CHAPTER 3

AFFECTED ENVIRONMENT

3.0 INTRODUCTION

The Affected Environment chapter of this environmental assessment (EA) for the proposed JGGC Bridger to Opal Natural Gas Project discusses environmental, social, and economic factors as they currently exist within the Bridger to Opal Natural Gas project area (BTOPA). The material presented here has been guided by management issues identified by the Bureau of Land Management (BLM), Kemmerer, Pinedale, and Rock Springs Field Offices; public scoping; and by interdisciplinary field analysis of the area.

This proposal could potentially affect critical elements of the human environment as listed in BLM's National Environmental Policy Act (NEPA) Handbook H-1790-1 (USDI-BLM 1988) (Table 3-1). This EA discusses potential effects of the project on range resources, air quality, transportation, geology/minerals/paleontology, soils, water resources, vegetation (including invasive and non-native species) and wetlands, wildlife, special status species, visual resources, noise, recreation, socioeconomics (including environmental justice), cultural resources (including Native American religious concerns), and health and safety (including hazardous and solid waste). The resource elements to be analyzed in this EA are summarized in Table 3-2.

Table 3-1. Critical Elements of the Human Environment[1], Jonah Bridger to Opal Natural Gas Project, Lincoln, Sweetwater, and Sublette Counties, Wyoming

Element	Status on the Project Area	Addressed in text of EA
Air Quality Issues	Potentially affected	Yes
Areas of critical environmental concern	None present	No
Cultural resources	Potentially affected	Yes
Environmental justice	Potentially affected	Yes
Prime or unique farmlands	None present	No
Floodplains	Potentially affected	Yes
Native American religious concerns	Potentially affected	Yes
Invasive plants	Potentially affected	Yes
Threatened and endangered species	Potentially affected	Yes
Hazardous or solid wastes	Potentially affected	Yes
Water quality (surface water)	Potentially affected	Yes
Wetlands/riparian zones	Potentially affected	Yes
Wild and scenic rivers	None present	No
Wilderness (study area)	None present	No

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

Table 3-2. Other Elements for Analysis, Jonah Bridger to Opal Natural Gas Project, Lincoln, Sweetwater, and Sublette Counties, Wyoming

Element	Status on the Project Area	Addressed in text of EA
Geology/Minerals/Paleontology	Potentially affected	Yes
Soils	Potentially affected	Yes
Vegetation	Potentially affected	Yes
Wildlife	Potentially affected	Yes
Special Status Species	Potentially affected	Yes
Noise	Potentially affected	Yes
Visual Resources/Recreation	Potentially affected	Yes
Ground Water	Potentially affected	Yes
Socioeconomic Issues	Potentially affected	Yes
Range/Other Uses	Potentially affected	Yes
Cumulative Impacts	Potentially affected	Yes

3.1 GEOLOGY/MINERALS/PALEONTOLOGY

3.1.1 Geology

3.1.1.1 Regional Geologic Overview

The BTOPA traverses the Bridger Basin, the western topographic and structural extension of the Greater Green River Basin. The Greater Green River Basin is a large structural and topographic basin that occupies most of southwestern Wyoming. Both the Bridger and Green River basins are part of the Wyoming Basin Physiographic Province. This province is characterized by large intermontane structural basins bounded by mountain uplifts that have Precambrian granitic rocks at their cores. The basins are filled by deposits of latest Cretaceous and Tertiary age sediments derived from surrounding uplifts that exceed thousands of feet in thickness in the subsurface.

General structural elements that border the Bridger Basin include the Rock Springs Uplift, to the east, the Wind River Range, to the north, the Uinta Range to the south, and the Wyoming Thrust Belt to the west. A buried structural arch, the Moxa Arch, occurs at depth beneath the central parts of the BTOPA. The arch has a north-trending axis and is a broad, deep-seated basement uplift with folded sediments over it, resulting in large closure and large oil and gas pools.

The precursor to the modern greater Green River Basin developed during the late Cretaceous Period (about 75 million years ago) and began filling with sediments eroded from surrounding uplifts to the north, east and south. The Utah-Wyoming Thrust Belt began forming west of the area in early Cretaceous time with the development of large scale eastward movement of thick piles of sedimentary rocks along relatively low angle thrust faults in western Utah. Uplift and thrusting progressed eastward throughout the Cretaceous so that by the end of that period and during the succeeding early Paleocene, thrusting and associated uplift had progressed into southwestern Wyoming.

Sediment accumulated in the Bridger (and Green River Basin) in a variety of environments related to their distance from the bordering mountain fronts. Adjacent to the mountains coarse-grained sediments accumulated as mass movement deposits (landslide, mudslide) and alluvial fans. Progressively basin ward away from the mountains, streams, rivers, and ponds or lakes accumulated finer-grained sediments in a broad ancient flood plain and lake basin. During times when sediment supply was high, deposits of rivers and associated ponds accumulated in a broad flood basin that occupied most of the ancient basin. When uplift, erosion, and sediment supply diminished, but the basin floor continued to sink, a large lake system developed in the ancient basin center. This ancient lake system, the Green River Lakes, fluctuated dramatically in size, throughout its existence. When lake stands were high, lake deposits expanded to cover most of the basin and river deposits were restricted to the basin edges. When lake stands were low, river deposits expanded to cover most of the basin and lake deposits were restricted to the basin center. Thick, chemically precipitated deposits formed in and around the lake at times of lake restriction.

Periodic oscillation of the level of the ancient lakes resulted in a complex interfingering relationship between lake sediments and their laterally equivalent terrestrial/riverine sediments as seen preserved in the rock record. During the late middle Eocene, the last Green River Lake filled with chemically precipitated rocks and sediment and river deposits of a broad ancient flood basin that spread across the basin. Large volumes of ash derived from the Absaroka area of northwestern Wyoming periodically blanketed the area and helped fill the lake basin with sediment.

3.1.1.2 Surface Geology

Geologic mapping by the USGS and Wyoming Geological Survey document that sedimentary deposits of the Laney Member of the Green River Formation and Bridger Formation of early Tertiary age crop out in the BTOPA (Roehler 1977 et seq., Love and others 1993, M=Gonigle and Dover 1992, Love and Christiansen 1985, Brady 1965). A thin veneer of Quaternary soil, alluvium (stream deposited), colluvium (gravity deposited at bottom of slope), and aeolian (wind blown) material occurs in places above these rocks, but these deposits are chiefly too thin to be depicted on maps. In addition, Quaternary sand and gravel deposits occur where the proposed pipeline crosses the Green River.

North of the Green River the proposed pipeline is probably underlain in its entirety at the surface by bedrock of the lower part of the Laney Shale Member, or Craven Creek Bed of Sullivan (1980). South and west of the Green River the pipeline route is also chiefly underlain by the lower Laney, Shale , but in some areas, particularly south of Shute Creek, along Wyoming State Highway 240, the pipeline traverses the Whiskey Butte Bed of the Bridger Formation (Bridger A), which overlies the Laney Shale.

Laney Member-Green River Formation

The Laney Member that underlies the JGGC basically forms the top of the Green River Formation and records in its sediments the greatest expansion of the ancient lake system (Lake Gosiute) followed by its final restriction and desiccation. At its peak the lake in which the Laney accumulated occupied more than 75% of the Greater Green River Basin, or an area of about 15,000 square miles.

Of the three rocks units (LaClede Bed, Sand Butte Bed, and Hart Cabin Bed), comprising the Laney Member distinguished by Roehler (1993) only the LaClede Bed is thought to underlie the JGGC. This is mapped as a lower, unnamed member of the Laney by M=Gonigle and Dover (1992) and named the Craven Creek Bed by Sullivan (1980).

The LaClede Bed regionally consists chiefly of oil shale with lesser amount of limestone, sandstone, claystone and tuff. Thick deposits of oil shales characteristic of the LaClede Bed that occur in the more central areas of the Greater Green River Basin accumulated in the deeper parts of the Lake Gosiute, during the longest high stand of the lake, which may have lasted as long as 2.5 million years. The BTOPA would have occupied an area nearer the lake edge and was a site where sandstone, shale, and marlstone accumulated more so than shale.

Bridger Formation

The lower part of the Bridger Formation (Bridger A), including the Whiskey Butte Bed of Sullivan (1980), overlies the lower Laney Member and sporadically crops out in the BTOPA west of the Green River, particularly along Wyoming State Highway 240. The Whiskey Butte Bed consists of light and medium gray to green-gray mudstone, claystone, siltstone, and sandstone with minor interbeds of light-gray and green tuff and tan to light-pink limestone and marlstone and thin lignites and coals.

Older-Underlying Sedimentary Rock Units

Underlying the Green River Formation in the JGGCA are Phanerozoic sedimentary rocks that range from Cretaceous to Cambrian in age. Some of these rocks produce oil and gas. The Phanerozoic sediments are underlain by Precambrian metamorphic bedrock that comprises part of the ancient North American cratonic shield.

3.1.1.3 Geological Hazards

Naturally occurring geologic hazards include fault generated earthquakes, floods, landslides or other mass movements. There are no known faults with surface expression or earthquake epicenters mapped within the JGGC (NEIC 2003, WGS 2003). The nearest earthquake epicenter occurs just east of the area near Stud Horse Butte in Section 17, T29N, R108W, where a quake of 3.3 Richter magnitude occurred at a depth of 33 km in 1978.

Seismicity

The BTOPA occurs within Seismic Zone 2 of the Uniform Building Code (UBC). Effective peak accelerations (90% chance of non-exceedance in 50 years) can range from 5%g-20%g in this zone. New probabilistic acceleration maps for Wyoming are available from the USGS (Case, 2000). These maps assume accelerations based on what would be expected if firm soil or rock were present at the surface. Based upon the 500-year map (10% probability of exceedance in 50 years) (Figure 3), the estimated peak horizontal acceleration the JCCC area is approximately 7%g. This acceleration is roughly comparable to intensity V earthquakes (3.9%g - 9.2%g). Intensity V earthquakes can result in cracked plaster and broken dishes (Case and others 2002).

Until recently, the 500-year map was often used for planning purposes for average structures, and was the basis of the UBC. The new International Building Code (IBC), however, uses

2,500-year maps as the basis for building design. Based upon the 2500-year map (2% probability of exceedance in 50 years), the estimated peak horizontal acceleration in the BTOPA is approximately 18%g. This acceleration is roughly comparable to intensity VI earthquakes (9.2%g-18%g). Intensity VI earthquakes can result in fallen plaster and damaged chimneys.

Ground accelerations shown on the USGS maps in Wyoming can be increased due to local soil conditions. If fairly soft, saturated sediments are present at the surface, and seismic waves pass through them, surface ground accelerations will usually be greater than would be experienced if only bedrock was present. Thus, ground accelerations shown by the USGS maps could underestimate the local hazard.

The historic record of earthquakes is limited and it is nearly impossible to determine when a 2,500-year event last occurred in the county. This uncertainty and because the IBC utilizes 2,500-year events for building design, led Case and others (2002) to suggest that the 2,500-year probabilistic maps be used for analyses.

Mass movement

M'Gonigle and Dover (1992) include small mass movement deposits in area they mapped as Quaternary age secondary stream alluvium and undoubtedly there are small slumps and other mass movement deposits along the Green River, however there are major no landslide deposits mapped in the BTOPA. The secondary stream alluvium fills Craven Creek, Shute Creek, and Slate Creek.

Topographic relief is approximately 340 feet (6,780 ft to 7,120 ft) and slope over most of the area is gentle. Geologic dip on the Laney Member of the Green River Formation (which forms bedrock over most of the area) at the surface is nearly horizontal and overlying soils are well drained, thus lessening the chance for naturally occurring mass movements.

Slopes are steepest along the margins of modern drainages: including along the banks of the Green River and adjacent tributaries and along ephemeral drainages such as Buckhorn and West Buckhorn draws, Figure Four, Steed and Anderson canyons. Slopes are also steep at the contact between the sandstones and shales of the lower Laney Shale which are less resistant to erosion than the overlying mudstones of the Whiskey Butte Bed of the Bridger Formation. The Laney typically weathers flat, whereas the latter typically forms badlands such as those along the north side of Opal Bench. Slopes are also steepest along the flanks of existing buttes such as Sugar Loaf, Yellow Cat Ridge. The steepest slopes occur along the banks of the Green River, south of the town of Fontenelle, where slopes of about 20 degrees or more are common.

3.1.2 Mineral Resources

With the exception of sand and gravel deposits, no economic deposits of minerals are known to occur within the JGGC. High-level terrace gravels as much as 15 feet thick of Plio-Pliestocene age occur at about 225 feet above present stream drainage level at the top of Dodge Butte a few miles southeast of Fontenelle. These gravels may be the erosional remnant of a high level terrace, which now extends from the Fort Bridger airport to the southern part of the Evanston Quadrangle and is also preserved south of Kemmerer. Quaternary-age sands and gravels also occur along the Green River.

3.1.2.1 Petroleum

The region in and adjoining the BTOPA has produced highly significant quantities of oil and natural gas, principally from Cretaceous rocks (Mesaverde, Frontier, Dakota) but with some additional resources derived from the Fort Union Formation (Tertiary), Adaville Formation, Lance Formation, Muddy Sandstone, Baxter Shale, Blair Formation, and Rock Springs Formation (Cretaceous), Morrison Formation (Jurassic), and the Madison Limestone (Mississippian).

Developed oil and gas fields within the area include, from south to north, Cow Hollow, Black Jack, Shute Creek, Storm Shelter, Emigrant Springs, Haven, Swan, Little Monument, Bird Canyon, Fontenelle, Green River Bend, Green River Bluffs, CCC Road, Cutlass, and Jonah.

Petroleum fields along the Moxa Arch produce primarily from the Frontier Formation and together contain more than one trillion cubic feet of gas (estimated ultimate recovery) in the Frontier and other strata. The traps are combinations of structure and stratigraphic traps with development of the accumulations dependant on the nature of the specific rocks as well as the timing of structural arching.

3.1.3 Paleontology

In places within the BTOPA such as along modern river drainages and atop modern terraces and buttes, rocks of the Laney Shale and Bridger Formation are overlain by much younger unconsolidated sediments of Quaternary age. These sediments include alluvium, colluvium, stream terrace gravels and wind-blown sand that are late Pleistocene to Holocene (Recent) in age. Some of these deposits may be pre-Wisconsin in age (Mears, 1987). According to Vlcek (2005) sediments along Yellow Point Ridge have yielded the fossil remains of horse that predate their extinction in North America. If this identification is correct then these remains and sediments, which are latest Pleistocene in age, are of paleontological and archaeological interest.

The abundance of fossil vertebrates, invertebrates, and plants, particularly excellently preserved fossil fish, in the Green River Formation is also well known, but shale beds that preserve these fossils are mostly lacking in the project area.

The abundance of fossil vertebrates in the Bridger Formation is well known and has been documented in the vicinity of the BTOPA in previous project reports including the Kern River Pipeline (Dames & Moore 1992), Bird Canyon Pipeline (EVG 1999), Opal Loop Pipeline (EVG 2001), and Rendezvous Pipeline (EVG 2002). Fossil localities discovered in the Whiskey Butte Bed produce a varied paleofauna of fossil fish (gar and catfish), reptiles (turtle and crocodile), and mammals (condylarths, tapirs, rodents, primates, and carnivores), including important specimens (holotypes and neotypes) of specific species of mammals.

The BLM classifies areas (chiefly on a geological formation) based on a three-tiered classification system described in their BLM Paleontology Resources Manual and Handbook H-8270-1. Under this system, units are ranked according to their potential for noteworthy fossil occurrences as follows:

- **Condition 1** – Areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.

- **Condition 2** – Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.
- **Condition 3** – Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology, igneous or metamorphic rocks, extremely young alluvium, colluvium, or eolian deposits, or the presence of deep soils.

The Laney Member of the Green River Shale and Whiskey Butte Member of the Bridger Formations are known to yield accumulations of scientifically significant vertebrate fossils and, therefore, are considered Condition 1 formations. In addition to classifying lands by BLM Paleontology Condition, the BLM in Wyoming utilizes an additional classification system to describe the paleontological sensitivity of geological formations, the Probable Fossil Yield Classification (PFYC). The PFYC is a tool developed by the Paleontology Center of Excellence and the Region 2 Initiative, whereby geological units are classified according to the probability of Yielding paleontological concern to land managers. Both members are considered to have a PFYC of 4 or 5, depending on the nature of exposures, indicating a high potential to yield vertebrate fossils and/or scientifically significant non-vertebrate fossils. Formations with this ranking require consideration of mitigation during environmental review.

3.2 Climate and Air Quality

3.2.1 Climate

The BTOPA is located in a semi-arid (dry and cold) mid-continental climate regime. The area is typified by dry windy conditions, with limited rainfall and long cold winters. Meteorological measurements collected at La Barge, Wyoming (1958-2005) are representative of the entire project area. These data indicate that the annual average total precipitation for the area is 8.0 inches, ranging from 3.4 inches (1975) to 17.8 inches (1995). Precipitation is greatest from late spring to early fall, with the peak monthly average of 1.30 inches occurring in May. An average of 31.8 inches of snow falls during the year (annual high 43.6 inches in 1987), with heaviest monthly snowfalls occurring in December and January. Table 3-3 shows the mean monthly temperature ranges and average precipitation amounts.

Table 3-3. Mean Monthly Temperature Ranges and Total Precipitation Amounts.

Month	Average Temperature Range (°F)	Total Precipitation (inches)
January	-2-30	0.32
February	0-34	0.36
March	14-43	0.39
April	24-54	0.83
May	32-65	1.30
June	39-73	1.05
July	44-83	0.66
August	42-82	0.85
September	33-71	0.74

Month	Average Temperature Range (°F)	Total Precipitation (inches)
October	23-59	0.61
November	10-41	0.46
December	-1-31	0.46
ANNUAL	38.5 (mean)	8.04 (mean)

Source: (WRCC 2005)

Temperatures are generally cooler, frost-free periods shorter, and both precipitation and snowfall greater at higher elevations. The region is typically cool, with average daily temperatures (in degrees Fahrenheit; ^{o}F) ranging between –1 ^{o}F (low) and 32 ^{o}F (high) in mid winter and between 42 ^{o}F (low) and 80 ^{o}F (high) in mid summer. Extreme temperatures have ranged from –52 ^{o}F (occurring in 1990) to 96 ^{o}F (occurring in 2002). The frost-free period (above 32 ^{o}F) generally occurs from early June to mid-September.

The project area is subject to strong and gusty winds, reflecting channeling and mountain valley flows due to complex terrain. During the winter months, strong winds are often accompanied by snow, producing blizzard conditions and drifting snow. The closest comprehensive wind measurements were collected by BP America Production Company (BP) in the Jonah Field, approximately 25 miles southeast of Pinedale, Wyoming in Sublette County. Figure 3-1 shows the relative frequency of winds, with radial distributions by speed class, indicating the direction of the wind source. Table 3-4 provides the wind direction distribution in a tabular format. From this information, it is evident that the winds originate from the west-northwest to north-northwest nearly 40 percent of the time. The annual mean wind speed is 11.2 mph.

Table 3-4. Wind Direction Frequency Distribution for Jonah Field, WY.

Wind Direction	Percent of Occurrence
N	5.3
NNE	3.9
NE	3.5
ENE	3.9
E	3.8
ESE	3.3
SE	2.9
SSE	2.8
S	3.8
SSW	4.8
SW	6.0
WSW	6.6
W	9.9
WNW	16.0
NW	14.4
NNW	9.2

Source: Jonah Field meteorological data collected 1999-2003.

The frequency and strength of the winds greatly affects the dispersion and transport of air pollutants. Because of the strong winds in the project area, the potential for atmospheric

dispersion is relatively high (although nighttime cooling will enhance stable air, inhibiting air pollutant mixing and transport).

Table 3-5 shows the wind speed distribution and Table 3-6 shows the stability class distribution in the Jonah Field. 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" (stable). The "D" (neutral) stability class occurs more than half of the time.

Table 3-5. Wind Speed Distribution.

