cuckoos (Eastern Population) are Neotropical migrants that breed across the eastern United States and winter primarily in South America. Transient individuals that have been documented in the southwestern portion of the state are probably members of the western population (MTNHP 2006*b*). Yellow-billed cuckoo is considered a riparian-obligate species requiring mature riparian woodland, especially cottonwood (*Populus* spp.) or willow (*Salix* spp.), with low, dense undergrowth at elevations below 7,000 feet. Yellow-billed cuckoos have been documented in Bowdoin NWR but should be considered rare transients (USFWS 1999). Yellow-billed cuckoos are of management and conservation concern in Montana primarily because they are a riparian-associated species, are relatively rare, and have such a limited distribution within the state.

Amphibians

Plains Spadefoot is a prairie species known for its ability to quickly cover itself by burrowing into the soil using a unique morphological feature (i.e., 'spade') on its hind legs. It is primarily associated with sandy soils and gravel-loams (Werner et al. 2004). Plains Spadefoots have been known to disperse more than a mile but normally are found within a few hundred meters of their breeding site (Werner et al. 2004). A lack of large areas of sandy soils in the BNGPA probably greatly restricts the population of the species.

Great Plains Toads are primarily found at the headwaters of drainages and in glacial potholes, irrigation ditches, and smaller coulees (Werner et al. 2004). They are good burrowers and spend a considerable amount of time underground during hot, dry periods. During drought they sometimes use prairie-dog burrows to escape the heat. Individuals are known to travel approximately a mile from their breeding sites to forage (Werner et al. 2004). Toads are rarely observed in the BNGPA because they are most easily seen after summer rain storms when roads are impassable and people are not in toad habitat.

Northern Leopard Frogs are not usually found far from wetlands, cattail marshes, or along vegetated shorelines during summer, but they will venture several hundred meters along wet drainages during wet periods (Werner et al. 2004). Nevertheless, northern leopard frogs are known to travel up to five miles during spring and fall migration and during juvenile dispersal (Werner et al. 2004). Northern leopard frogs are most common near large, deep reservoirs scattered across the BNGPA where water persists throughout drought periods (Figure 3.12-9). Reservoirs with fish often have leopard frogs (D. Prellwitz, BLM, personal communication). Although these frogs are fairly common in the BNGPA, they may be exposed to similar factors that are causing declines west of the Continental Divide (Werner et al. 2004).

Reptiles

Greater Short-horned Lizards are cryptically colored and secretive. They are found in sagebrush and short-grass prairie habitats usually on south-facing slopes, rocky rims, and shale outcrops (Werner et al. 2004). They are sit-and-wait predators that only move about three meters per day. They are prey to snakes, hawks and owls, and escape or hide from these predators in sagebrush, under rocks, or in burrows (Werner et al. 2004). Short-horned lizards are most common in the breaks along Cottonwood Creek and Little Cottonwood Creek near the western edge of the BNGPA (Figure 3.12-9).

Western Hog-nosed Snakes use well-drained, sandy soils found along exposed riverbanks, sandstone outcrops, and old riverbeds (Werner et al. 2004). Western hog-nosed snakes can move several hundred meters in a day. They specialize in amphibian prey such as salamanders, frogs, and toads that they locate by olfactory cues (Werner et al. 2004). The species over-winters in underground cavities and mammal burrows (Werner et al. 2004). A western hog-nosed snake has been documented in Martins Coulee, but otherwise this species is uncommon in the BNGPA due to a lack of sandy soils. There is one record from Bowdoin NWR which is immediately adjacent to the BNGPA.

Fish

Paddlefish habitat includes slow or quiet waters of large rivers or impoundments. The species spawns on the gravel bars of large rivers during spring high water. Paddlefish tolerate, and may prefer, turbid water. Paddlefish stocks in Montana are adequate to support a recreational fishery.

Pearl Dace is a native species of both the eastern and northern drainages in Montana. Pearl dace prefer small cool streams, either clear or turbid. They spawn in clear water at depths of one to two feet over a gravel or sand bottom.

Sauger are native to Montana east of the Continental Divide. They inhabit both large rivers and reservoirs but are mainly a river fish. Sauger broadcast their spawn over riffles in rivers in the spring. Sauger are a highly prized sport fish; in some areas outside Montana they are also commercially fished.