Wind Speed (miles/hour)	Percent of Occurrence
0-4.0	9.1
4.0-7.5	25.4
7.5-12.1	28.2
12.1-19.0	24.7
19.0-24.7	7.2
Greater than 24.7	5.5

Table 3-6. Stability Class Distribution.

Stability Class	Percent of Occurrence
A (unstable)	2.4
B	6.1
C	12.2
D (neutral)	60.2
E	15.4
F (very stable)	3.7

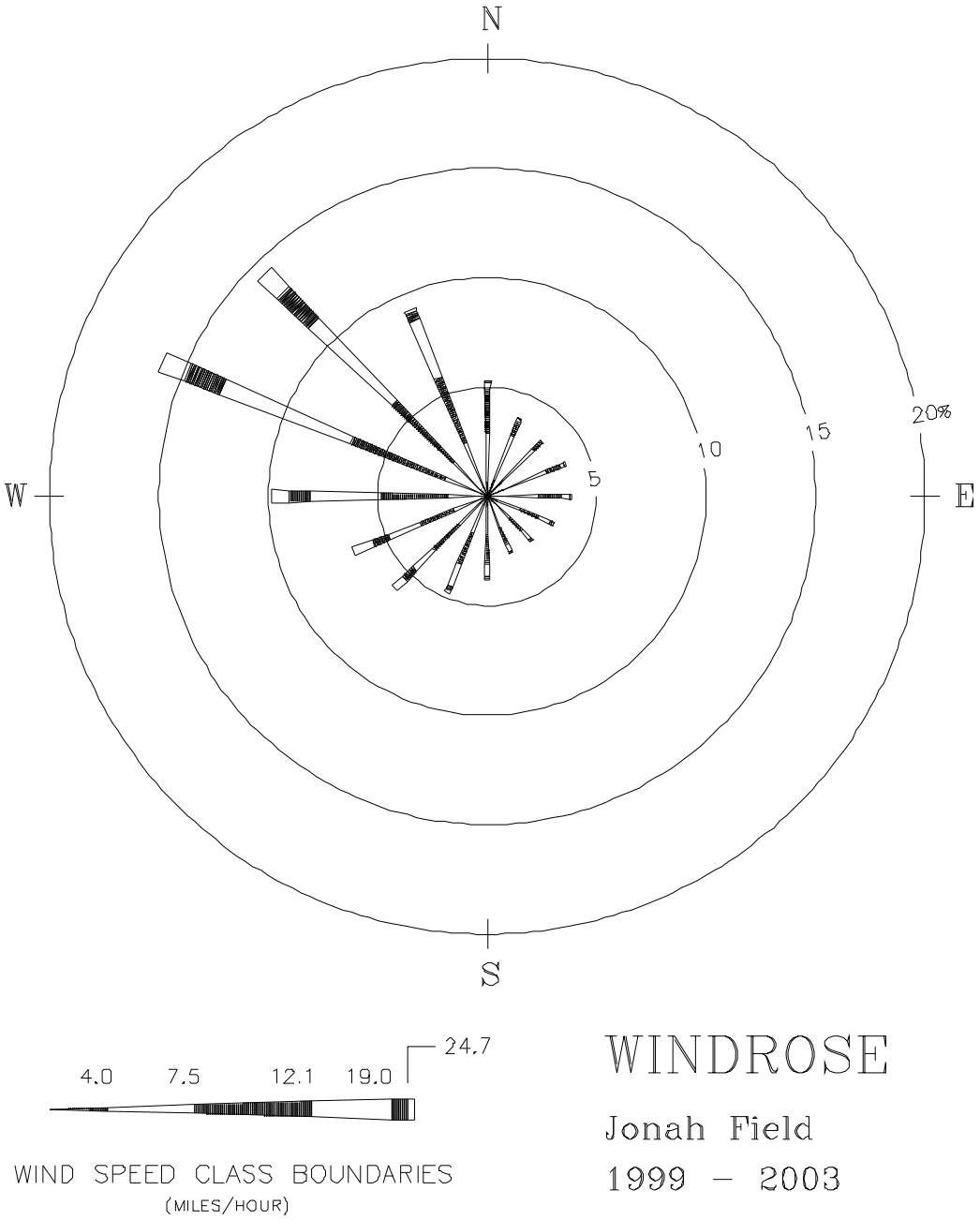
Source: Jonah Field meteorological data collected 1999-2003.

3.2.2 Air Quality

The Wyoming Ambient Air Quality Standards (WAAQS) 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 limited specific air quality monitoring has taken place in the study area, regional air quality monitoring has been conducted near the study area. Air pollutants measured in the region for which ambient air quality standards exist include: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns in effective diameter (PM_{10}), particulate matter less than 2.5 microns in effective diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). Background pollutant concentrations, as used in the Final Jonah Infill Drilling Project EIS (BLM, 2006), for these pollutants are compared to the WAAQS and NAAQS in Table 3-7.

Limited monitoring has also been conducted near the project area. The most recent data available, that is representative of background conditions, is from a monitoring site 4 miles south of Daniel, in Sublette County, WY. This monitoring site is operated by the WDEQ. Currently, only 6 months of this data is available for NO_2, ozone, and PM_{10}. This data is listed in Table 3-8 for additional comparison to Table 3-7.

As shown in Tables 3-7 and 3-8, regional background values are well below established standards, and all areas 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.



Source: Jonah Field meteorological data collected 1999-2003.

Figure 3-1. Wind Rose for the Bridger to Opal Project Area.

Federal air quality regulations adopted and enforced by WDEQ-AQD 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 two closest PSD Class I and sensitive Class II areas, the Bridger and Fitzpatrick Wilderness Areas, lie over 45 miles to the northeast of the project area and could be impacted by cumulative project source emissions.

All background concentration data have been identified by WDEQ-AQD as the most representative air quality monitoring data available for the region. An estimate of background air quality concentrations is needed to determine existing air quality conditions and to combine with modeled project-related air quality impacts for comparison to applicable air quality standards. It is important that each pollutant's background concentration, model predictions, and air quality standards are based on the same averaging times.

Table 3-7. Air Pollutant Background Concentrations, Wyoming and National Ambient Air Quality Standards (µg/m^3).

Pollutant/Averaging Time	Measured Background Concentration	Wyoming and National Ambient Air Quality Standards
Carbon Monoxide (CO) [1]		
1-hour	3,336	40,000
8-hour	1,381	10,000
Nitrogen dioxide (NO_2) [2]		
Annual	3.4	100
Ozone [3]		
1-hour	169	235
8-hour	147	157
Particulate Matter (PM_{10}) [4]		
24-Hour	33	150
Annual	16	50
Particulate Matter ($PM_{2.5}$) [4]		
24-Hour	13	65
Annual	5	15
Sulfur dioxide (SO_2) [5]		
3-hour (National)	132	1,300
24-hour (National)	43	365
24-hour (Wyoming)	43	260
Annual (National)	9	80
Annual (Wyoming)	9	60

[1] Background data collected by Amoco at Ryckman Creek for an 8-month period during 1978-1979, summarized for the Riley Ridge project (BLM 1983).
[2] Background data collected at Green River Basin Visibility Study site, Green River, Wyoming, during period January-December 2001 (Air Resource Specialists [ARS] 2002).
[3] Background data collected at Green River Basin Visibility site, Green River, Wyoming during period June 10, 1998, through December 31, 2001 (ARS 2002).

[4] Background data collected by WDEQ/Air Quality Division (AQD) at the Emerson Building, Cheyenne, Wyoming, in 2001. These data have been determined by WDEQ/AQD to be the most representative co-located PM_{10} and $PM_{2.5}$ data available.
[5] Background data collected at the La Barge Study Area/Northwest Pipeline Craven Creek site in 1982-1983.

Table 3-8. Recent Monitoring Concentrations (µg/m^3) - Data Collected Near the Project Area (2005)

Pollutant/Averaging Time	Measured Background Concentration	Wyoming and National Ambient Air Quality Standards
Nitrogen dioxide (NO_2) [1]		
Annual	5.7	100
Ozone [1]		
1-hour	144	235
8-hour	132	157
Particulate Matter (PM_{10}) [1]		
24-Hour	23	150
Annual	11	50

[1] Based on six months of data collected approximately 4 miles south of Daniel, Sublette County, Wyoming, 2005.

Continuous visibility-related optical background data have been collected at the PSD Class I Bridger Wilderness Area in Wyoming, 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). In addition, a background atmospheric deposition (acid rain) monitoring system is in place at the three National Acid Deposition Program/National Trends Network sampling stations near Pinedale, Wyoming, and site-specific lake chemistry (pH, acid neutralizing capacity, elemental concentrations, etc.) monitoring is conducted by the U.S. Geological Survey Water Quality Division in several high mountain lakes in regional wilderness areas.

Wyoming regulates pollutants emitted into the air through the Wyoming Environmental Quality Act (W.S. 35-11-101 et. seq.). Wyoming is also authorized by an approved State Implementation Plan (SIP) to administer all requirements of the Prevention of Significant Deterioration (PSD) permit program under the Clean Air Act. Additionally, the approved Wyoming SIP contains a number of programs which provide for the implementation, maintenance, and enforcement of the National Ambient Air Quality Standards, including a New Source Review program for minor source permitting which requires, among other things, application of Best Available Control Technology (BACT) for all new or modified sources regardless of size or source category. Included as well are authorities for the control of particulate emissions, including fugitive particulate emissions from haul roads, access roads, or general facility boundaries. Wyoming is also delegated responsibility to operate an approved ambient air quality monitoring network for the purpose of demonstrating compliance with the National and Wyoming Ambient Air Quality Standards.

NEPA requires that federal agencies consider mitigation of direct and cumulative impacts during their preparation of an EIS (BLM Land Use Planning Manual 1601). Under the CAA, federal

agencies are to comply with State Implementation Plans regarding the control and abatement of air pollution. Prior to approval of RMPs or Amendments to RMPs, the State Director is to submit any known inconsistencies with SIPs to the Governor of that state. If the Governor of the State recommends changes in the proposed RMP or Amendment to meet SIP requirements, the State Director shall provide the public an opportunity to comment on those recommendations. (BLM Land Use Planning Manual at Section 1610.3-2)

3.3 SOILS

Soil can be defined as the top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter that serves as a natural medium for the growth of land plants. Vegetation type, growth form, composition, distribution, and density on the project area are principally governed by the biological, chemical, and physical properties of the parent soil and precipitation régime. The complex relationship of these two essential natural resources ultimately controls habitat quantity and quality for the fauna and flora of Wyoming.

Soil development is a function of parent material, living matter, climate, relief or topography, and time. Living matter provides the biological community that changes inert rock material into soil. Under shrubs and grasses, soils tend to have slightly greater organic accumulations, and different vegetative cover gives rise to different soil characteristics. Very wet soils tend to have more accumulation of organic material on the surface.

Climate has a direct and indirect effect on soil development through its principal components, precipitation, temperature, humidity, wind, and sunshine. Precipitation promotes leaching and physical, chemical and biological activity and temperature affect bedrock by expansion, contraction and frost action. Humidity promotes plant growth. Wind is a very important component of the physical environment because at certain velocities, it can transport soil particles and cause varying degrees of erosion.

Relief or topography influence soils principally though its effect on microclimate and runoff. The ARPA is typical of a desert intermontane basin in that its physiography is dominated by: (1) hogbacks and strike valleys; (2) flat-topped stripped bedrock surfaces (strath terraces); (3) pebble/gravel/cobble stream terraces; (4) alluvial fan deposits; and (5) alluvium along the principal drainages.

The length of time for soils to form depends largely on other factors involved. Soils form more rapidly on sandstone than on granite, and more rapidly on sand than sandstone. A soil derived from granite will differ chemically from a soil derived from sandstone soil, and a soil formed on sandstone might closely resemble one formed on loose sand. Mature soils are in equilibrium with their surroundings, and begin to show the development of horizons. Very young soils lack horizons. In general, the best-developed (most mature) soils form on stable surfaces that are geomorphically at equilibrium with their surroundings and the highest of these stable surfaces are the oldest and will generally exhibit the thickest soil horizons. Soil horizonation is the development of different stratified textures and chemical properties that are ordered, from top to bottom, within the soil. The development of soil horizons is largely the result of translocation; that is, the depletion (eluviation) of the topsoil of some elements (e.g., clay, iron oxides), and their concentration (illuviation) in the subsoil.

A summary of soil types on the project area, as presented by Munn and Arneson (1999) and their area (acres) affected is shown in Table 3-9.

Table 3-9. Soil Types in the Jonah Bridger to Opal Natural Gas Project Area.

Soil Map Unit[A]	Soil Type Description[A]	Total Acres
SU03	Rock Outcrop - Typic Torriorthents, loamy, mixed (calcareous), frigid, shallow Lithic Torriorthents, loamy-skeletal, mixed (calcareous), frigid Typic Natragids, fine-loamy, mixed, frigid	433.0
SU05	Typic Torriorthents, loamy, mixed (calcareous), frigid, shallow Typic Haplocalcids. Coarse-loamy, mixed, frigid Lithic Torriothents, loamy-skeletal, mixed (calcareous), frigid	79.4
SW08	Typic Haplocalcids. Coarse-loamy, mixed, frigid and Typic Haplocambids, fine-silty, mixed, frigid	6.2
SW12	Ustic Haplagids, fine-loamy and coarse-loamy, mixed, frigid Ustic Haplocambids, sandy, mixed, frigid	311.4
LN08	Typiv Torrifluvents, fine-loamy over sandy-skeletal, mixed, frigid and Fluventic Haplaquolls, fine-loamy over sandy or sandy-skeletal, mixed, frigid	5.9
LN09	Typic Torripsamments, siliceous, frigid	13.0
LN11	Ustic Haplaargids, fine-loamy, mixed, frigid Ustic Haplocambids, sandy, mixed, frigid and Typic Natragids, fine-loamy, mixed, frigid	17.3
LN12	Ustic Haplocambids, coarse-loamy, mixed, frigid and Ustic Torriorthents, loamy-skeltal, frigid	60.3
LN13	Rock outcrop and Lithic Torriorthents, loamy-skeletal, frigid	224.1
TOTAL		1,151.5

[A] Based on Munn and Arneson (1999)

Geomorphic Soils: Field survey of the soils in the project area document that they are developed on five basic geomorphologic (physiographic) terrains: (1) strath surfaces; (2) gentle slopes dominated by colluvial sediment; (3) river terraces; (4) alluvium in the lower (near-thalweg) parts of stream valleys; and (5) stabilized sand dunes.

Strath surface soils are developed on essentially flat-lying rocks or sediments that have been geomorphically stable for considerable periods of time. Examples of these soils, samples OBC-1 and OBC-6 described below, have thin (8-10 cm) A (surface horizons) because they form on mildly weathered bedrock, which requires a great deal of time to break down, both mechanically and chemically. Unless sediment is added through wind (eolian) action, these soils are very thin and essentially impermeable. Strath surface soils developed on the Laney Member of the Green River Formation are the dominant and most common soils along the pipeline route.

Colluvial soils are developed on weathered bedrock throughout the project area and include eolian material that has piled up on relatively gentle slopes, over many years, through the action of gravity and slopewash, to form a thicker drape of sediment than the simple veneer formed on strath surfaces. Because the sediment formed is weathered and unconsolidated, colluvial soils

are generally thicker than strath surface soils. In general, the thickness of individual soils is based on both the relative thicknesses of unconsolidated sediment (upon which sediment it is easy for soil-forming processes to operate), and the time available for the colluvial soils to form. Sample OBC-2, described below is an example of a colluvial soil.

River terrace soils are restricted to areas proximal to the Green River and lie near the tops of stream terraces formed by that river. In areas where the tops of river terraces soils are not composed of coarse (granule, pebble, cobble) stream clasts but, rather, of finer materials (sample OBC-3 described below), the last period of stream downcutting prior to establishment of the present floodplain, was preceded by either: (a) a period of high water that allowed deposition of fine materials adjacent to the near floodplain; or an episode of eolian sedimentation. River terrace soils, by the very nature of the sediments involved and their proximity to active streams, are very shallow. The relatively great thickness of Soil OBC-3—a River Terrace Soil—is due to the relatively great thickness of stream granules, pebbles, and cobbles deposited on the stream floodplain before the stream's last major downcutting phase. Most of this soil is composed of a relatively unaltered C horizon.

True alluvial soils are rare in the project area (due to the dominance of erosion throughout the area); however, sediments deposited near the thalweg (deepest part) of the Green River channel are included in this category. The textural composition of these soils is related to the nature of the last major depositional events. Rapid-flood water conditions will deposit gravels, whereas high/slack water conditions will deposit clays. If the relative depositional rate is high, an alluvial soil might contain several meters of relatively unsorted, highly permeable sediment upon which there has been little physical or chemical weathering. Sample OBC-4, an alluvial soil has a relatively thick Bw horizon that is coarser grained than the A horizon. These kinds of soils are extremely immature, and document principally the original distributions of sediment textures.

Dune soils develop on combinations of sand and silt that are of eolian (wind blown paleodune) origin. Eolian sediments are ubiquitous throughout Wyoming, and eolian silts and sands can be identified in most modern or Holocene soils throughout the state. Regional and local variations in the incidence of such soils reflect more the geomorphologic province at the time of deposition (likelihood of local entrapment of sand) than the presence or absence of significant eolian activity. These soils occur throughout the report area, but are most common south of the Green River, particularly the valley of Slate Creek. Sample OBC-5 is a Dune soil in which both fine and medium-grained lithologies prevail equally throughout the horizons of highly permeable soils.

The following soils were identified sampled along the proposed pipeline route during field survey:

Soil OBC-1: Strath Surface Soil on Laney Member of Green River Formation

A = Sandy Clay loam; very weakly calcareous; 7.5 YR6/5; pH 7.2; rooted with slabs of weathered Laney Shale on surface; admixture of eolian silt; 10 cm

C = Sandy shale in weathered slabs = weathered Laney Shale regolith

Slope = < 1.0 %; very permeable due to poor sorting

Location: GPS T12N, 0580205 E; 468748 N

Soil OBC-2: Gentle Slope Colluvial Soil, UTM T12N, 4666974m N, 579507m E

A = Sandy loam; very weakly calcareous; 10YR6/3; pH 7.5; rooted; admixture of eolian silt; 18 cm

Bt = Clay loam; highly calcareous with tiny $CaCO_3$ glaebules; 10YR5/5; pH 7.8; rooted; 43+ cm

C = Weathered sandstone of Laney Member of Green River Formation

Slope = 1-3%; slightly permeable

Location: GPS T12N, 0579512 E; 4666971 N

Soil OBC-3: River Terrace Soil

A = Loamy sand (15%) mixed with stream granules, pebbles, and cobbles (85%); loamy sand forms surficial 3-6 cm and occurs in interstices between larger clasts; 60-150 cm

Location: GPS T12N, 0579552 E; 6468018 N

Soil OBC-4: Alluvial Soil in Valley of Green River

A = Silty clay loam; moderately calcareous; 10YR6/4; pH 7.2; rooted; 9 cm

Bw = Sandy loam; moderately calcareous; 10YR5/4; pH 7.8; rooted; >36 cm

Slope = <1.0%; A horizon weakly permeable and B horizon very permeable

Location: GPS T12N, 0578920 E; 4647943 N

Soil OBC-5: Dune Soil

A = Sandy clay loam; weakly calcareous; 10YR6/2; pH 7.5; rooted; 8 cm

Bw = Sandy clay loam; highly calcareous with visible streaks and tiny glaebules of $CaCO_3$; 10YR5/4; pH 7.6; >33 cm

Slope = 0-40% (higher figure on faces of stabilized dunes); highly permeable due to poor sorting

Location: GPS T12N, 0573534 E; 4644574E

Soil OBC-6: Strath Surface Soil on Bridger Formation

A = Loam, silty; highly calcareous; 10YR7/3; pH 7.7; rooted; strong admixture of

eolian silt; 8 cm

Btc = Sandy clay; highly calcareous with 2-4 mm-diameter $CaCO_3$ glaebules; 10YR5/5; pH 7.8; rooted, but many fewer roots than in A horizon; 37cm

C = Weathered sandy mudstone of Bridger Formation occurring as weathered chips surrounded with lower Btc horizon matrix and $CaCO_3$ glaebules

Slope = 0-1 %; this soil is highly permeable due to very poor sorting

Location: GPS T12N, 0557615 E; 4632538N

3.4 WATER RESOURCES

Detailed discussions of groundwater and surface water resources throughout the project area can be found in the GRRMP (BLM 1996), the KRMP (BLM 1985), the PRA RMP (BLM 1987), the EIS for the Expanded Moxa Arch Area Natural Gas Development Project (BLM 1995), the Fontenelle Natural Gas Infill Drilling Projects EIS (BLM 1995), the EA and FONSI for the Modified Jonah Field II Natural Gas Project (BLM 2000), the DEIS for the Pinedale Anticline Oil and Gas Exploration and Development Project (BLM 1999), and the FEIS for the Jonah Infill Drilling Project (BLM 2006). The watershed management objectives included in the RMPs are to *maintain or enhance the quality of surface or groundwater. Watersheds will be managed to maintain or improve channel stability and overall watershed conditions.*

The project area lies within Green River Basin, which covers some 21,020 square miles. The area is a high desert plateau flanked by The Wind River Mountains to the east and north, the Wyoming Range to the west, the Gros Ventre Range to the northwest, the Uinta Mountains to the south and the Great Divide Basin to the southeast. Numerous perennial streams originate in the mountain ranges, where significant annual precipitation occurs. Streams originating in the interior semiarid and arid plains are generally ephemeral, flowing mainly in response to snow melt and rainfall.

The proposed pipeline would be bored under the Green River downstream of the Fontenelle Reservoir dam, which is operated by the Bureau of Reclamation. According to the Bureau or Reclamation (usbr.gov), Fontenelle Reservoir, commissioned in 1964, was originally conceived as an irrigation storage project, but evolved toward storage of water for cities, industry, and fish and wildlife. Irrigation development has been indefinitely deferred. The drainage area above Fontenelle Reservoir is 4,175 square miles.

3.4.1 Surface Waters

The project area lies within the Green River Basin, which is part of the Colorado River drainage. The major surface water resources near the proposed project component locations (Figure 1-1) are the Green River and the Hams Fork, a tributary of the Blacks Fork River, which drains into the Flaming Gorge Reservoir. Other surface water resources in the project area include several named and unnamed intermittent, ephemeral, and perennial streams, livestock ponds, and seeps and springs (BLM 1995). Intermittent and ephemeral streams that are tributaries of the

Green River and Hams Fork drain the majority of the proposed pipeline corridor and associated component locations.

Because the Green River is part of the Colorado River Compact of 1922, its waters are apportioned among the participating states. It is the largest tributary of the Colorado River, and its waters are subject to salinity control through the Colorado River Basin Salinity Control Forum. The Colorado River Basin Salinity Control Forum is a cooperative effort between federal agencies and seven states (including Wyoming) to address the problem of increasing salinity in the lower reaches of the Colorado River. The purpose of the Colorado River Basin Salinity Control Forum is to provide information necessary to comply with Section 303(d) of the Clean Water Act and to meet national and state water quality objectives (Colorado River Basin Salinity Control Forum 2002). Section 303(d) requires states to identify waters that are not supporting their designated uses and/or that need to have a TMDL established to support their uses. The latest plan of implementation developed by the Salinity Control Forum includes:

1) Completion of Reclamation, United States Bureau of Land Management (BLM), and United States Department of Agriculture (USDA) salinity control measures to the extent that each unit remains viable and appropriately cost-effective.

2) Implementation of the Forum's recommended and adopted policies of effluent limitations, principally under the National Pollutant Discharge Elimination System (NPDES) permit program established by the Section 402 of the Clean Water Act as amended.

3) Implementation of non-point source management plans developed by the states and approved by USEPA.

The project area is located within three sub-basins of the Green River Basin, the Upper Green (HUC 14040101), Slate Creek (HUC 14040103), and Blacks Fork (14040107). Salts contained within sedimentary rocks throughout the Green River Basin are easily eroded, dissolved and transported into the river. Lower elevations of the Upper Green Sub-basin lie in primarily fine-grained sedimentary rocks that are a natural source of fine sediment and total dissolved solids in surface waters. Surficial materials within the Slate Creek and Blacks Fork Sub-basins tend to be saline and alkaline, erode easily, and can be difficult to stabilize after being disturbed. Tributary streams of the Green River, both above and below Fontenelle Reservoir are sensitive to channel disturbance and to increases in surface runoff and/or tributary inflow and sediment (BLM 1995). Stream bank erosion potential is high to very high, and recovery potential ranges from very poor to good, depending on stream type.

The Green River in the vicinity of the proposed project area is not listed as a monitoring stream or as impaired waters in Wyoming's Draft 2006 303(d) Master List of Impaired Waters Requiring TMDLs (WDEQ/WQD 2006). The Hams Fork in the vicinity of the proposed project area is listed as a monitoring stream in the Draft 2006 Wyoming 303(d) Master List and as impaired waters. The Hams Fork near Diamondville has been listed on Table A of the 303(d) list since 1998 due to high pH (above the criteria of 9.0 standard units) measurements indicating it is partially impaired for its aquatic life uses below the Town of Kemmerer; however, the impairment does not represent a risk to human health. The WDEQ/WQD classifies those sections of the Green River in the vicinity of the proposed project area, both above and below Fontenelle Reservoir, as Class 2AB (waters that are known to support game fish populations

and where a game fishery and drinking water use is attainable, and are protected for those uses). The Hams Fork is also Class 2AB (WDEQ/WQD 2001).

3.4.1.1 Floodplains

Floodplains are defined as the relatively flat area or lowlands adjoining a body of standing or flowing water that has or might be covered with water. Flood insurance rate maps from the Federal Emergency Management Agency (FEMA) were reviewed to determine floodplains in the project area.

Approximately twenty named and unnamed ephemeral or intermittent streams are will be crossed. These include; Buckhorn Canyon, Bull Draw and unnamed tributaries of Bull Draw, unnamed tributaries to Big Sandy Creek, the upper reaches of Jonah Gulch, East Buckhorn Draw, West Buckhorn Draw, the upper reaches of Slate Creek (Sweetwater County), an unnamed tributary to Fourmile Creek, several unnamed tributaries to Fontenelle Reservoir, the upper reaches of Shute Creek and five unnamed tributaries to Craven Creek. None of these streams is included in the FEMA floodplain mapping.

Under the Proposed Action, the project will intercept the 100-year floodplains of Craven Creek and the Green River. The Green River will be bored, obviating any floodplain disturbance. The project terminus is located outside of the Hams Fork floodplain. The Proposed Action corridor would cross Craven Creek and Craven Creek tributary floodplains in three places, encompassing approximately 700 feet or 1.77 acres of floodplain.

3.4.2 Groundwater

The only groundwater expected to be encountered will be in the Quaternary to Recent alluvium of the Green River. Water bearing units in deeper bedrock formations will not be disturbed. Groundwater quality data presented in Lowham, et al (1983), indicates that TDS concentrations in the alluvial groundwater in the immediate vicinity of Fontenelle Reservoir are less than 500 mg/l.

3.5 VEGETATION, WETLANDS AND NOXIOUS/INVASIVE WEEDS

3.5.1 General Vegetation

All proposed facilities and pipelines associated with this project are located within Omernik Ecoregion 18 (Wyoming Basin)(Omernik 1987). This ecoregion is a broad intermontane basin dominated by arid grasslands and shrublands supporting bunchgrasses and sagebrush, interrupted by high hills and low mountains (EPA 2002). Nearly surrounded by forest covered mountains, the region is somewhat drier than the Northwestern Great Plains to the northeast and does not have the extensive cover of pinyon-juniper woodland found in the Colorado Plateaus to the south. Much of the region is used for livestock grazing and contains major producing natural gas and petroleum fields.

Vegetation on the proposed pipeline routes and related facility sites is dominated primarily by Wyoming big sagebrush (*Artemisia tridentate* ssp. *wyomingensis*), desert shrub, and greasewood (*Sarcobatus vermiculatus*) communities, usually interspersed with mixed grass prairie as a secondary cover. The entire project area is located within the Natural Resources Conservation Service (NRCS) Green River and Great Divide Basin (7" - 9") precipitation zone,

Region 4 (USDA-NRCS 1986). As a result, native plants in this area of Wyoming are predominantly drought-tolerant low shrub, grass, and flowering forb species. The recent prolonged drought in this area of Wyoming has negatively impacted many native shrub communities and several small-scale natural die-backs can be observed throughout the project area with the most conspicuous occurring in basin big sagebrush (*Artemisia tridentate* ssp. *tridentate*)/black greasewood communities commonly associated with the numerous ephemeral drainages throughout the area.

3.5.2 Vegetation Cover Types

A vegetation cover-type map of the proposed BTOPA was provided by the Wyoming Natural Resources Clearinghouse and used to delineate primary and secondary land cover type boundaries. Information for plant species of concern on or near the project area was provided by the Wyoming Natural Diversity Database (WYNDD 2005).

The vegetation cover-type layer was derived from Landsat Thematic Mapper (TM) satellite imagery, "acquired from mid-June to late August between the years 1984 and 1993 (Merrill *et al.* 1996). Resolution of this layer is 100 hectares (248 acres or 0.4 section) for uplands and 40 hectares (100 acres or 0.2 section) for riparian and wetland areas. Given the resolution of the GAP layer, small stands of some cover-types do not appear on the map. For example, linear stands of basin big sagebrush commonly associated with narrow ephemeral drainages, small saltbush-dominated openings, and smaller cushion plant communities are often too small to appear at this scale of resolution.

Based upon the WY-GAP data, Wyoming big sagebrush and desert shrubs, principally Gardner's saltbush (*Atriplex gardneri),* collectively comprise about 99 percent of the primary cover types on the project area. Table 3-10 shows the extent of the primary and secondary vegetation cover types on the PRPA.

Table 3-10 Primary and Secondary Vegetation Cover Types on the Jonah Bridger to Opal Natural Gas Project Area Identified by LandSat Satellite Imagery (Wyoming GAP Analysis Program, Merrill *et al.* 1996).

Vegetation Cover Type	GAP Code	Primary		Secondary	
		Acres	%	Acres	%
Pipeline route					
Wyoming big sagebrush -	32007	1,072.9	90.2	116.6	10.6
Desert Shrub	32010	104.3	8.8	15.8	1.4
Greasewood fan and flats	32012	12.3	1.1	--	--
Mixed grass prairie	31001	--	--	865.9	78.1
Compressor Site					
Wyoming big sagebrush	32007	37.3	100.0	--	--
Mixed grass prairie	31001	--	--	37.3	100.0

A brief description of each cover type is presented below.

Wyoming big sagebrush: This sub-species of the big sagebrush complex is the dominant cover type in the project area, covering 100% at the Compressor site and approximately 91 % of the pipeline route. Merrill *et al*. (1996) describes this cover type as follows:

> Total shrub cover in this type comprises more than 25% of the total vegetative cover. This type is variable in Wyoming and ranges from dense, homogeneous Wyoming big sagebrush to sparsely vegetated arid areas where Wyoming big sagebrush is the dominant shrub. Often, patches of Wyoming big sagebrush are found with patches of mixed grasses. In these cases the type is classified as Wyoming big sagebrush steppe if the sagebrush patches occupy more than 50% of the total landscape area and as mixed grass if the grasses occupy more than 50% of the total area.

Mixed grass prairie: This is a "catch-all" type for grasslands that contain a mixture of short grass and tall grass prairie species. These grasslands do not contain buffalo grass, considered an indicator of short grass prairie. Mixed grass prairie often occurs in patches intermixed with shrub species such as sagebrush. Dominant plant species in this cover type include: thickspike wheatgrass (*Agropyron dasystachyum*), western wheat grass (*Pascopyrum smithii*), bottlebush squirreltail (*Sitanion hystrix*), needle-and-thread (*Stipa comata*), Indian ricegrass (*Oryzopsis hymenoides*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass *(Agropyron spicatum*), and threadleaf sedge (*Carex filifolia*). Forbs and especially woody crowned half-shrubs such as Hood's phlox (*Phlox hoodii*), Hooker's sandwort (*Arenaria hookeri*), cushion wild buckwheat (*Eriogonum ovalifolium*), green rabbitbrush (*Chrysothamnus viscidiflorus*), winterfat (*Krascheninnikovia lanata*), and broom snakeweed (*Gutierrezia sarothrae*) occur in some locations as understory dominants with the sagebrush. These sites are usually alkaline with limited permeability, and often occur on thin soils with rocky or gravelly subsurface materials. Locoweed (*Oxytropis* spp.) and milkvetch (*Astragulus* spp.) are poisonous plants often occurring with this cover type (Merrill *et al.* 1996).

Desert shrub: This type is a "catch-all" classification for a mixture of shrubs usually associated with dry, saline habitats. Shrub cover is often dominated by alkaline/saline adapted species such as shadscale saltbush (*Atriplex confertifolia*), but can be a mixture of Gardner's saltbush, greasewood and/or desert cushion plants (Merrill *et al*. 1996). Many saltbush dominated communities occur on the project area and these sites are characterized by an accumulation of salt in poorly developed soils with a pH of 7.8 to 9.0. Grass cover is negligible and bare ground usually exceeds 50%. Birdsfoot sagebrush (A*rtemisia pedatifida*) also occurs in alkaline soils with pH levels of 8.5 to 11. At the lower pH levels, birdsfoot sagebrush can occur with Gardner's saltbush in varying densities. At the higher pH levels, birdsfoot sagebrush usually occurs as a monoculture.

Greasewood Fans and Flats

This type is characteristic of areas where greasewood comprises more than 75% of the total shrub cover and where shrubs comprise more than 25% of the total vegetative cover. These communities are often mixed with a grass understory. This type is frequently found along streams at low to medium elevations although it can occur of fine textured, saline upland areas and on basin fans and flats.

3.5.3 Biological Soil Crusts

An often overlooked, but extremely vital component of Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are the biological soil crusts (BSC) that occupy most of the open space not occupied by vascular plants. Biological soil crusts predominantly are composed of cyanobacteria (formerly blue-green algae), green and brown algae, mosses, and lichens. Liverworts, fungi, and bacteria can also be important components. Because they are concentrated in the top 1-4 mm of soil, they primarily affect processes that occur at the soil surface or soil-air interface, including soil stability, decreased erosion potential, atmospheric N-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seeding germination, and plant growth. Crusts are well adapted to severe growing conditions, but poorly adapted to compressional disturbances such as trampling by humans and livestock, wild horses, wildlife, or vehicles driving off roads. Disruption of the crusts decreases organism diversity, soil nutrients, stability, and organic matter (Belnap *et al*. 2001).

The dominant BSC on the project area is the "tumbleweed shield lichen", (*Xanthoparmelia chlorochroa*), commonly referred to as "Parmelia". *Xanthoparmelia chlorochroa* is a widespread foliose yellow-green lichen of sagebrush landscapes and is a member of the largest North American genus of vagrant lichens (Belnap *et al.* 2001). Vagrant lichens are those taxa that grow, persist, and reproduce without attachment to a substrate. In Wyoming, this species is fairly common and commonly associated with the Wyoming big sagebrush vegetation cover type.

3.5.4 Noxious and Invasive Weeds

On 3 February 1999, Executive Order (EO) 13112 ("Invasive Species") was signed by President Clinton (revokes EO 11987). The primary purpose of this EO is to prevent the introduction of invasive species and provides for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. In Wyoming, some 428 species have been documented as invasive (Hartman and Nelson 2000). Of these 428 plants, 24 are designated as noxious by the State of Wyoming and are shown in Table 3-11

Noxious weeds are very aggressive and invading infestations tend to exclude other native plant species thereby reducing the overall forage production of desirable shrubs, herbaceous grasses and forbs. The project area is vulnerable to infestations of noxious weeds, especially on newly disturbed surfaces.

Table 3-11. Designated Noxious Weeds in Wyoming.[1]

Scientific Name	Common Name
Agropyron repens	Quackgrass
Ambrosia tomentosa	Skeletonleaf bursage
Arctium minus	Common burdock
Cardaria draba, C. pubescens	Hoary cress, whitetop
Carduus acanthoides	Plumeless thistle
Carduus nutans	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea maculosa	Spotted knapweed
Centaurea repens	Russian knapweed
Chrysanthemum leucanthemum	Ox-eye daisy

Scientific Name	Common Name
Cirsium arvense	Canada thistle
Convolvulus arvensis	Field bindweed
Cynoglossum officinale	Houndstongue
Euphorbia esula	Leafy spurge
Isatis tinctoria	Dyers woad
Lepidium latifolium	Perennial pepperweed
Linaria dalmatica	Dalmatian toadflax
Linaria vulgaris	Yellow toadflax
Lythrum salicaria	Purple loosestrife
Onopordum acanthium	Scotch thistle
Sonchus arvensis	Perennial sowthistle
Tamarisk spp.	Salt cedar
Hypericum perforatum	Common St. Johnswort
Tanacetum vulgare	Common tansy

[1] Designated Noxious Weeds, Wyoming Stat. § 11-5-102 (a)(xi) and Prohibited Noxious Weeds, Wyoming Stat. § 11-12-104.

In addition to the Wyoming State List, each county may designate a weed species as noxious. Within the project area these include: **Sublette** - scentless chamomile (*Anthemis arvensis*), black henbane (*Hyoscyamus niger*), Field scabious (*Knautia arvensis*), and Western water hemlock (*Cicutta douglasii*); **Sweetwater** -Black henbane, Foxtail barley (*Hordeum jubatum*), Lady's bedstraw (*Galium verum*), and Mountain thermopsis (*Thermopsis montana*), and **Lincoln** - Wild oat (*Avena fatua*)(www.wyoweed.org/docs/2006%20Declared%20List.doc).

The past three growing seasons (2002-2005) has seen the rapid establishment and spread of halogeton, *Halogeton glomeratus,* (M. Bieb.) C. A. Myer, throughout southwestern Wyoming. Halogeton, an annual plant, is an aggressive invader of newly disturbed sites with alkaline to saline soils that are common in Wyoming. Plant tissues accumulate salts from lower soil horizons. The salts leach from dead plant material, increasing topsoil salinity and favoring halogeton seed germination and establishment. Some salt in the foliage consists of soluble oxalates toxic to livestock, especially sheep. Soil surface disturbances associated with energy development and production (seismic exploration, pipelines, drill pads, staging areas, etc.), are especially vulnerable to halogeton invasion. Other non-energy activities such as state and federal road construction, installation of fiber-optic cables, buried electric lines, etc. are equally susceptible to halogeton invasion.

3.5.5 Waters of The United States, Including Wetlands

The U.S. Fish and Wildlife Service's (FWS) National Wetlands Inventory (NWI) has mapped wetlands throughout the project area according to the classification system of Cowardin *et al*. (1979). The digital files for the project area were downloaded from the web site of the University of Wyoming's Geographic Information Science Center (WGISC). Relevant portions were clipped from the map to provide wetland data for the project area using Arc-GIS® software.

Waters of the US - The majority of all drainages (streams, draws, washes) in the project area are within the USGS-fifth order hydrologic cataloging units 14040101 (Upper Green) and 14040103 (Upper Green-Slate) that eventually drain into the Green River. A small portion of the northeastern portion of the project area drains to the Big Sandy watershed (1404104). Most of the surface water features in the project area qualify as Waters of the United States. Channels

that carry surface flows and that show signs of active water movement are classified as 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)] and are regulated by the ACOE. Many ephemeral drainage channels identified on the USGS topographic maps for the project area may or may not be considered as Waters of the U.S. depending upon bed/bank characteristics.

Any activity that involves discharge of dredge or fill material into or excavation of "Waters of the U.S." is subject to regulation by the ACOE pursuant to Section 404 of the CWA. Activities that modify the morphology of stream channels are also subject to regulation by the Wyoming Department of Environmental Quality (WDEQ).

Wetlands - Wetlands are typically defined as lands transitional between terrestrial and aquatic systems where the water is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominately hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year (ACOE 1987, 1992).