Shortnose Gar is the only representative of the gar family in Montana. It is typically found in large rivers, quiet pools, backwaters, and oxbow lakes. This fish is native to Montana, but is found at only one location: the dredge ponds below Fort Peck Reservoir. Shortnose gar are of management and conservation concern in Montana because of their restricted distribution and limited population size.

Plants

Chaffweed (formerly *Centunculus minimus*) is a low annual herb inhabiting vernally wet and sparsely vegetated soils around ponds, rivers, and streams in the valleys and plains throughout Montana (MNHP 2006*e*). The flowering/fruiting period of chaffweed is June through September. Chaffweed is known to occur in Phillips and Valley counties and in the BNGPA (Taylor 2006).

Dwarf woolly-head is a low annual herb inhabiting drying mud of ponds and other vernally wet soil in valleys and plains (MNHP 2006*e*). Mature fruit is produced June to early August. Dwarf woolly-head is known to occur in the BNGPA (Taylor 2006).

Hot spring phacelia is an annual herb inhabiting open to partially wooded settings. This species has been collected on level ground adjacent to steep slopes above coulees (MTNHP 2006*e*). The Montana Natural Heritage Program records show that it was documented in the southern part of the BNGPA in 1982.

Long-sheath waterweed (formerly *Elodea longivaginata*) is an aquatic perennial herb inhabiting the shallow water of ponds and lakes on the plains with a flowering period of late June/July (MNHP 2006*e*). Long-sheath waterweed is known to occur on public land administered by the Malta Field Office, and the MNHP indicates it was observed in the southern part of the BNGPA in 1984.

Roundleaf water-hyssop is a perennial aquatic herb inhabiting muddy shores of ponds and streams in the valleys and on the plains with a flowering/fruiting period of June-August (MNHP 2006*e*). Roundleaf water-hyssop is known to occur in the BNGPA (Taylor 2006).

Scarlet ammannia (formerly *Ammania coccinea)* is a branching annual up to 4 decimeters tall, often inhabiting alkaline wet places throughout North America (Cronquist et al. 1997). Historical records maintained by the MNHP indicate this species was recorded just outside of the project area on the Bowdoin National Wildlife Refuge in 1903. Subsequent surveys have not recorded the presence of this species, and there is a possibility the plant may have been misidentified during the original survey.

Slender-branched popcorn flower is an annual herb inhabiting drying mud of ponds and other vernally wet soil in valleys and plains. The flowering/fruiting period usually occurs in July-August (MNHP 2006*e*). Slender-branched popcorn flower has been documented in Phillips County and is known to occur in the BNGPA (Taylor 2006).

Slender bulrush (formerly *Scirpus heterochaetus*) is a tall grass-like perennial rush inhabiting marshes and edges of lakes and ponds on the plains with fruiting usually occurring in August (MNHP 2006*e*). Slender bulrush is known to occur on the project area (Taylor 2006).

Table 3.13-3. Occurrence Potential, Status, and Associations of Montana Animal Species of Concern present in the BNGPA