The National Wetland Inventory (NWI) has mapped wetlands throughout the project area. Digital NWI data was obtained through the Wyoming Geographical Information Science Center (www.sdvc.uwyo.edu). Digital NWI data were converted into ARC-GIS format, tiled into 1:100,000-scale quadrangles for distribution, and attributes standardized and checked. In general, with the exception of the Green River crossing, wetlands are relatively scarce in the project area. The wetland types that are identified in the NWI are shown in Table 3-12.

Table 3-12. Wetland types in the Jonah Bridger to Opal Natural Gas Project Area.

NWI Wetland Classification[A]	Linear Wetlands (Length in feet)	Percent	Polygonal Wetlands (Area in Acres)	Percent
PEMA	----	--	122.0	11.0
R4SBA	284.3	n/a	----	
R2UBH	0.98	n/a	----	
PUSAh	----	--	0.5	0.05

[A] System, Subsystem (if applicable), and Class levels.
PEMA Palustrine, Emergent, Temporarily Flooded
R4SBA Riverine, Intermittent, Streambed, Temporarily flooded
R2UBH Riverine Lower Perennial Unconsolidated Bottom, Permanently Flooded
PUSAh Palustrine, Unconsolidated Shore, Temporarily flooded

The most common linear wetland is classified as R4SBA (Riverine- Intermittent-Streambed-Temporarily Flooded). The total length of these intermittent streams intersected by the pipeline is only 284 ft. (< city block). Many individual wetlands are so small that they hardly appear on a small scale map as used in the NWI. The most common polygonal wetland on the project area is PEMA covering about 122 acres. Stock ponds in Wyoming are usually included in this classification. Wetland types are more fully described in Cowardin *et al*. (1979).

3.6 RANGELAND RESOURCES

The Green River, Kemmerer, and Pinedale RMPs stipulate that the objective for grazing resources is that *vegetation will be managed to maintain or improve ecological range condition and to maintain or increase forage for livestock grazing, while providing for the maintenance or improvement of wildlife habitats, watershed values and riparian areas. Objectives of the livestock management program in riparian areas will include maintenance, restoration, and improvement of riparian areas where livestock grazing has contributed to riparian management problems.*

The primary historical land use of the project area has been for livestock (cattle and sheep) production and wildlife habitat. Twenty-two permittees graze their livestock on the project area beginning in the area of the three suction lines in the Jonah Field complex to the terminus of the pipeline at the Pioneer Gas Plant site. Chapter 4 discusses the allotments, authorized Animal Unit Month's (AUM's), and average stocking ratios for the project area. An AUM is defined as 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. It is assumed 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%, results in an estimate of about 1000 pounds of dry matter (DM) from forage to supply one AU each month.

3.6.1 WILD HORSE MANAGEMENT

A wild horse is defined as an unbranded and unclaimed free roaming horse in the western United States. Wild horses on public lands are protected and managed in accordance with the Wild Horse and Burro Act of 1971 (Public Law 92-195). The Bureau of Land Management maintains and manages wild horses or burros in herd management areas (HMAs).

A small portion of the southwestern portion of the proposed project lies within the boundaries of the Little Colorado HMA. The Little Colorado HMA encompasses 519,541 acres of BLM administered public lands. The majority of the HMA consists of consolidated public lands along with state school sections and, in the south of the HMA, Bureau of Reclamation lands. The HMA is bounded on the west by the Green River, on the east by Highway 191 and on the north by the Pinedale/Rock Springs Field Office boundary. The area is unfenced except for sections of the boundary fence between the Rock Springs and Pinedale Field Offices, and along Highway 191. The HMA is divided among Sublette, Lincoln, and Sweetwater counties.

The Bureau establishes an appropriate management level (AML) for each HMA. The AML is the population objective for the HMA that will ensure a thriving ecological balance among all the users and resources of the HMA, for example, wildlife, livestock, wild horses, vegetation, water, and soil. The AML for the Little Colorado HMA is 100 horses (http://www.wy.blm.gov/wildhorses/hma.htm).

3.7 WILDLIFE AND FISHERIES

3.7.1 Wildlife

3.7.1.1 Introduction

The proposed project area extends through parts of the Kemmerer, Pinedale, and Rock Springs Field Offices of the BLM. The project area provides diverse habitat that supports a wide variety of resident, migrant, and seasonally resident wildlife species. Because many wildlife species are highly mobile and can readily move in and out of the project area, records of current and historical wildlife species occurrences were obtained for the area within three miles of the planned development. Since activities within the project area could potentially affect nesting raptors and greater sage-grouse breeding activities that are outside the project area, the area of analysis was expanded for these species to include a one-mile and two-mile buffer zone, respectively.

Information concerning current and historical wildlife locations was obtained from several sources. Greater sage-grouse lek and raptor nest locations were obtained from the BLM Kemmerer, Pinedale, and Rock Springs Field Offices. Additional information was acquired from the Wyoming Game and Fish Department's (WGFD) Wildlife Observation System (WOS), the Wyoming Natural Diversity Database (WYNDD), the Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming (Cerovski et al. 2004), and the species list for the Seedskadee National Wildlife Refuge (SNWR) (USDI-FWS 2002) located within 2 miles of the proposed pipeline. The WOS database contains records for birds, mammals, reptiles, and amphibians (WGFD 2005d). Location records for vertebrate species of special concern (federal or state) were obtained within the townships encompassing the project development area from the Wyoming Natural Diversity Database (WYNDD 2005). The Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming and the Seedskadee NWR species list were used to assess the potential occurrence of a species in the project area (USDI-FWS 2002, Cerovski et al. 2004). The atlas divides Wyoming into 28 degree blocks, and the presence or absence and breeding activity of vertebrate species are documented by degree block. The project area covers parts of degree block 15, 16, and 22. A species was considered to have the potential for occurrence in the project area if it was reported as observed, breeding, or historically present within degree blocks 15, 16, or 22. Annual big game herd unit reports obtained from WGFD were used for identifying crucial big game ranges in the area of the BTOPA.

3.7.1.2 Wildlife Habitat

Wildlife habitats potentially affected by the project include areas that would be physically disturbed by the construction of pipelines, power lines, and production facilities, as well as zones of influence. 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 circumstance.

Wildlife habitats in the upland areas within the project area are dominated by sagebrush, mixed shrub, and sagebrush-grassland communities. Cottonwood communities occur along the Green River, and other intermittent riparian habitats occur along drainage bottoms. See Section 3.5 for further description of vegetation types.

3.7.1.3 General Wildlife

A total of 401 species has been recorded near the project area either as residents or migrants and includes 81 mammal species, 301 bird species, 6 amphibian species, and 13 reptile species (Appendix B). Most of these species are common and are widely distributed throughout the region. Consequently, the relationship of most of these species to the proposed project is not discussed in the same detail as species that are threatened, endangered, sensitive, or are otherwise of high interest or value.

3.7.1.4 Big Game

Four big game species: mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), pronghorn (*Antilocapra americana*) and moose (*Alces alces shirasi*) occur along the proposed pipeline and power line routes. Big game populations are managed by the WGFD within areas designated as herd units and are discussed in that context. However, the BLM administers most of the land included in the BTOPA. The types of big game seasonal ranges discussed in this document include: (1) crucial winter ranges, (2) severe winter relief range, (3) parturition areas, and (4) areas designated as "out". Crucial ranges contain components that have been identified as the determining factor in a population's ability to maintain itself at a certain level over the long-term. Severe winter relief range is considered a survival range which is used during extremely severe winters only. Parturition areas are critical for fawn/calf survival. Areas designated as "out" do not contain enough animals to be important habitat, or the habitats are of limited importance to the species (WGFD 2005a, 2005b). Management directives from the BLM state that big game parturition areas will be closed to activity between May 1 and June 30 and big game crucial winter ranges will be closed to activity between November 15 and April 30.

Mule Deer. The BTOPA is located within the Steamboat, Sublette, and Wyoming Range Mule Deer Herd Units and is a popular mule deer hunting area. These herd units cover portions of Lincoln, Sublette, and Sweetwater counties and have a combined population objective of 86,000 animals. The 2004 population estimate was 58,623 (WGFD 2005a, WGFD 2005b). The vast majority of the BTOPA is located in areas designated as "out," with two exceptions: approximately 2.4 miles of the proposed pipeline that intersects habitat classified as winter/yearlong habitat just downriver from Fontenelle Reservoir, and a 14.2-mile section of the proposed transmission power line that intersects crucial winter range near La Barge (Figure 3-2). No parturition areas or intensively used migration routes or migration bottlenecks have been identified within the BTOPA.

Elk. The BTOPA would occur within the Pinedale, Piney, and West Green River Elk Herd Units. All three of these herd units are popular hunting areas. The Pinedale, Piney, and West Green River Elk Herd Units had 2004 population objectives of 1,900, 2,424, and 3,100 elk, respectively. The 2004 population estimates for the Pinedale, Piney, and West Green River Herd Units are 1,911, 2,500, and 3,600 elk, respectively (WGFD 2005a, WGFD 2005b). A 10.87-mile section of the proposed pipeline in the West Green River Herd Unit would run through "crucial severe winter relief range" (Figure 3-2). Otherwise, no other crucial ranges, parturition areas, or migration routes or bottlenecks have been identified along the BTOPA.

Pronghorn. The BTOPA is located within the Sublette Pronghorn Herd Unit. The 2004 population estimate of 42,500 animals for this herd unit falls below the population objective of 48,000 for the Upper Green River Basin (WGFD 2005a). Although persistent drought conditions and associated high fawn mortality is considered the leading cause for the population falling

below the herd objective, improving range conditions are expected to increase the herd numbers to near the objective in 2005. The majority of the BTOPA would run through spring/summer/fall pronghorn range. Two sections of the proposed pipeline, totaling 18.6 miles in length, intersect crucial winter/yearlong pronghorn range (Figure 3-2). Similarly, 18.0 miles (56.4%) of the proposed transmission power line would intersect spring/summer/fall pronghorn range, whereas two sections totaling 13.9 miles (43.6%) would occur within crucial winter/yearlong range (Figure 3-2).

Pronghorn within the Sublette Herd Unit boundaries migrate farther between seasonal ranges than any other known herd in North America, with some animals summering within Grand Teton National Park and wintering as far south as Rock Springs (approximately 150 miles apart) (WGFD 2005a). WGFD recommends protecting pronghorn migration corridors throughout the herd unit, but places special priority on the corridors between Pinedale and Jackson Hole (WGFD 2005a). Although the effect of natural gas pipelines is unknown, roads and fences can influence pronghorn movements and in some cases prevent migratory movement (WGFD 2005a, Sheldon 2005). Although the BTOPA would cross several pronghorn migration zones, the most critical migration corridors are north-northwest of the BTOPA (WGFD 2005a).

Moose. The BTOPA is located along the edge of the Sublette Moose Herd Unit, and within the Lincoln Moose Herd Unit. The Sublette herd unit covers most of the Upper Green River Basin and the northern portion of the Wyoming Range. The estimated 2004 population for this herd unit of 4,107 falls below the 2004 objective of 5,500 animals (WGFD 2005b). The estimated 2004 population for the Lincoln herd unit of 1,526 also falls below the 2004 population estimate of 1,650 animals (WGFD 2005a). Two sections of the proposed pipeline totaling 2.5 miles in length would run through moose crucial winter/yearlong range near the Green River (Figure 3-2). All of the proposed transmission power line would run through areas designated as "out" for moose except for a 4.2-mile section near the Green River that would occur within crucial winter/yearlong range (Figure 3-2).

3.7.1.5 Raptors

Sixteen raptor species have been observed on or within three miles of the BTOPA including: American kestrel (*Falco sparverius*), bald eagle (*Haliaeetus leucocephalus*), burrowing owl (*Athene cunicularia*), Cooper's hawk (*Accipiter cooperii*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), merlin (*Falco columbarius*), northern goshawk (*Accipiter gentiles*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), short-eared owl (*Asio flammeus*), and Swainson's hawk (*Buteo swainsoni*) (WGFD 2005d, WYNDD 2005). Additional species observed at SNWR include: long-eared owl (*Asio otus*), northern saw-whet owl (*Aegolius acadicus*), peregrine falcon (*Falco peregrinus*), and snowy owl (*Nyctea scandiaca*) (USDI-FWS 2002). Records from the BLM's Kemmerer, Pinedale, and Rock Springs field offices and HWA show that 43 raptor nests have been documented within one mile of the BTOPA since 1996 (Figure 3-7). These included: 1 American kestrel, 1 bald eagle, 17 ferruginous hawk, 1 great horned owl, 2 golden eagle, 3 prairie falcon, 15 red-tailed hawk, 1 Swainson's hawk, and 2 unknown nests (Figure 3-7). Only one nest was active in 2003 or 2004—a bald eagle nest 0.75 miles from the proposed pipeline (unpub. data, S. Patla, WGFD 2005).

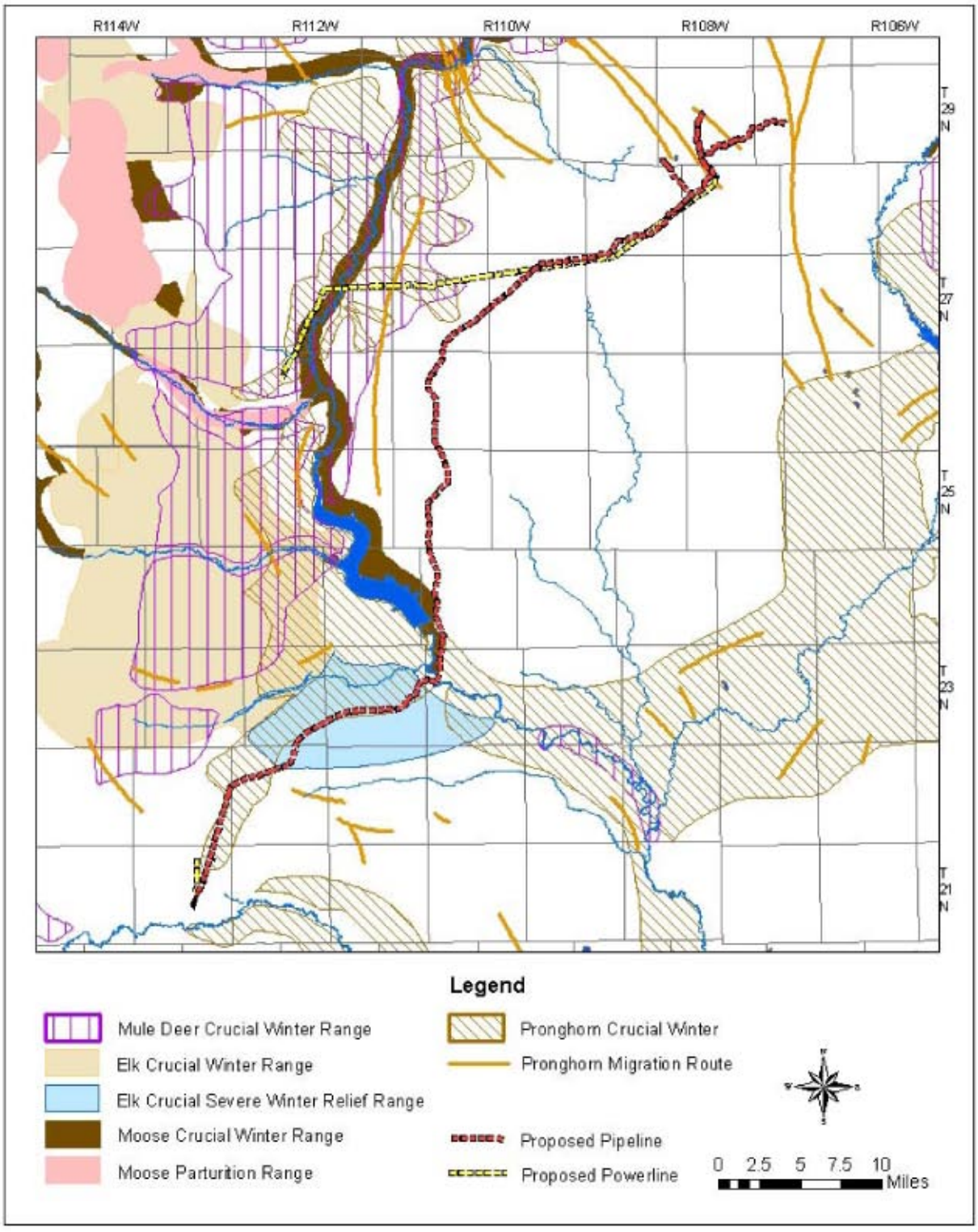


Figure 3-2. Big game crucial winter ranges associated with the Jonah Bridger to Opal Pipeline Project.

No recent nest activity information was available for the nests in the Rock Springs (RSFO) or Pinedale field office (PFO) portions of this project, but preliminary surveys in the Kemmerer field office (KFO) portion of the project were conducted in January and February, 2006. Three ferruginous hawk nests were located within 0.5 miles of the proposed pipeline: one in excellent condition on an artificial platform that had extensive sign of nesting activity from recent years, and two nests on the ground in very poor condition. In addition, a previously documented bald eagle nest (S. Patla, WDFG) within one mile of the proposed pipeline was being tended by a pair of eagles on January 10 and February 8, and one adult was seen on the nest in incubating position on February 22, 2006.

Additional surveys will be conducted throughout the BTOPA to document the location and activity status of all new and previously documented raptor nests in 2006.

3.7.2 Fish

3.7.2.1 Fish Introduction

The project area occurs within the Upper Green River Basin. All tributaries within the BTOPA drain into the Green River.

3.7.2.2 Fish Habitat

Virtually all streams along the BTOPA are classified by the WDEQ as Class 2AB or Class 3B (WDEQ 2001). Class 2AB streams have game fish present, while Class 3B do not have any fish species present, but have other types of aquatic life. The Green River is a Class 2AB stream. All other streams along the pipeline route are Class 3B streams, including Alkali Creek, Buckhorn Draw Creek, Eighteen-mile Canyon Creek, and Sand Springs Draw. The Green River in Wyoming and Colorado supports a wide variety of game and non-game fish species, both native and non-native.

3.7.2.3 General Fish

About 33 fish species are potentially present in waters downstream of the project corridor in the Green River (see Appendix B), Flaming Gorge Reservoir, their associated streams, and the Colorado River. This includes five that are BLM sensitive species (see Section 3.8.1) and four federally listed species (see Section 3.8.1.3).

3.8 SPECIAL STATUS WILDLIFE, FISH AND PLANT SPECIES

3.8.1 BLM Sensitive Species

Although these species have no legal protection under the Endangered Species Act (ESA), the BLM and FWS still maintain an active interest in their numbers and status. It is BLM policy (BLM Manual Section 6840) to manage these species to preclude the need for listing under the ESA. Sensitive species included in this section include those listed on the BLM Wyoming State Sensitive Species Policy and List (USDI-BLM 2002) for the Kemmerer, Pinedale, and Rock Springs Field Offices (Table 3-13). The BLM Wyoming Sensitive Species list is meant to be dynamic, and the list will be reviewed annually. Those BLM sensitive species that are known or

likely to occur on or near the BTOPA are discussed in more detail below. Those species unlikely to occur are not discussed further.

3.8.1.1 Mammals

Townsend's Big-eared Bat. Townsend's big-eared bats are found throughout Wyoming, but are classified as a rare summer resident (Clark and Stromberg 1987, Cerovski et al. 2004). They are associated with a variety of habitats, including desert shrub lands, pinyon-juniper woodlands, and dry coniferous forests (Clark and Stromberg 1987). In the Great Plains, Townsend's big-eared bats are restricted to deciduous woodlands near suitable caves, rocky outcrops or abandoned mines and buildings, which they require for roosting and hibernation sites (Clark and Stromberg 1987, Fitzgerald et al. 1994). Although there are no known records for Townsend's big-eared bats in the vicinity of the BTOPA (Cerovski et al. 2004), habitat along portions of the project corridor appears to be suitable for the species.

Long-eared Myotis. Long-eared myotis occur throughout Wyoming in suitable habitat (Clark and Stromberg 1987). They are associated with coniferous habitats such as ponderosa pine or juniper-dominated habitats, but may also occur in higher elevation spruce-fir stands (Clark and Stromberg 1987). Although the feeding habitats are poorly known, they have been found foraging near water in open areas that are within flying distance from coniferous forests. Long-eared myotis have been observed in southwestern Wyoming, but the number of records are unknown (Cerovski et al. 2004). They also have been recorded at SNWR (USDI-FWS 2002), which is within 2 miles of the proposed pipeline. Long-eared myotis potentially may occur within the project, but due to the paucity of coniferous forests near the planned development, they are likely to be rare.

Pygmy Rabbit. The geographic range of the pygmy rabbit was thought to be limited to portions of Idaho and Utah until their presence was confirmed in southwest Wyoming (Campbell et al. 1982). Currently, the distribution of pygmy rabbits in Wyoming is unknown; however, the species has been documented on and near the BTOPA. Pygmy rabbits are limited to areas of dense and tall big sagebrush (*Artemisia* spp.) in predominantly sandy soils (Campbell et al. 1982, Clark and Stromberg 1987, Heady et al. 2002). Burrows are located in areas with greater cover, higher shrub density, taller vegetation, and greater forb cover than the surrounding area (Heady et al. 2002).

Pygmy rabbit sightings were documented in 1994 south of Fontenelle Reservoir in eastern Lincoln and western Sweetwater counties (HWA 1994). Four pygmy rabbit sightings were recorded within one mile of the BTOPA during 2004 and 2005, and nine additional pygmy rabbit sightings within six miles of the BTOPA were recorded in recent years (USDI-BLM 2005a, WGFD 2005d, WYNDD 2005).

Table 3-13. Sensitive wildlife and fish species in the Kemmerer, Pinedale, and Rock Springs BLM field offices.[1]

Wildlife Species			
Common Name	**Scientific Name**	**Sensitivity Status[2]**	**Occurrence [3]**
Mammals			
Fringed myotis	*Myotis thysanodes*	G5/S1B, S1N, FSR2, TBNG, NSS2	Unlikely
Long-eared myotis	*Myotis evotis*	G5/S1B, S1?N, NSS2	Likely
Townsend's big-eared bat	*Corynorhinus townsendii*	G4/S1B, S2N, FSR2, TBNG FSR4, NSS2	Likely
Pygmy rabbit	*Brachylagus idahoensis*	G4/S2, NSS3	Present
White-tailed prairie dog	*Cynomys leucurus*	G4/S2S3, NSS3	Present
Idaho pocket gopher	*Thomomys idahoensis*	G4/S2?, NSS3	Likely
Wyoming pocket gopher	*Thomomys clusius*	G2/S1S2, NSS4, FSR2	Unlikely
Swift fox	*Vulpes velox*	G3/S2A3, FSR2	Unlikely
Birds			
Mountain plover	*Charadrius montanus*	G2/S2B, SZN	Present
Sage sparrow	*Amphispiza belli*	G5/S3B, SZN	Present
Brewer's sparrow	*Spizella breweri*	G5/S3B, SZN	Present
Long-billed curlew	*Numenius americanus*	G5/S3B, SZN, R2, NSS3	Likely
Yellow-billed cuckoo	*Coccyzus americanus*	G5/S2B, SZN, FSR2, TBNG, NSS2	Likely
Sage thrasher	*Oreoscoptes montanus*	G5/S3B, SZN	Present
Burrowing owl	*Athene cunicularia*	R2, G4/S3B, SZN, NSS4	Present
Loggerhead shrike	*Lanius ludovicianus*	G5/S4B, SZN, R2	Present
Greater sage-grouse	*Centrocercus urophasianus*	G5/S3	Present
White-faced ibis	*Plegadis chihi*	G5/S1B, SZN, R2, NSS3	Likely
Trumpeter swan	*Cygnus buccinator*	R2/R4, G4/S1B, S2N, NSS2	Present
Peregrine falcon	*Falco peregrinus*	G4/T3/S1B, S2N, R2, NSS3	Likely
Ferruginous hawk	*Buteo regalis*	R2, G4/S3B, S3N, NSS3	Present
Northern goshawk	*Accipiter gentilis*	R2/R4, G5/S23B, S4N, NSS4	Likely
Reptiles			
Midget faded rattlesnake	*Crotalus viridis concolor*	G5T3/S1S2	Unlikely
Amphibians			
Boreal toad	*Bufo boreas boreas*	G4T4/S2, R2, R4, NSS2	Unlikely
Northern leopard frog	*Rana pipiens*	G5/S3, R2, NSS4	Likely
Spotted frog	*Rana pretiosa*	G4/S2S3, R2, R4, NSS4	Unlikely
Great Basin spadefoot	*Spea intermontana*	G5/S4, NSS4	Likely

Wildlife Species			
Common Name	**Scientific Name**	**Sensitivity Status[2]**	**Occurrence [3]**
Fish			
Leatherside chub	*Gila copei*	G3G4/S2, NSS1	Likely
Roundtail chub	*Gila robusta*	G2G3/S2?, NSS1	Likely
Bluehead sucker	*Catostomus discobolus*	G4/S2S3, NSS1	Likely
Flannelmouth sucker	*Catostomus latipinnis*	G3G4/S3, NSS1	Likely
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	R2/R4, G4T2T3/S2, NSS2	Likely
Fine-spotted Snake River cutthroat trout	*Oncorhynchus clarki spp*	G4T1T2Q/S1, NSS4	Likely
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*	G4T2/S2, NSS3	Unlikely

[1] - Source: USDI-BLM (2002)
[2] - Definition of status
[3] - Occurrence likelihood based upon presence of suitable habitat and recorded locations from the WYNDD (WYNDD 2005), WOS (WGFD 2005) Jonah Infill Drilling
Project EIS (USDI-BLM 2005), Seedskadee National Wildlife Refuge species list (USDI-FWS 2002) and HWA surveys.

G Global rank: Rank refers to the range-wide status of a species.
T Trinomial rank: Rank refers to the range-wide status of a subspecies or variety.
S State rank: Rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.
1 Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.
2 Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
3 Rare or local throughout its range or found locally in a restricted range (usually known from 21-100 occurrences).
4 Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
5 Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.
H Known only from historical records. 1950 is the cutoff for plants; 1970 is the cutoff date for animals.
X Believed to be extinct.
A Accidental or vagrant: A taxon that is not known to regularly breed in the state or which appears very infrequently (typically refers to birds and bats).
B Breeding rank: A state rank modifier indicating the status of a migratory species during the breeding season (used mostly for migratory birds and bats)
N Nonbreeding rank: A state rank modifier indicating the status of a migratory species during the non-breeding season (used mostly for migratory birds and bats)
ZN or ZB Taxa that are not of significant concern in Wyoming during breeding (ZB) or non-breeding (ZN) seasons. Such taxa often are not encountered in the same locations from year to year.
U Possibly in peril, but status uncertain; more information is needed.
Q Questions exist regarding the taxonomic validity of a species, subspecies, or variety.
? Questions exist regarding the assigned G, T, or S rank of a taxon.
R2 Designated sensitive in U.S. Forest Service Region 2 (Rocky Mountain Region).
R4 Designated sensitive in U.S. Forest Service Region 4 (Intermountain Region).

WGFD Native Species Status Codes - Fish and Amphibians

NSS1 - Populations are physically isolated and/or exist at extremely low densities throughout range. Habitats are declining or vulnerable. Extirpation appears possible. The Wyoming Game and Fish Commission mitigation category for Status 1 species is AVital@. The mitigation objective for this resource category is to realize "no loss of habitat function". Under these guidelines, it will be very important that the project be conducted in a manner that avoids alteration of habitat function.
NSS2 - Populations are physically isolated and/or exist at extremely low densities throughout range. Habitat conditions appear to be stable. The Wyoming Game and Fish Commission mitigation category for Status 2 species is also "Vital". The mitigation objective for this resource category is to realize "no loss of habitat function". Under these guidelines, it will be very important that the project be conducted in a manner that avoids alteration of habitat function.
NSS3 - Populations are widely distributed throughout its native range and appear stable. However, habitats are declining or vulnerable. The Wyoming Game and Fish Commission mitigation category for Status 3 species is "High". The mitigation objective

for this resource category is to realize "no net loss of habitat function within the biological community which encompasses the project site". Under these guidelines, it will be important that the project be conducted in a manner that either avoids the impact, enhances similar habitat or results in the creation of an equal amount of similarly valued fishery habitat.

NSS4-7 - Populations are widely distributed throughout native range and are stable or expanding. Habitats are also stable. There is no special concern for these species.

WGFD Native Species Status Codes - Birds and Mammals

NSS1 - Populations are greatly restricted or declining, extirpation appears possible. AND On-going significant loss of habitat.

NSS2 - Populations are declining, extirpation appears possible; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance. OR Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; ongoing significant loss of habitat.

NSS3 - Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance. OR Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance. OR Species is widely distributed; population status or trends are unknown but are suspected to be stable; on-going significant loss of habitat.

NSS4 - Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance. OR Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance.

NSS5 - Populations are declining or restricted in numbers and/or distribution, extirpation is not imminent; habitat is stable and not restricted. OR Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance.

NSS6 - Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is stable and not restricted.

NSS7 - Populations are stable or increasing and not restricted in numbers and/or distribution; habitat is stable and not restricted.

Surveys were conducted by HWA within the KFO during January and February of 2006 to identify and map potential pygmy rabbit habitat within ¼-mile of the proposed development. Additional surveys will be conducted in the PFO prior to the beginning of construction. Within the KFO, 1,276 acres of suitable pygmy habitat are delineated within ¼-mile of the BTOPA, consisting of 506 distinct habitat patches ranging in size from <0.1 acres to 74.5 acres (Figure 3-3). Of the 506 habitat patches, 336 were confirmed as occupied by direct observation of rabbits (63 sightings) or the presence of recent sign (recent pellets, active burrows, and tracks) (Figure 3-3). The surveys conducted in 2006 indicate that pygmy rabbit sign is abundant and widespread in mature dense sagebrush patches in the KFO. Habitat patches are generally located on leeward slopes, along the bottom edges of steeper slopes, and along drainage bottoms; however remnant sage brush habitat along previously disturbed and appropriately reclaimed pipeline corridors was consistently occupied by the species.

White-tailed Prairie Dog. Much of the western half of Wyoming is occupied by white-tailed prairie dogs (Cerovski et al. 2004). They occur in grassland, open shrubland, and semi-desert grassland communities (Clark and Stromberg 1987, Fitzgerald et al. 1994). Colonies of white-tailed prairie dogs may reach several hundred hectares in size, although they are usually much smaller. Population densities vary between and among years and sites, ranging from 0.8 to 12.6 animals per hectare during to a four-year study of six sites in Wyoming (Menkens and Anderson 1989). White-tailed prairie dogs are known to occur and breed on the project area. Thirteen white-tailed prairie dog colonies have been documented on or adjacent to the BTOPA in the Jonah Field (USDI-BLM 2005) and the area south and southwest of Fontenelle Reservoir (USDI-BLM 1995). These colonies were mapped during different years, and thus, the status and boundaries may have changed.

Idaho Pocket Gopher. In Wyoming, Idaho pocket gophers occur only in the southwestern corner of the state (Clark and Stromberg 1987, Cerovski et al. 2004). They are known to closely

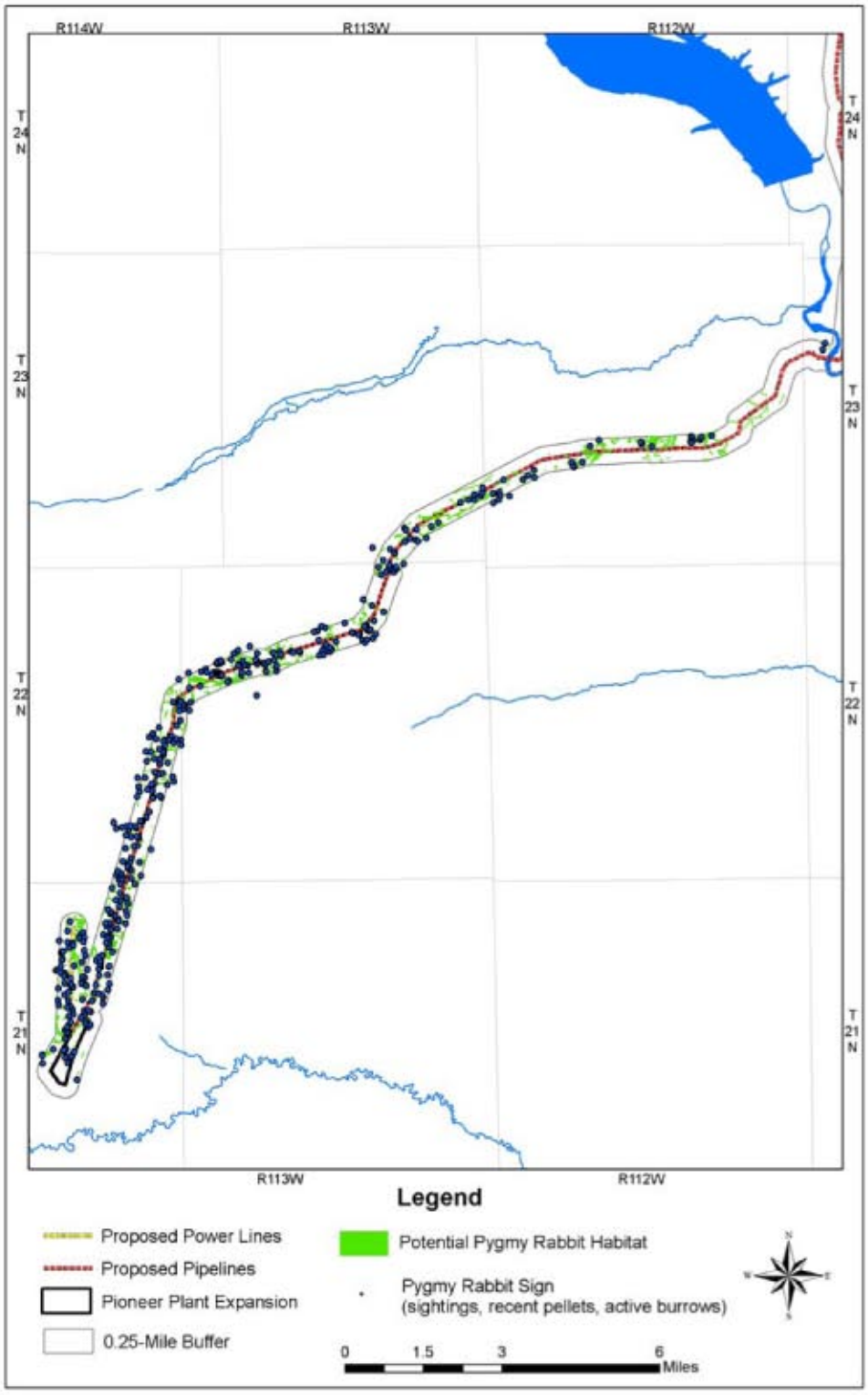


Figure 3-3. Pygmy rabbit habitat, observations, and recent sign (fresh pellets or active burrows) within a quarter-mile of the Bridger to Opal Natural Gas Project, Kemmerer Field Office area.

coexist with the sympatric northern pocket gophers, sometimes only separated by a few meters, near Fort Bridger, Wyoming. In areas where the two species coincide, the much smaller Idaho pocket gopher tends to inhabit soils that are shallower and rockier, whereas the northern pocket gopher prefers deeper soils that are largely free of rocks and stones. Little is known about the specific dietary habits of Idaho pocket gophers in Wyoming, but forbs and grasses likely comprise the majority of their diet (Clark and Stomberg 1987).

In Wyoming, the distribution and habitat requirements of this species are poorly understood. Only historical records exist for Idaho pocket gophers in the vicinity of the BTOPA (Cerovski et al. 2004). However, the species was recently recorded in the Jonah Field near the north end of the BTOPA (USDI-BLM 2005). It is unlikely but possible, therefore, that Idaho pocket gophers occur in the area of proposed development.

3.8.1.2 Birds

Mountain Plover. Due to long term declines, the mountain plover was listed as a Candidate Species under the ESA in 1993 and was proposed for federal listing as threatened in 1999. In 2003, however, the USFWS removed the mountain plover from Candidate status (*Federal Register,* September 9, 2003, 68[174]: 53083-53101).

The mountain plover primarily utilizes open and relatively flat grasslands, and the species is often associated with short-grass prairie and prairie dog towns. Nesting habitat is restricted to sites with bare ground or low vegetation (<4 inches), including areas of surface disturbance such as those with heavy cattle grazing, unnatural clearings, and/or plowed fields (Knopf 1996). Mountain plovers feed primarily on invertebrates in areas of short (<2 cm) vegetation with interstices of bare ground or disturbed ground surface (e.g., prairie dog towns, heavy sheep or cattle-grazed areas, dirt or gravel roads, and recently plowed or fallow fields) (Knopf 1996). HWA mapped potential plover habitat in the KFO portion of the project during January and February, 2006. Three hundred forty patches of potential habitat were found totaling 658.3 acres within 0.25 miles of the BTOPA. Habitat patches ranged in size from 0.42 to 125.9 acres (Figure 3-4). Additional habitat mapping will be conducted in the PFO, along with mountain plover presence/absence surveys in all potential habitat within 0.25 miles of the proposed development prior to construction.

Fifteen individual sightings of mountain plover were recorded during 1994 in the Expanded Moxa Arch Analysis area, one of which was within six miles of the proposed pipeline route (HWA 1994), and two individuals were seen in 1999 at separate locations approximately five miles south of the proposed pipeline within the KFO (WYNDD 2005). At least two additional records exist within six miles of the project (WGFD 2005d). Several additional mountain plover sightings are known for the Jonah Field near the north end of the BTOPA (USDI-BLM 2005). Although not common, mountain plover are expected to occur and likely breed on or near the BTOPA.

Sage Sparrow. The sage sparrow prefers semi-open habitats with evenly spaced shrubs 1-2 meters high. Although closely associated with Wyoming big sagebrush, the sage sparrow will utilize sagebrush communities interspersed with other shrub species, such as bitterbrush (*Purshia tridentata*), saltbush (*Atriplex* spp.), shadescale (*Atriplex confertifolia*), rabbitbrush (*Chrysothamnus* spp.), or greasewood (*Sarcobatus vermiculatus*) (Martin and Carlson 1998). Sage sparrows nest in shrubs up to one meter high and require a large block of unfragmented habitat to breed successfully (Cerovski et al. 2001).