Common Name[1]	Scientific Name	Occurrence Potential[2]	Global and State Status[3]	FWS[4]	BLM[5]	Habitat Association[6]	Other Association[7]
Mammals							
Black-footed Ferret	*Mustela nigripes*	VU	G1/S1	E,XN		grasslands	Prairie Dog Colonies
Black-tailed Prairie Dog	*Cynomys ludovicianus*	P	G4/S3	C	S	grasslands	Prairie Dog Colonies
Preble's Shrew	*Sorex preblei*	pp	G4/S3		S	sagebrush/grasslands	Sagebrush obligate
Swift Fox	*Vulpes velox*	P	G3/S3		S	grasslands	Prairie Endemic
Townsend's Big-eared Bat	*Corynorhinus townsendii*	U	G4/S2		S	caves in forest	
Birds							
Alder Flycatcher	*Empidonax alnorum*	pp	G5/S1B			wetlands/shrublands	Wetlands
American White Pelican	*Pelecanus erythrorhynchos*	P	G3/S3B			lakes	Colonial Nesting Waterbird
Baird's Sparrow	*Ammodramus bairdii*	P	G4/S2B		S	grasslands	Prairie Endemic
Bald Eagle	*Haliaeetus leucocephalus*	P	G4/S3B,N		S	riparian forest	Raptor
Black Tern	*Chlidonias niger*	P	G4/S3B		S	wetlands	Colonial Nesting Waterbird
Black-and-white Warbler	*Mniotilta varia*	VU	G5/S2,S3B			deciduous forest	Riparian
Black-crowned Night-heron	*Nycticorax nycticorax*	P	G5/S3B			wetland-lake w/ emergent vegetation	Colonial Nesting Waterbird
Bobolink	*Dolichonyx oryzivorus*	P	G5/S2B			moist grassland	Intermediate-Tall Grassland
Brewer's Sparrow	*Spizella breweri*	pp	G5/S2B			sagebrush	Sagebrush steppe obligate
Burrowing Owl	*Athene cunicularia*	P	G4/S2B		S	grassland	Prairie Dog Colonies
Caspian Tern	*Sterna caspia*	P	G5/S2B			large rivers and lakes	Colonial Nesting Waterbird
Chestnut-collared Longspur	*Calcarius ornatus*	P	G5/S3B			grassland	Prairie Endemic
Common Loon	*Gavia immer*	P	G5/S2B		S	mountain lakes w/ emergent vegetation	Wetlands
Common Tern	*Sterna hirundo*	P	G5/S3B			large rivers and lakes	Colonial Nesting Waterbird
Ferruginous Hawk	*Buteo regalis*	P	G4/S2B		S	sagebrush/grasslands	Prairie Endemic
Forster's Tern	*Sterna forsteri*	pp	G5/S2B			wetlands	Colonial Nesting Waterbird
Franklin's Gull	*Larus pipixcan*	P	G4G5/S3B			wetland-lake w/ emergent vegetation	Colonial Nesting Waterbird
Grasshopper Sparrow	*Ammodramus savannarum*	P	G5/S3B			grassland	Intermediate-Tall Grassland
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*	P	G5/S2B,S5N			alpine	
Greater Sage-Grouse	*Centrocercus urophasianus*	P	G4/S3		S	sagebrush	Sagebrush obligate
Harlequin Duck	*Histrionicus histrionicus*	pp	G4/S2B		S	mountain streams	
Interior Least Tern	*Sterna antillarum athalassos*	P	G4T2Q/ S1B	E		large prairie rivers	Colonial Nesting Waterbird
Lark Bunting	*Calamospiza melanocorys*	P	G5/S3B			sagebrush/grasslands	Prairie Endemic
Le Conte's Sparrow	*Ammodramus leconteii*	P	G4/S1S2B		S	prairie wetlands	Wetlands
Loggerhead Shrike	*Lanius ludovicianus*	P	G4/S3B		S	shrublands	Intermediate-Tall Grassland
Long-billed Curlew	*Numenius americanus*	P	G5/S2B		S	grassland	Prairie Endemic
McCown's Longspur	*Calcarius mccownii*	P	G5/S2B			grassland	Prairie Endemic
Mountain Plover	*Charadrius montanus*	P	G2/S2B			grasslands	Prairie Dog Colonies
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*	U	G5/S1B			prairie wetlands	Wetlands
Northern Goshawk	*Accipiter gentilis*	P	G5/S3		S	mixed conifer forest	Raptor
Northern Hawk Owl	*Surnia ulula*	VU	G5/S1B,S1N			conifer forest	Raptor
Olive-sided Flycatcher	*Contopus cooperi*	U	G4/S3B			early seral forest/shrub patches	
Peregrine Falcon	*Falco peregrinus*	P	G4/S2B		S	cliffs	Raptor
Piping Plover	*Charadrius melodus*	P	G3/S2B	T		prairie lake and river shorelines	Wetlands
Red-headed Woodpecker	*Melanerpes erythrocephalus*	P	G5/S3B			riparian forest	Riparian
Sage Thrasher	*Oreoscoptes montanus*	U	G5/S3B			sagebrush	Sagebrush obligate
Sedge Wren	*Cistothorus platensis*	U	G5/S1B		S	prairie wetlands	Wetlands