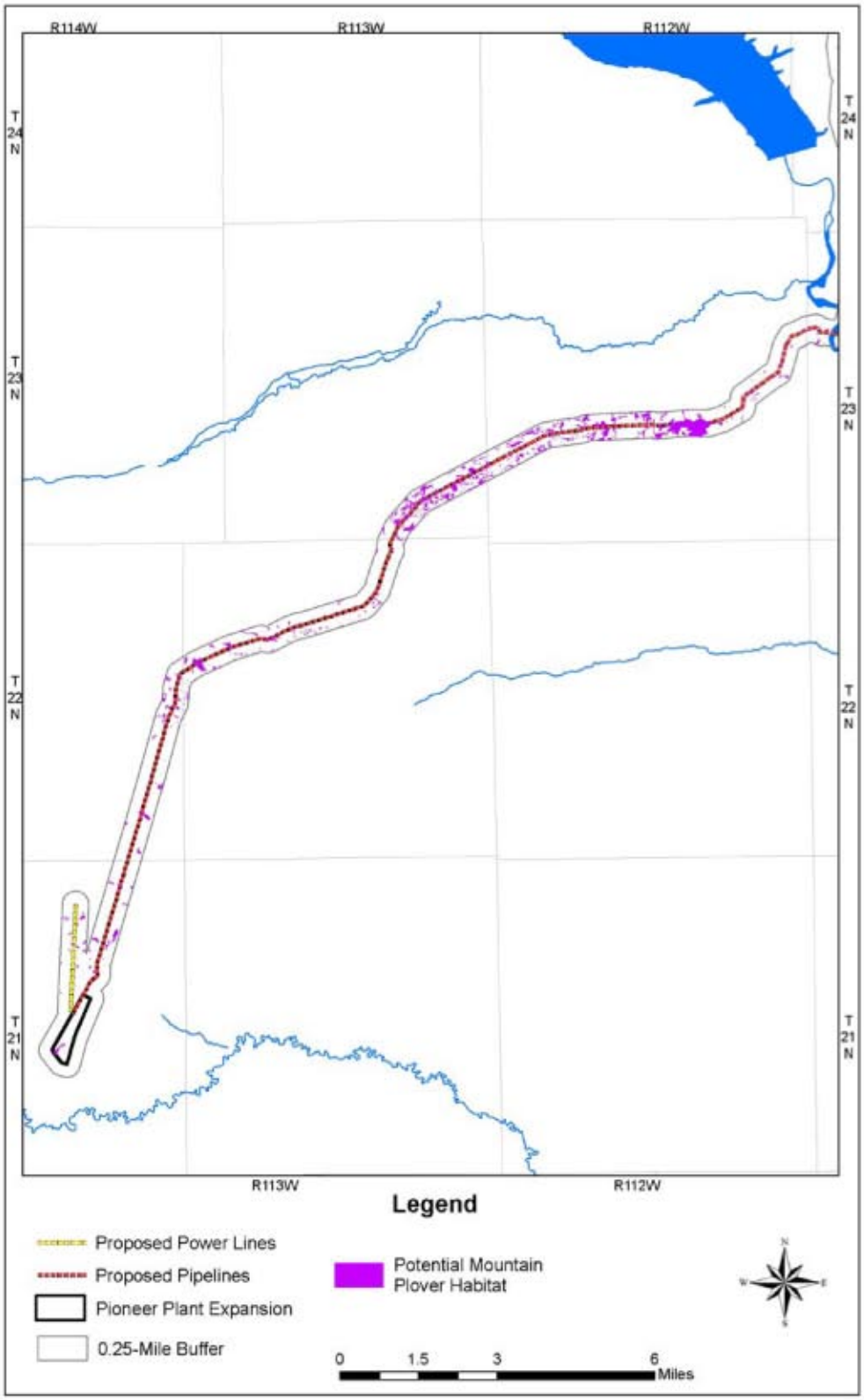


Figure 3-4. Potential mountain plover habitat within a quarter-mile of the Bridger to Opal Natural Gas Project, Kemmerer Field Office area.

There are over 20 records of sage sparrows documented in the Jonah Field area in the vicinity of the north end of the BTOPA (WYNDD 2005). Sage sparrows have also been recorded on the SNWR (USDI-FWS 2002). The project corridor is dominated by sagebrush communities that may be suitable for sage sparrows, and it is likely that breeding populations of sage sparrows occur in the BTOPA.

Brewer's Sparrow. Brewer's sparrows inhabit prairie and foothill scrublands where sagebrush is present. They are common summer residents of suitable habitats in Wyoming. Brewer's sparrow is a sagebrush obligate species that nests in live sagebrush or on the ground at the base of a live sagebrush shrub (Nicholoff 2003). Brewer's sparrows are neotropical migrants that summer in North America and winter in Central or South America. They feed on insects and seeds gleaned from the ground (Nicholoff 2003). Numerous Brewer's sparrows were recorded on Breeding Bird Surveys in the general area (within 6-10 miles) during the 1980s and 1990s, but exact locations were unknown (WYNDD 2005). In 2002, Brewer's sparrows were recorded at two locations within one mile of the BTOPA in the Jonah Field, and the species has been observed at SNWR (USDI-FWS 2002). Therefore, it is likely that breeding populations of Brewer's sparrows occur in the sagebrush/grassland habitats within the proposed project corridor.

Long-billed Curlew. Long-billed curlews prefer to nest in arid regions of grassland and shrub habitats of the western plains. Curlews build their nests in shallow scrapes on the ground, and although they may nest several kilometers from water, nests are usually located within close proximity to open lakes and sloughs (Dinsmore 1983). In Wyoming, it is an uncommon summer resident but may be locally common in suitable habitat (Dorn and Dorn 1999, Cerovski et al. 2001). There have been at least seven records of long-billed curlews in the vicinity (within 6-10 miles) of the proposed project, but none within one mile of the BTOPA. Most known records were south of the project corridor around the SNWR (WYNDD 2005), although the species was also observed in the Jonah Field area (USDI-BLM 2005). Long-billed curlews could potentially occur on or near the project corridor.

Sage Thrasher. The sage thrasher generally occurs within shrub-dominated valleys and plains of the western United States and is considered a sagebrush (*Artemesia* spp.) obligate. Insects are the primary food source and foraging occurs almost exclusively on the ground. For successful breeding, the sage thrasher requires large patches of sagebrush steppe habitat and typically nests in taller shrubs with wider crowns (Reynolds et al. 1999). At least 10 sightings of sage thrashers have occurred within six miles of the project area (WGFD 2005, WYNDD 2005). The project area is dominated by sagebrush habitat that may be suitable for sage thrashers, sage thrashers are likely to occur on the BTOPA.

Burrowing Owl. The burrowing owl is a summer resident on the plains over much of Wyoming and usually arrives on its breeding grounds from late March to mid-April (Johnsgard 1986, Haug et al. 1993). The species is associated with dry, open habitat that has short vegetation and contains an abundance of burrows (Thomsen 1971, Wedgwood 1978, Haug et al. 1993). In Wyoming, prairie dog burrows are the most important source of burrowing owl nest sites. Burrowing owl use of abandoned prairie dog towns is minimal, and active prairie dog towns are their primary habitat (Butts 1973). Destruction of burrowing mammal habitat that the birds depend on, pesticides, predators, and vehicle collisions have all combined to cause a decline in burrowing owl numbers (Haug et al. 1993). Ten burrowing owl observations have been documented within six miles of the project area, four of which were within one mile of the

proposed pipeline route (WGFD 2005d, WYNDD 2005). Considering that the proposed pipelines intersect numerous white-tailed prairie dog colonies, nesting burrowing owls are likely to occur along the BTOPA.

Loggerhead Shrike. The loggerhead shrike is a small avian predator that hunts from perches and impales its prey on thorns, barbed wire fences, and other sharp objects (Yosef 1996). It prefers open country in close proximity to brushy areas containing trees or shrubs taller than six feet for nesting (Dinsmore 1983). It breeds in basin-prairie shrublands, sagebrush grasslands, mountain-foothills shrublands, pine-juniper woodlands, and woodland chaparral. Nests are located 1-5 feet above the ground regardless of shrub height. The loggerhead shrike feeds primarily on grasshoppers and other large insects, although some small mammals and birds are also taken. Areas of low vegetation or bare ground are preferred foraging habitat (Cerovski et al. 2001). Ten loggerhead shrike records exist for the general area (within 6-10 miles) surrounding the project, and at least five sightings were within six miles of the proposed pipeline route (WGFD 2005d, WYNDD 2005). Much of the habitat within the project may be suitable for shrikes and, thus, shrikes are likely to occur within the project area.

Greater Sage-grouse. In response to petitions to list the greater sage-grouse under the ESA, the FWS conducted a status review of this species throughout its range. On January 7, 2005, the FWS determined that it did not warrant protection under the ESA; however, Steve Williams, FWS Director, stated, "… the status review clearly illustrates the need for continued efforts to conserve sage-grouse and sagebrush habitats on a long-term basis." Greater sage-grouse populations in Wyoming have stabilized in recent years and are hunted in some areas of Wyoming, including the area around the BTOPA. Because of continuing modifications of sagebrush habitats from fire, chemical and mechanical treatments, and development, the need exists to minimize loss of nesting habitat and to conserve and improve sage-grouse habitats through careful management. Sage-grouse exhibit site fidelity to leks, winter areas, summer areas, and nesting areas (Eng 1963, Dunn and Braun 1985); therefore, impacts to these areas should be minimized.

The project area is located within the extensive sagebrush steppe habitat of southern Wyoming. Twenty two sightings of greater sage-grouse within two miles of the project area have been recorded (WYNDD 2005, WGFD 2004a, 2005), and during surveys conducted by HWA in the KFO portion of the BTOPA, three greater sage-grouse sightings and twenty-six observations of sign (tracks, droppings, feathers) were recorded (HWA unpublished data) (Figure 3-5).

According to Call (1974), Braun et al. (1977), and Hayden-Wing et al. (1986), approximately 50 percent of nests are located within two miles of the breeding lek. Locations of known sage-grouse leks were obtained from the BLM's KFO and from the WGFD. Nine occupied, eight unknown status, and six unoccupied leks are located within two miles of the proposed pipeline and power lines (Figure 3-6). Occupied leks have been active during at least one strutting season within the last ten years, and all nine of the occupied leks within two miles of the project area have been active within at least one of the past five years. Unknown status leks are treated as occupied for management purposes and for further analyses in this document. Under the Proposed Action, 37.1 miles of the proposed pipelines and 4.7 miles of power line would occur within two-mile lek buffers around occupied or unknown status leks. Surface disturbing activities within a two-mile radius of active leks would be restricted between March 15 and July 15 to provide protection for grouse during the egg-laying and incubation period. Exceptions may be granted if the activity is to occur in unsuitable nesting habitat. Within a ¼-

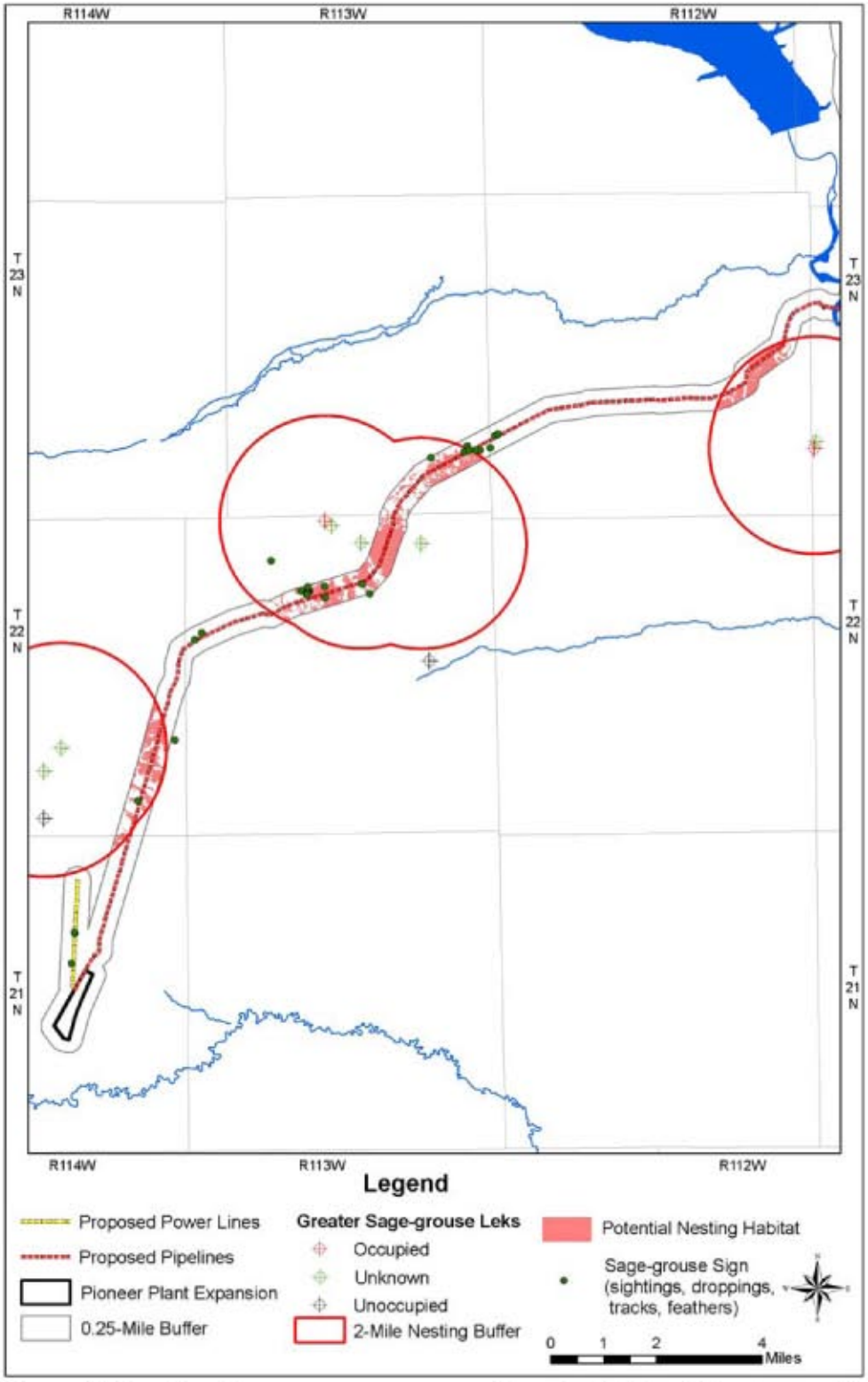


Figure 3-5. Greater sage-grouse nesting habitat within two miles of occupied or unknown leks and within a quarter-mile of the Bridger to Opal Natural Gas Project and observations and sign in the Kemmerer Field Office area, 2006

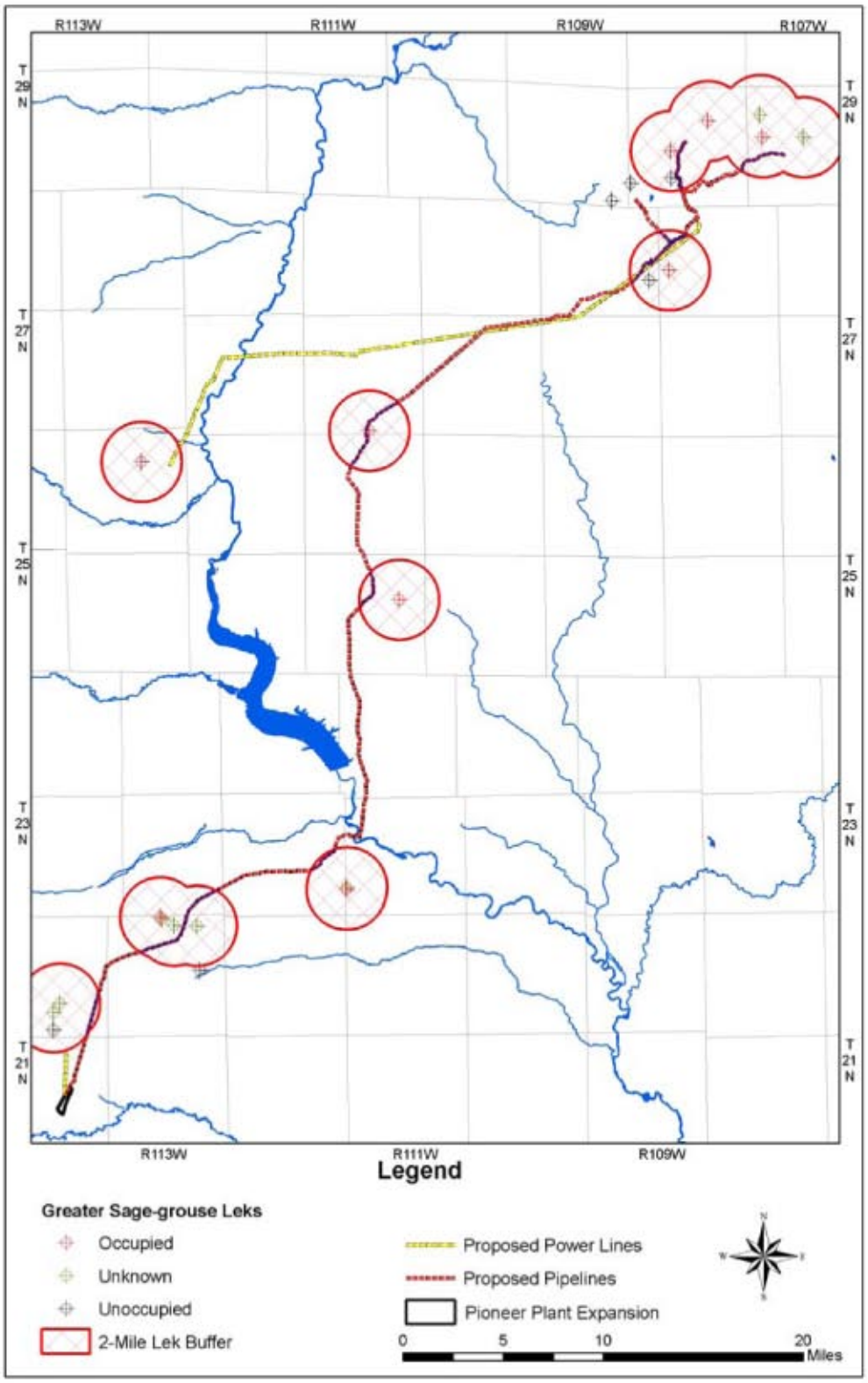


Figure 3-6. Greater sage-grouse leks within two miles of the Bridger to Opal Natural Gas Project.

mile radius of active leks, surface occupancy or disturbance would be restricted between 2000 hrs and 0800 hrs from March 1 to May 15.

In Wyoming greater sage-grouse typically nest under sagebrush, selecting mid-height and relatively dense sagebrush stands compared to surrounding vegetation (Wyoming Sage Grouse Working Group (WSGWG) 2003). The WSGWG identifies stands with the following characteristics as important nesting habitat: sagebrush canopy cover from 6-40 percent, sagebrush height from 8-32 inches, dense residual grasses at least as tall as the bottom of the canopy on mid-height sagebrush plants, and diverse forb understory (WSGWG 2003). Surveys were conducted within the KFO during January and February of 2006 within 0.25 miles of the proposed pipelines and power lines to identify potential sage-grouse nesting habitat portion of the project that occurs within two miles of occupied or unknown leks. Additional surveys will be conducted in the PFO prior to the beginning of construction. Within the KFO and within two miles of active or unknown status leks, a total of 1,501 acres of potential nesting habitat was identified within the ¼-mile project area buffer (Figure 3-5).

White-faced Ibis. The white-faced ibis is a medium-sized colonial wading bird occurring throughout much of the Great Basin and Rocky Mountain region and along the Louisiana-Texas coast into Mexico. White-faced ibises breed in colonies ranging from a few to several thousand birds in freshwater marshes from eastern Oregon, sporadically across to North Dakota, and south into parts of Kansas and Colorado. They winter in the southwestern U.S. and Mexico. Feeding habitat, consisting of extensive marshes, ponds, or rivers, overlaps considerably with nesting habitat. White-faced ibis colonies are always associated with shallow water habitats (Erwin 1983). White-faced ibis have been documented on Fontenelle Reservoir and in SNWR (USDI-FWS 2002, WYNDD 2005). Therefore, there is a slight potential that they may occur within wetland and riparian areas near the project area, but suitable habitat is limited in the BTOPA.

Trumpeter Swan. Trumpeter swans nest in a wide variety of freshwater habitats, including marshes, ponds, lakes, and occasionally rivers (Banko 1960, Mitchell 1994). Basic nesting habitat parameters include: (1) room for taking flight (approximately 100 m), (2) accessible forage, (3) shallow and stable levels of unpolluted fresh water, (4) emergent vegetation, muskrat (*Ondatra zibethicus*) mounds, islands, or other structures for nest sites, and (5) low human disturbance (Mitchell 1994). Productivity is greatest in breeding habitats with abundant invertebrate populations (Lockman et al. 1987) and/or macrophitic vegetation (Squires 1991). In western Wyoming, 18 swan pairs hatched 42 young in 2005, including eight pairs in the upper Green River area (WGFDe 2005). Five nests were located at the nearby Seedskadee NWR. Most of the trumpeter swans that nest in the upper Green River Basin are year-round residents that winter in sections of the Green River that remain unfrozen, including the section from Fontenelle Dam downriver approximately 20 miles (pers. com. L. Glass, Wildlife Biologist, Seedskadee NWR). During winter, as many as 80 swans have occurred in the section of river south of Fontenelle Dam, including the location where the pipeline crosses the river. Since swans occur year-round along the entire section where the proposed power line and pipeline will cross the Green River, trumpeter swans are likely to occur within the project area. However, swans would occur only where the pipeline and power line crosses the Green River.

Peregrine Falcon. Peregrine falcons normally nest on cliff faces 200 to 300 feet high, although cliffs as high as 2,100 feet have been used (USDI-FWS 1984). An available prey base of shorebirds, waterfowl, and/or small-to-medium sized terrestrial birds usually occurs within ten miles of the nest site; however, nesting peregrines may hunt up to 17 miles from their aerie to

locate prey. Wetlands and riparian zones as well as open meadows, parklands, croplands, lakes and gorges are potential habitats in which prey species are found and hunted by peregrines (USDI-FWS 1984). Peregrine falcons have been observed at SNWR just south of the BTOPA (USDI-FWS 2002); however, no peregrine falcon nests are known to occur on or near the project area.

Ferruginous Hawk. Throughout their range, ferruginous hawks have been found nesting on a wide variety of substrates (Evans 1983). In Utah for example, ferruginous hawks nested on junipers, pinon pines, cottonwoods, on the ground, on low hills and knolls, on low cliffs, and on artificial structures (Smith and Murphy 1978). Generally, this species nests in extremely open habitats with high visibility, and is considered to be more sensitive to human disturbance than most other raptor species (Suter and Joness 1981, Taylor 1988).

Fourteen ferruginous hawk nests over the past 12 years have been located within one mile of the BTOPA (HWA and BLM, unpubl. data). The status, condition, and last year of activity, is unknown for all of these nests. Three additional nests were documented within one mile of the planned development during preliminary surveys in the KFO during January and February, 2006 (HWA, unpubl. data) (Figure 3-7). Of these, two were in poor condition with no sign of recent breeding activity, and one was in excellent condition with extensive evidence of recent breeding activity. Therefore, the species is known to occur and likely breed in the vicinity of the BTOPA (USDI-BLM 2005, WYNND 2005).

Northern Goshawk. Goshawks are primarily a bird of dense, mature timbered stands although they occasionally hunt in open meadows near mature forest. Since no coniferous forest exists within one mile of the proposed power line or pipeline, northern goshawks are unlikely to breed within or near the project area. Northern goshawks have been observed near the project area (within six miles), but only during the non-breeding season and along the Green River riparian zone (USDI-FWS 2002, WYNDD 2005).

3.8.1.3 Amphibians

Boreal Toad. The boreal toad occurs from Alaska to northern New Mexico extending from the Rocky Mountains west to the Pacific Coast. In Wyoming, the boreal toad is a common resident of wet areas in foothills, montane, and subalpine zones from 8,000 to 11,000 feet above sea level (Cerovski et. al 2004). The entire BTOPA is less than 7400 feet in elevation suggesting that the species is unlikely to be found on the project area.

Northern Leopard Frog. The northern leopard frog usually inhabits areas in or near permanent water with aquatic vegetation and is found in a wide variety of environments including deserts, plains, woodlands and mountain meadows. Its range is throughout central North America extending east to the Atlantic Ocean. It is generally found north of the 40th parallel. In 2002, the BLM conducted a survey for northern leopard frogs west of the BTOPA along La Barge Creek, and no northern leopard frogs were observed. However, the species has been recorded on the nearby Seedskadee NWR (USDI-FWS 2002), and is considered a common resident throughout Wyoming (Cerovski et al. 2004). Therefore, this species may occur within suitable habitats in the vicinity of the BTOPA.

Spotted Frog. Spotted frog habitat consists of fishless oxbow ponds with emergent sedges (*Carex* sp.) located in wet meadows at the edge of lodgepole pine (*Pinus contorta*) forest. The

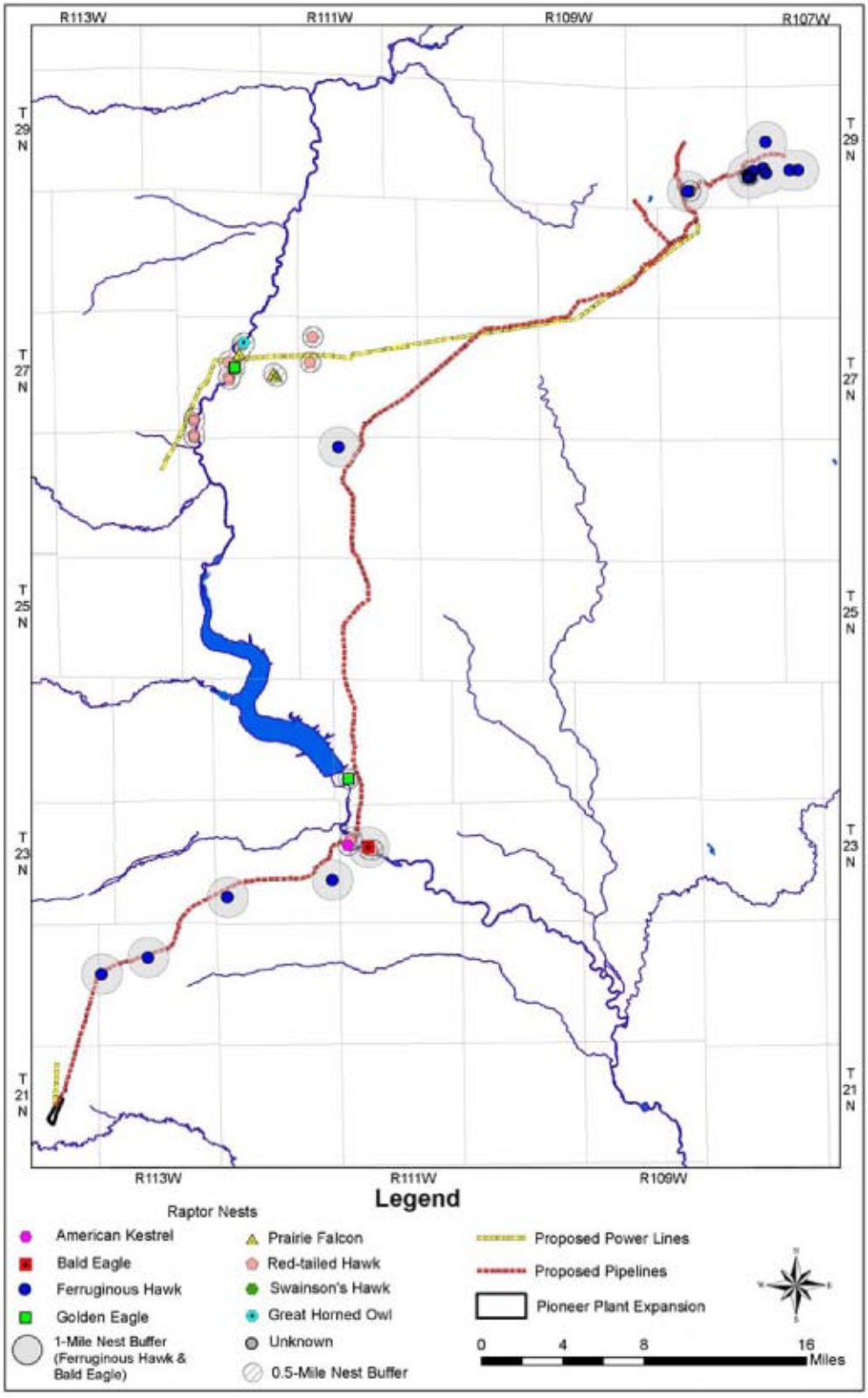


Figure 3-7. Previously documented raptor nests within one mile of the Bridger to Opal Project.

spotted frog has not been found within the project area (WYNDD 2005, WGFD 2005d) and suitable habitat for the spotted frog does not occur along the BTOPA.

3.8.1.4 Fish

Fish species that are not listed as endangered or threatened by the FWS, but that may be rare or declining in the state in the future, have been included on the BLM Wyoming Sensitive Species List (USDI-BLM 2002). Eight sensitive fish species occur within the Kemmerer, Pinedale, and Rock Springs Field Office areas (Table 3-8). These include: leatherside chub (*Gila copei*), roundtail chub (*Gila robusta*), bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*Catostomus latipinnis*), Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), fine-spotted Snake River cutthroat trout (*Oncorhynchus clarki spp.*), and Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*). The Yellowstone cutthroat trout inhabit drainage basins outside of the BTOPA (the Snake River and Yellowstone River drainages, respectively) and is not discussed further. The fine-spotted cutthroat trout is present in the Green River, but is outside of its historic range (Snake River Drainage).

Leatherside Chub. This species occurs in the Bonneville Basin and in the upper Snake River. In Wyoming, it is found in Sulphur Creek and Bear River in Uinta County, Pacific Creek in Teton County, and the North Fork of Slate Creek in the Green River Drainage in Lincoln County (Baxter and Stone 1995). It is found in rocky flowing pools and sometimes riffles of cold creeks and small to medium rivers (NatureServe 2005). Although the species is not known to occur, within the proposed project (USDI-FWS 2002, WYNDD 2005), occurrence where the project crosses the Green River is possible.

Roundtail Chub. The roundtail chub is restricted to the Colorado River drainage, and it is common in the Green River and Little Snake River drainages (Baxter and Stone 1995). This species inhabits creeks, small to large rivers, and occasionally reservoirs or lakes (NatureServe 2005). It is also found in Burnt Lake near Pinedale (Baxter and Stone 1995). Roundtail chub have been recorded just below Fontenelle Reservoir near the location of the proposed pipeline (WYNDD 2005) and in SNWR (USDI-FWS 2002). Therefore, the species is likely to occur near the BTOPA, but it would be limited to the location where the proposed pipeline would cross the Green River.

Bluehead Sucker. In Wyoming, the bluehead sucker is found in the Little Snake, Green, Bear, and Snake River drainages, and it was common in the Green River near Big Piney in 1963 (Baxter and Stone 1995). It is usually found in large rivers and mountain streams, seldom in lakes. There are several records below Fontenelle Reservoir near the location of the proposed pipeline (WYNDD 2005) and in SNWR just downriver (USDI-FWS 2002). Therefore, the species may occur near the BTOPA where the proposed pipeline would cross the Green River.

Flannelmouth Sucker. This species occurs in the Green and Little Snake river drainages (Baxter and Stone 1995). It inhabits moderate to large rivers absent from impoundments and is rarely found in small creeks or lakes. There are at least two records below Fontenelle Reservoir near the location of the proposed pipeline (WYNDD 2005), and the species has been documented at SNWR just downriver from the project (USDI-FWS 2002). Therefore, the species possibly occurs near the BTOPA, but it would be limited to the location where the proposed pipeline would cross the Green River.

Colorado River Cutthroat Trout. The Colorado River cutthroat trout is the only trout species native to the Colorado River system. Colorado River cutthroat trout are found in relatively silt free cool mountain streams requiring cobble, pebble, and relatively moderate stream gradients to spawn. The cutthroat has a tendency to interbreed and be out competed for favorable habitat. Populations of Colorado River cutthroat trout occur in numerous headwater streams that are tributaries of the Green River, but no populations are known to occur in the streams or the section of the Green River affected by the proposed project (USDI-FWS 2002, WGFD 2005, WYNDD 2005). Nevertheless, trout may occur within the main stem of the Green River during dispersal and, therefore, may occur near the project.

3.8.1.5 Plants

Plant species of special concern include:

- Those listed by the FWS as endangered (E), threatened (T), proposed for listing (P) or candidates for listing (C) under the Endangered Species Act (ESA) of 1973, as amended (see Section 3.8.2.4);
- BLM sensitive species (USDI BLM Wyoming 2002);
- Forest Service (USDA FS) sensitive species;
- Wyoming Game and Fish Department (WGFD) special concern species; and
- Certain plant species designated as "rare" by the Nature Conservancy and the Wyoming Natural Diversity Database (WYNDD).

Fourteen Wyoming sensitive plant species of concern are known to occur or have the potential to occur on or near the BTOPA. When land area of all affected counties (Lincoln, Sublette, and Sweetwater) is considered, an additional thirteen species may be included for a total of 27 Wyoming sensitive plant species of concern (WYNDD 2005).

Seven of these plant species of concern are globally imperiled (G2 or T2 ranks). Five of these seven (71%) are also designated as sensitive species by the BLM. Among the other species, *Phlox opalensis* (Opal phlox) is a state endemic that has one of its largest known populations in the vicinity of the project area on the Opal Bench. This species is on the WYNDD "Watch" list (WYNDD 2005).

A summary of Natural Heritage status, habitat associations, and potential for occurrence for the twenty-seven species is shown in Table 3-14.

Table 3-14. Wyoming BLM Special Status Plants and WYNDD Species of Concern with Potential to Occur on the Jonah Bridger to Opal Project Area .[A]

Common Name	Scientific Name	Status[B]	Habitat	O.P.[C]
WYBLM SS Plants with Known Occurrence in Project Area[d]				
Trelease's milkvetch	*Astragalus racemosus* var. *treleasei*	G5T2/S1 WY BLM SSL	Primarily in sparsely-vegetated outwash flats and fluted Badlands at 6,500 to 7,500 ft. on pale whitish or somber gray silty soils derived from shales associated with the Eocene paleolakes, Lake Gosiute and Lake Uinta.	Likely
Cedar Rim thistle	*Cirsium aridum*	G2Q/S2 WY BLM SSL	Barren, chalky hills, gravelly slopes and fine-textured, sandy-shaley draws 6700 to 7200'	Likely
Large-fruited bladderpod	*Lesquerella fremontimacrocarpa*	G2/S2 WY BLM SSL	Gypsum-clay hills and benches, clay flats & barren hill at 7,200 to 7,700 ft.	Likely
Beaver Rim phlox	*Phlox pungens*	G2/S2 WY BLM SSL	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrate 6000 to 7600'	Likely
Tufted twinpod	*Physaria condensatecondensata*	G2/S2 WY BLM SSL	Dry, rocky, calcareous knolls and ridges, clay banks, and shaley hills in sparsely vegetated cushion plant communities in openings within sagebrush grassland at 6,700 to 7,400 ft.	Likely
WYBLM SS Plants by Field Office Management Area but not Known to Occur in Project Area				
Meadow pussytoes	*Antennaria arcuata*	G5/S2 RSFO PFO	Moist, hummocky meadows, seep, or springs surrounded by sage/grassland 4,950 to 7,900	Unlikely
Small Rock Cress	*Arabis pusilla*	G1/S! RSFO	Cracks/crevices in sparsely vegetated granite/pegmatite outcrops within sage/grasslands 8,000 to 8,100 ft.,	Unlikely
Mystery wormwood	*Artemisia biennis* var. *diffusa*	G5T1/S1 RSFO(?)	Dry, rocky, calcareous knolls and ridges, clay banks, and shaley hills in sparsely vegetated cushion plant communities in openings within sagebrush grassland at 6,700 to 7,400 ft.	Unlikely
Nelson's milkvetch	*Astragalus nelsonianus*	G2/S2 RSFO	Alkaline clay flats, shale bluffs and gullies, pebbly slopes and volcanic cinders in sparsely vegetated sagebrush, juniper, and cushion plant communities 5200 to 7600'	Unlikely
Precocious milkvetch	*Astragalus proimanthus*	G1/S1 RSFO	Cushion plant communities on rocky, clay soils mixed with shales on summits and slopes of white shale hills 6800 to 7200'	Unlikely
Ownsbey's thistle	*Cirsium ownbeyi*	G3/S2 RSFO	Sparsely vegetated shaley slopes in sage and juniper communities 6440 to 8400'	Unlikely
Wyoming tanseymustard	*Descurainia torulosa*	G1/S1 RSFO	Sparsely vegetated sandy slopes at base of cliffs or volcanic breccia or sandstone 8300 to 10000'	Unlikely
Entire-leaved peppergrass	*Lepidium integrifolium* var. *integrifolium*	G2T1?/S1 KFO	Wyoming populations occur in sparsely vegetated and seasonally wet clay flats, greasewood communities on clay hummocks, and moist alkaline meadows at 6,200 to 6,770 ft.	Unlikely
Western bladderpod	*Lesquerella multiceps*	G3/S1 KFO (?)	Dry, gravelly limestone ridges & slopes in sparse grasslands or cushion plant communities at 8,300 to 8,600 ft.	Unlikely
Prostrate bladderpod	*Lesquerella prostrata*	G3/S1 KFO	Cushion plant or sparse sage grassland communities on slopes and rims of whitish to reddish or gray limey clays & soft sandstones with a surface layer of fine gravel at 7,200 to 7,700 ft.	Unlikely

Common Name	Scientific Name	Status[B]	Habitat	O.P.[C]
WYBLM SS Plants by Field Office Management Area but not Known to Occur in Project Area				
Stemless beardtongue	*Penstemon acaulis* var*,. acaulis*	G3T2/S1 RSFO	Cushion plant or black sage grassland communities on semi-barren rocky ridges, knoll & slopes at 5,900 to 8,200 ft.	Unlikely
Dorn's twinpod	*Physaria dornii*	G1/S1 KFO	Dry, calcareous-shaley soils on slopes & ridges with /mountain mahogany & rabbitbrush at 6,500 to 7,200 ft.	Unlikely
Green River greenthread	*Thelesperma caespitosum*	G1/S1 RSFO	White shale slopes and ridges of Green River Formation 6300'	Unlikely
Cedar Mountain Easter daisy	*Townsendia microcephala*	G1/S1 RSFO	Rocky slopes of Bisop Conglomerate 8500'	Unlikely
Uinta greenthread	*Thelesperma pubescens*	G1/S1 RSFO FSR4	Sparsely vegetated benches and ridges on coarse, cobbly soils of Bishop Conglomerate 8500'	Unlikely
Wyoming Plant Species of Concern Known to Occur in Project Area				
Swallen's ricegrass	*Achnatherum swallenii*	G5/ S2	Moist, hummocky meadows, seep or spring, surrounded by sagebrush grasslands.	Likely
King's milkvetch	*Astragalus calycosus var. calycosus*	G5T4? S1S2	Habitat requirements and distribution status under current review.	Unlikely
Sickle saltbush	*Atriplex falcatefalcata*	G4Q/S2 WY BLM SSLL	Sagebrush-dominated mesas, draws, and gravel benches with sandy to clayey soils.	Likely
Divergent wild buckwheat	*Erigonum divaricatum*	G4G5 S1	Barren or semi-barren clay, shale, or sandstone slopes in cushion plant communities or on the fringes of sagebrush grasslands.	Likely
Wasatch biscuitroot	*Lomatium bicolor var. bicolor*	G4T3T4 S2	Habitat requirements and distribution status under current review.	Unlikely
Juniper prickly-pear	*Opuntia polyacanthia var. juniperina*	G5T3?Q S1	Sandy soils of flats, washes, and hillsides in desert scrub, grasslands, and open grassy flats in southern pinyon-juniper woodlands.	Unlikely
Contracted Indian ricegrass	*Oryzopsis contracta (Achnatherum contractum)*	G3G4 S3S4	Habitat requirements and distribution status under current review.	Unlikely
Desert glandular phacelia	*Phacella grandulosa glandulosa* var. *desereta*	G4T1T2 S1?	Status survey currently in progress.	Unlikely
Nelson's phacelia	*Phacella salina*	G3Q S1	Alkaline flats and clay slopes.	Likely
Opal phlox	*Phlox opalenesis*	G3/S3	Typically occurs in open desert shrub or cushion plant communities on fine=textures clay-shale flats, steep slopes, and rims.	Likely

[A] Source: USDI-BLM (2002), WYNDD (2005).
[B] See below.
[C] Occurrence Potential: Determined by Mr. Jim Glennon, Botanist, RSFO.

Definition of status:

G Global rank: Rank refers to the range-wide status of a species.
T Trinomial rank: Rank refers to the range-wide status of a subspecies or variety.
S State rank: Rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.
1 Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.
2 Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
3 Rare or local throughout its range or found locally in a restricted range (usually known from 21-100 occurrences).
4 Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
5 Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.
H Known only from historical records. 1950 is the cutoff for plants; 1970 is the cutoff date for animals.