Common Name[1]	Scientific Name	Occurrence Potential[2]	Global and State Status[3]	FWS[4]	BLM[5]	Habitat Association[6]	Other Association[7]
Sprague's Pipit	*Anthus spragueii*	P	G4/S2B			grasslands	Prairie Endemic
Swainson's Hawk	*Buteo swainsoni*	P	G5/S3B		S	sagebrush/grasslands	Raptor
White-faced Ibis	*Plegadis chihi*	P	G5/S1B		S	wetland-lake w/ emergent vegetation	Wetlands
Whooping Crane	*Grus americana*	P	G1/S1M	E		wetlands	Wetlands
Yellow Rail	*Coturnicops noveboracensis*	pp	G4/S1B			wetlands	Wetlands
Yellow-billed Cuckoo (E. Pop.)	*Coccyzus americanus*	U	G5/S3B			prairie riparian forest	Riparian
Amphibians							
Great Plains Toad	*Bufo cognatus*	pp	G5/S2		S	wetlands, floodplain pools	Wetlands
Northern Leopard Frog	*Rana pipiens*	P	G5/S3		S	wetlands, floodplain pools	Wetlands
Plains Spadefoot	*Spea bombifrons*	pp	G5/S3		S	wetlands, floodplain pools	Wetlands
Reptiles							
Sagebrush Lizard	*Sceloporus graciosus*	VU	G5/S3			rock outcrops	Sagebrush obligate
Western Hog-nosed Snake	*Heterodon nasicus*	P	G5/S2		S	floodplain friable soils	Wetlands
Greater Short-horned Lizard	*Phrynosoma hernandesi*	P	G5/S3		S	sandy/gravelly soils	Sagebrush steppe obligate
Fish							
Paddlefish	*Polyodon spathula*	pp	G4/S1,2		S	large prairie rivers	
Pallid Sturgeon	*Scaphirhynchus albus*	pp	G1/S1	E	S	large prairie rivers	
Pearl Dace	*Margariscus margarita*	P	G5/S2		S	small prairie streams	
Sauger	*Stizostedion canadense*	P	G5/S2		S	large prairie rivers	
Shortnose Gar	*Lepisosteus platostomus*	pp	G5/S1		S	large prairie rivers	
Plants							
Chaffweed	*Anagallis minima*	P	G5/S2		S	wetlands	Wetlands obligate
Dwarf Woolly-heads	*Psilocarphus brevissimus*	P	G4/S1		S	wetlands	Wetlands obligate
Hot Spring Phacelia	*Phacelia thermalis*	pp	G3G4/S1		pS	open areas and scattered woodlands	
Long-Sheath Waterweed	*Elodea longivaginata*	P	G4G5/S2		S	aquatic	Wetlands obligate
Roundleaf Water-hyssop	*Bacopa rotundifolia*	P	G5/S1		pS	aquatic	Wetlands obligate
Scarlet Ammannia	*Ammannia robusta*	pp	G5/SH			alkaline wetlands	Wetlands obligate
Slender-branched Popcorn Flower	*Plagiobothrys leptocladus*	P	G4/S1		S	wetlands	Wetlands obligate
Slender Bulrush	*Schoenoplectus heterochaetus*	P	G5/S1		S	wetlands	Wetlands obligate

[1] (MTNHP 2006*a*).
[2] Occurrence potential include: present (P), potentially present (pp), unlikely (U), and very unlikely (VU; USFWS 1999, MBDD 2006*a*, *b*; MTNHP 2006*a*; D. Prellwitz, BLM, personal communication).
[3] Global (G) and State (S) Status includes:
- 1: At high risk because of extremely high limited and/or rapidly declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
- 2: At risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
- 3: Potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas.
- 4: Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern.
- 5: Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.
- U: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
- H: Historically occurred; may be rediscovered.
- B/N: Breeding status for a migratory species includes: Breeding (B), Non-breeding (N).
- M: A state rank modifier indicating migratory stopover status for a species.
- Q: A global rank modifier indicating that there are taxonomic questions or problems.
- T: Denotes the rank for a subspecific taxon (subspecies or population); appended to the global rank for the full species.

[4] FWS ESA status includes: Endangered (E); Threatened (T); and Experimental Non-essential (XN; USDI-FWS 2004).
[5] BLM Status (BLM Manual 6840 BLM 2004) includes: Proposed Sensitive (pS), and Sensitive (S); species that are proven imperiled in at least part of their ranges and are documented to occur on BLM lands.
[6] (MTNHP 2006*a*).
[7] (USFWS 1988, Feigley 1998, Miller et al. 2000, Lenard et al. 2006, MTNHP 2006*b*, NRCS 2006).

3.14 HEALTH AND SAFETY

3.14.1 Worker Safety

Operating companies in the participating area are required to comply with the Montana Safety Culture Act and the Occupational Safety and Health Act (OSHA). The participating companies have a variety of policies, safe work practices and training programs in place for compliance with these regulatory programs and to safeguard employee health. Their contractors are expected to implement similar programs. In Montana, for fiscal year 2004, the greatest number of reported accidents were strains followed by slips, trips and falls and being struck by an object, 29.7 percent, 18.6 percent and 14.1 percent respectively. The oil and gas industry, included in the Mining category, reported strains, being struck by and slips, trips and falls at 26.5 percent, 17.5 percent and 12.4 percent, respectively, as the most common causes of worker injury. Similar accident statistics were reported for the construction industry which would include location, road and pipeline construction contractors (Montana Department of Labor and Industry, 2004). The oil and gas industry has long been known as a hazardous work environment due to the weather conditions, the nature of the equipment (i. e. drilling rigs) and the materials being handled (oil and gas).

3.14.2 Public Health and Safety

The BNGPA is attractive to local residents as a recreation area for such pursuits as bird and big game hunting, open water and ice fishing, snowmobiling and seeking solitude. The area is also home for numerous rural families and their ranching operations.

The roads within the project area see a wide variety of use. BLM and county roads have historically been built to the appropriate standards for the anticipated use, as have the private roads in the area. Roads to individual well sites are generally two-tracks that are used primarily by site workers but may be accessed by bird and big game hunters. In an effort to protect their employees, as well as the public, the participating companies have safe driving policies in place. This topic is more fully discussed in the Transportation section.

The United States Department of Transportation (USDOT) regulates some aspects of gas-gathering and transmission pipelines operated in the field and beyond. USDOT regulations also address the safe transportation of hazardous materials (i. e. drip gas, methanol, drilling mud chemicals, etc) on the national roads and highways. The gas produced in the BNGPA is “sweet,” meaning it does not contain hydrogen sulfide (H_2S), and therefore it does not pose a H_2S hazard to the general public or site workers.

Pipeline and site construction fire-prevention measures are in place during the summer construction season. These include using equipment with spark arrestors, welding in cleared areas only, and the ready availability of fire extinguishers or water trucks in the event fire occurs. BLM requires, and companies implement, extra precautions in the event of drought or high fire danger.

Local and state emergency responders are annually provided information regarding the location and nature of hazardous materials that are held in quantities in excess of their regulatory threshold planning quantity (TPQ) or 10,000 pounds, whichever is greater. These notifications are required of all participating companies and their contractors under the Community Right-to Know Laws (40 CFR 355 and 370, as amended). The participating companies each have an

Emergency Action Response Plan as well as the trained personnel and equipment needed to respond to releases of hazardous materials or other hazardous conditions in the project area.

3.15 NOISE

Noise—unwanted sound—is measured with a decibel meter which has been designed to correspond to the ability of the human ear to detect sound. The A-weighted decibel (dBA) measurement is on a logarithmic scale. The increase in noise or loudness doubles with every 10 dBA increase in the measurement (Bell 1982).

Existing noise levels within the project area are, for the most part, representative of rural conditions and are expected to be between 35 and 45 decibels (Harris 1991), except near county roads and compressor stations where noise levels may be as high as 65 decibels. Noise sources in the project area are primarily natural, such as wind, but additional noise comes from aircraft, traffic on county roads and state highways, operation of the existing gas compression stations, natural gas drilling and production areas, and railroad corridors. Gas pipeline compressor stations in the BNGPA have noise levels ranging from 35 to 67 decibels 500 feet from the station, depending on wind speed and direction, the size of the compression unit, the configuration of the compressor station and the type of muffler installed (WBIP unpublished data, 2005). For comparison purposes residential areas are typically 40 dBA at night and 50 dBA during the day (BLM 2003). The BLM has not established noise standards for the project area. Noise is generally a concern for local residences and for wildlife such as raptors, grouse, big game (winter range), and piping plovers (near Nelson Reservoir nesting sites).