X Believed to be extinct.
U Possibly in peril, but status uncertain; more information is needed.
Q Questions exist regarding the taxonomic validity of a species, subspecies, or variety.
? Questions exist regarding the assigned G, T, or S rank of a taxon.

3.8.2 Threatened, Endangered, Proposed, and Candidate Species

One mammal, two birds, four fish, and one plant species listed as either threatened, endangered, candidate or proposed under the ESA may potentially be found or be affected by activities conducted within the project (USDI-FWS 2005). These species and their federal status under the ESA are listed in Table 3-15. The black-footed ferret, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker are listed as endangered. The bald eagle, and Ute ladies'-tresses are listed as threatened and the yellow-billed cuckoo is a candidate for listing as endangered under the ESA. Four endangered fish species are downstream residents of the Colorado River System.

Table 3-15. Threatened, endangered, proposed, and candidate species potentially affected by or present on the Jonah Bridger to Opal Project.

Common Name	Scientific Name	Status
Humpback Chub	*Gila cypha*	Endangered
Bonytail	*Gila elegans*	Endangered
Colorado Pikeminnow	*Ptychocheilus lucius*	Endangered
Razorback Sucker	*Xyrauchen texanus*	Endangered
Black-footed Ferret	*Mustella nigripes*	Endangered
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Yellow-billed Cuckoo	*Coccyzus americanus*	Candidate
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened

Source: USDI-FWS 2005

3.8.2.1 Mammal Species

Black-footed Ferret. Black-footed ferrets inhabit the burrows of and feed almost exclusively on prairie dogs. Several historic sightings of black-footed ferrets have been documented within six miles of the proposed pipeline route (WYNDD 2005), and the black-footed ferret was found historically on the Seedskadee National Wildlife Refuge (USDI-FWS 2002). The last known wild population of black-footed ferrets was found near Meeteetse, Wyoming in 1981. The entire population was live trapped for use in a captive breeding and reintroduction program. At that time all known black-footed ferrets were in captivity.

Surveys of prairie dog towns conducted by HWA and other consulting firms within the Moxa prairie dog complex in recent years have not detected any sign of black-footed ferrets. Although no black-footed ferrets have been found in recent years, the size and burrow density of the colonies would be considered large enough to support ferrets.

On February 2, 2004, the U.S. FWS issued a letter stating that, in Wyoming, surveys for black-footed ferrets are no longer warranted in black-tailed prairie dog complexes and in many white-tailed prairie dog complexes, except for sixteen non-block cleared white-tailed prairie dog complexes (USDI-FWS 2004). One of these complexes, the Moxa Complex, is located along

the southern portion of the proposed pipeline. Extensive white-tailed prairie dog colonies occur within the Moxa Complex. White-tailed prairie dog colonies within the Moxa Complex would meet requirements for consideration as black-footed ferret habitat (Biggins et al. 1989). Development of the Proposed Action would likely result in direct disturbance of some portions of these prairie dog colonies. However, surveys for black-footed ferrets would be required prior to ground disturbing activities within prairie dog colonies located in the Moxa Complex. Surveys would be conducted according to U.S. FWS guidelines (USDI-FWS 1989). The remaining white-tailed prairie dog colonies along the pipeline that are outside of the Moxa Complex are in the "block clearance" area, where surveys for black-footed ferrets are no longer warranted. However, these towns located within the block-clearance area should be examined for their potential to provide habitat for relocation of black-footed ferrets. Several of the proposed suction pipelines located within the Jonah Field cross white-tailed prairie dog colonies. Although this area is in the "block clearance" area, the FWS believes that these colonies within the Jonah Field may be associated with the Big Piney prairie dog complex (USDI-FWS 2005), which is not block-cleared. As part of the FWS consultation process for the Final Jonah Infill Drilling Project EIS (USDI-FWS 2005), the FWS stated that "In the event that the Jonah Field prairie dog towns are within 4.3 miles of towns associated with the Big Piney complex then they should be considered part of that complex and additional information may be required before a decision on surveys for black-footed ferrets is made." Therefore, the BLM has requested that surveys for black-footed ferrets would be completed prior to ground disturbing activities within prairie dog colonies located in the Jonah Field.

3.8.2.2 Bird Species

Bald Eagle. Bald eagles typically build stick nests in the tops of coniferous or deciduous trees along streams, rivers, or lakes. Selection of nest sites likely depends upon availability of food in the early nesting season (Swenson et al. 1986). Wintering areas are typically associated with concentrations of food sources including major rivers that remain unfrozen where fish and waterfowl are available and ungulate winter ranges where carrion is available. Nesting and communal roosting habitat for bald eagles is limited within the project area to the riparian corridor along the Green River. There are no documented communal roosts near the project area, but one active (see section 3.7.1.5) bald eagle nest is located approximately 0.75 miles downstream of where the proposed pipeline would cross the Green River. A pair of bald eagles was observed tending the nest on January 10 and February 8, and an adult was seen perched on the nest in incubating position on February 22, 2006.

Yellow-billed Cuckoo. The yellow-billed cuckoo is a neotropical migrant that winters primarily in South America and migrates north into the United States during April and May. The yellow-billed cuckoo feeds primarily on large insects: caterpillars, katydids, cicadas, grasshoppers, and crickets. Occasionally small frogs, lizards, eggs, and young birds are eaten (Hughes 1999). It is a riparian obligate species that requires at least 25 acres of mature riparian woodland, especially cottonwood (*Populus* spp.) or willow (*Salix* spp.) with low, dense undergrowth at elevations below 7,000 feet. The cuckoo prefers 100 acres or more of deciduous woodland at least 100 meters wide. Marginal habitat is at least 10 acres of riparian habitat more than 50 meters in width. Nests are located less than 8 meters above the ground in at least 2.5 acres of dense deciduous vegetation near water (Cerovski et al. 2001). Suitable riparian area habitats for yellow-billed cuckoos are not found near the proposed pipeline and power line corridors. This species was observed on the southern portion of the Seedskadee National Wildlife Refuge in 2005, but nesting was not confirmed. Understory willow and cottonwood habitats near where

the pipeline will cross the Green River are not suitable for yellow-billed cuckoo nesting (pers. comm. L. Glass, FWS Biologist, Dec. 2005).

3.8.2.3 Fish Species

Four federally endangered fish species may occur as downstream residents of the Green and Colorado River system: bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) (USDI-FWS 2004). The Colorado pikeminnow, bonytail chub, and humpback chub are all members of the minnow family. The razorback sucker is a member of the sucker family. These four species share similar habitat requirements and historically occupied the same river systems. All four species are native to the Upper Colorado River Basin, where they were once abundant. Declines in populations of these species are mainly attributed to impacts of water development (e.g. dams and reservoirs) on natural temperature and flow regimes, creation of migration barriers, habitat fragmentation, the introduction of competitive and predatory non-native fishes, and the loss of inundated bottom lands and backwater areas (Minckley and Deacon 1991, USDI-FWS 1993). All drainages near the proposed project flow into the Green River, a tributary to the Colorado River. The Green River above Flaming Gorge Reservoir is no longer known to support populations of these species.

The last known occurrence of these four fish species in the Green River in Wyoming was prior to the filling of Flaming Gorge Reservoir in 1963. Habitat for these species is not present within the project area and critical habitat for these species has not been designated in Wyoming (Upper Colorado River Endangered Fish Recovery Program 1999).

Bonytail. Habitat of the bonytail is primarily limited to narrow, deep, canyon-bound rivers with swift currents and white water areas (Valdez and Clemmer 1982, Archer et al. 1985, Upper Colorado River Endangered Fish Recovery Program 1999). With no known reproducing populations in the wild today, the bonytail is thought to be the rarest of the endangered fishes in the Colorado River System.

The bonytail historically inhabited portions of the upper and lower Colorado River basins. Today, in the upper Colorado River Basin, only small, disjunct populations of bonytail are thought to exist in the Yampa River in Dinosaur National Monument, in the Green River at Desolation and Gray canyons, in the Colorado River at the Colorado/Utah border, and in Cataract Canyon (Upper Colorado River Endangered Fish Recovery Program 1999). The northern limit of the bonytail's current range is the Colorado River and Green River confluence in Utah (USDI-FWS 1993).

Colorado Pikeminnow. The Colorado pikeminnow is the largest member of the minnow family and occurs in swift, warm waters of Colorado Basin rivers. The species was once abundant in the main stem of the Colorado River and most of its major tributaries throughout Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, California, and Mexico. It was known to occur historically in the Green River in Wyoming at least as far north as the City of Green River.

Humpback Chub. Habitat of the humpback chub is also limited to narrow, deep, canyon-bound rivers with swift currents and white water areas (Valdez and Clemmer 1982, Archer et al. 1985, Upper Colorado River Endangered Fish Recovery Program 1999). The humpback chub was historically found throughout the Colorado River System, and its tributaries, which are used for spawning (Valdez et al. 2000). It is now only known to occur in the Little Colorado River and

adjacent portions of the Colorado River (USDI-FWS 1993). It is estimated that the humpback chub currently occupies 68% of its original distribution in five independent populations that are thought to be stable (Valdez et al. 2000).

Razorback Sucker. The razorback sucker is an omnivorous bottom feeder and is one of the largest fishes in the sucker family. Adult razorback sucker habitat use varies depending on season and location. This species was once widespread throughout most of the Colorado River Basin from Wyoming to Mexico. Today, in the Colorado River Basin, populations of razorback suckers are only found in the upper Green River in Utah, the lower Yampa River in Colorado and occasionally in the Colorado River near Grand Junction (Upper Colorado River Endangered Fish Recovery Program 1999, USDI-FWS 1993).

3.8.2.4 Plant Species

A review of plant species of special concern known in the proposed project area was completed by the Wyoming Natural Diversity Database in February, 2006. According to these records, no federally listed threatened, endangered, or candidate plant species are known to occur on the project area (WYNDD 2005). Ute ladies'-tresses (*Spiranthes diluvialis*), a FWS threatened species, is known to occur in four populations in eastern Wyoming and in certain habitats along the Green River in Daggett County, Utah, south of the project area. Although suitable habitat for Ute ladies'-tresses does not occur on the majority of the project area, the FWS requires pre-construction surveys for this species in all Wyoming Counties with the exception of Teton County (FWS, Wyoming Field Office 2005). The following description of the plant and its habitat requirements is summarized from information provided by the FWS (1995) and Fertig (2000).

Ute ladies'-tresses: Ute ladies'-tresses is a perennial, terrestrial orchid with stems 12 to 50 cm tall, narrow leaves, and flowers consisting of a few to many white or ivory flowers clustered into a spike arrangement at the top of the stem. It blooms from late July through August; however, depending on location and climatic conditions, orchids may bloom in early July or still be in flower as late as early October. In the project area the flowering period will usually be from August through September. Plants probably do not flower every year and may remain dormant below ground during drought years.

Ute ladies'-tresses is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams. It occurs generally in alluvial substrates along riparian edges, gravel bars, old oxbows, and wet meadows from 4200 to 7000 feet. The orchid colonizes early successional riparian habitats such as point bars, sand bars, and low-lying gravelly, sandy, or cobbly edges, persisting in those areas where the hydrology provides continual wetness in the root zone through the growing season. The orchid seems generally intolerant of shade and is found primarily in open grass and forb-dominated sites where vegetation is relatively open and is not dense or overgrown. The plants usually occur as small scattered groups.

In Wyoming, the four populations of Ute ladies'-tresses documented to date are located in Goshen County (State); one in Converse County (BLM); one in Niobrara County (Private); and one in Laramie County (Private).

3.9. RECREATION

Recreational resources in the Jonah Infill Project Area (the northern end of the Proposed Action)

are fully described in the FEIS for that project in Section 3.5.3 on pages 3-133 through 3-136 (BLM. 2006). The proposed pipeline, power lines, and the Pioneer Gas Plant Expansion cross BLM lands that support dispersed recreation for fishing, river rafting, hiking, camping, mountain biking, and wildlife watching.

Fontenelle Reservoir is located on the Green River approximately 1/2 mile west of the pipeline ROW at its closest point. Recreation use is low and seasonal (BLM, 2004). The pipeline crossing of the Green River below the Fontenelle Dam passes through a "medium level" recreation potential area (BLM, 1985).

3.10 VISUAL RESOURCES

The proposed pipeline and power line routes cross three Visual Resource Management (VRM) sensitivity classes (Classes II, III, and IV). Most of the routes would be in Class IV VRM areas. The pipeline and power line would cross Class II and Class III VRM areas along the Green River. The proposed pipeline parallels, is adjacent to, or overlaps an existing right-of-way of another pipeline for most of the proposed length. The Bridger Compressor Station and the Pioneer Gas Plant Expansion would both be located in Class IV areas.

The objective of Class II is to retain the existing character of the landscape. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the landscape. The Class III objective is to partially retain the existing character of the landscape. Projects in these areas may draw a casual observer's attention, but they should not dominate the landscape. The objective of Class IV areas is to provide for management activities requiring major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high, and management activities may dominate the view; however, the change should repeat the basic elements (form, line, color, and texture) of the surrounding landscape. All activities that could be viewed from the Fontenelle Reservoir will be designed to be subordinate to the landscape.

3.11 CULTURAL RESOURCES

3.11.1 Cultural History Overview

Cultural resources in the area of the proposed pipeline consist of sites associated with prehistoric and historic time periods. The prehistoric period extends from approximately 12,000 years before present time (B.P.) through 350 B.P. when European cultural items began to arrive in the Green River Basin. Approximately 75 percent of the sites found in the Green River Basin are prehistoric. Artifacts from prehistoric times include projectile points, grinding slabs, pottery, and evidence of camp sites (BLM, 1996).

Many historic sites in the Green River Basin are associated with historic trails. The Upper Green River Basin provided practicable routes over the Continental Divide and over the major rivers of the region. Trails provided a route through the arid region on the way to finding moister lands to the west and nearer the coast (BLM, 2003d). Several historic trails would be crossed by the proposed pipeline. They include the Oregon-California-Mormon Pioneer-Pony Express

Trails and the Sublette, Kinney (East Bank Kinney), and Baker-Davis Road of the Oregon Trail. The Oregon-California-Mormon Pioneer-Pony Express Trails are listed in the NRHP (BLM, 1986). The Kinney, Baker-Davis, and Sublette Cutoffs were variants of the Oregon Trail, each crossing the Green River at a different location. The routes rejoined to the west before reaching the Bear River and the main route of the Oregon Trail (BLM, 2003d).

Other historic sites in the Green River Basin are associated with the early fur trade, the frontier military, railroads, the mining industry, ranching, and early oil and gas development (BLM, 1996).

Cultural resources are protected under the *National Historic Preservation Act of 1966*, the *Archaeological Resources Protection Act of 1979*, Executive Order 11593 *Protection and Enhancement of the Cultural Environment*, and Executive Order 13007 *Indian Sacred Sites*.

3.11.2 Cultural Resource Inventory Results

The cultural resource inventories for the various elements of the Jonah Gas Gathering project were conducted by Western Archaeological Services. The project includes two power lines; the JGGC PP&L La Barge to Bridger Compressor Site Powerline submitted in two separate reports to Rock Springs and Pinedale BLM Field Offices (Ficenec 2006a, 2006b) and the 230 kV Overhead Power Line from Craven Substation to Pioneer Gas Plant (Class III cultural resource inventory not completed). The JGGC Bridger Compressor Site report was submitted to the Pinedale Field Office (Stainbrook 2005). The JGGC Pioneer Plant Site Expansion Project was submitted to the Kemmerer Field Office (Byers 2005). The proposed pipelines including the JGGC Windmill II pipeline (Larson 2005a), the JGGC Windmill II Pipeline Extension (Larson 2005b), the Burma Suction Pipeline (Larson 2005c), and the Luman Road (East) 24" Suction Pipeline (Larson 2005d) were submitted to the Pinedale Field Office. And finally, the Bridger to Opal Pipeline report was segmented between BLM Field Offices and submitted as separate reports (Stainbrook and Yerkovich 2005a, 2005b, and 2006). Included in the Pinedale Field Office JGGC Bridger to Opal Pipeline project is a portion of the JGGC Burma Suction Pipeline, the Luman Suction Pipeline, and the 8" Liquids Pipeline. The Class III cultural resource inventories for the above listed projects resulted in the testing and documentation of previously known sites, the recording and evaluation of previously unknown sites, and the identification of isolated finds and isolated resources. The archaeological landscape, a secondary lithic procurement site, is documented within several of the Jonah Gas project areas. The landscape is not eligible to the National Register.

The Class III cultural resource inventory for the JGGC PP&L La Barge to Bridger Compressor Site Powerline resulted in the location of 30 sites. Site types include 12 prehistoric open camp sites (14 eligible and 7 not eligible), 3 not eligible lithic scatters, 2 eligible trails, 3 not eligible historic cairns, and 1 not eligible historic inscription.

The Class III cultural resource inventory for the JGGC Bridger Compressor Site resulted in the location of Site 48SU1334. Site 48SU1334 is a secondary lithic procurement site considered not eligible to the NRHP with SHPO concurrence.

The Class III cultural resource inventory for the JGGC Pioneer Plant Expansion Project resulted in the location of 10 sites. Site types include nine not eligible prehistoric camp sites and one not eligible historic debris-dump site.

The Class III cultural resource inventory for the JGGC Windmill II pipeline project and the JGGC Windmill II Pipeline Extension resulted in the location of 10 sites. Site types include four not eligible prehistoric camps (two destroyed), three eligible prehistoric camps, and three not eligible lithic scatters (one destroyed).

The Class III cultural resource inventory of the JGGC Burma Suction Pipeline (northern leg) resulted in the location of six sites. Site types include three not eligible prehistoric open camps (one destroyed), one eligible open camp, one not eligible lithic scatter (destroyed), and one not eligible isolated feature (destroyed).

The Class III cultural resource inventory of the JGGC Luman Road (East) 24" Suction Pipeline include the location of 13 sites. Site types include eight not eligible prehistoric camps (one destroyed) and five not eligible lithic scatters (one destroyed).

The Class III cultural resource inventory for the proposed JGGC Bridger to Opal pipeline ROW parallels existing pipelines in the Rock Springs and Pinedale Field Offices (Hoefer and Darlington 1987, Rosenberg 1994, Darlington 1994, Murray 1998) and the proposed, but never built, Questar Gas Management 611 pipeline (Yerkovich 2005). Results of the JGGC Bridger to Opal Pipeline Pinedale segment which included a portion of the JGGC Burma Suction pipeline, the Luman Suction Pipeline, and the 8" Liquids Pipeline resulted in the location of 13 sites. Site types include six not eligible prehistoric camps (one destroyed), one eligible prehistoric camp, three not eligible lithic scatters (two destroyed), and three not eligible multi-component sites. Results of the JGGC Bridger to Opal Pipeline Rock Springs segment included the location of 25 sites. Site types include three eligible historic trails, one not eligible river ford, one not eligible historic debris site, two not eligible buried hearths (one destroyed), one not eligible lithic scatter, (previously destroyed), 15 not eligible prehistoric sites (two destroyed), and two eligible prehistoric camps.

Two alternative routes were inventoried for the proposed JGGC Bridger to Opal pipeline in the Kemmerer Field Office. A portion of the proposed pipeline also parallels existing pipelines in the Kemmerer Field Office (Mackey 1984 and Shields 1985). Results of the JGGC Bridger to Opal Pipeline Kemmerer segment included the location of 64 sites. Site types along the original alignment include 1 not eligible historic/modern cairn (off-survey), 3 not eligible multi-component sites, 1 eligible multi-component site, 9 not eligible lithic scatters (2 destroyed), 35 not eligible prehistoric camps (1 destroyed), and 5 eligible prehistoric camps. The inventory along the preferred JGGC Bridger to Opal Pipeline alignment account for 9 of the 64 documented sites. Site types include four not eligible prehistoric camps and one eligible prehistoric camp, two not eligible lithic scatters, one not eligible historic debris scatter, and one not eligible multi-component site.

The historic Opal Wagon Road is identified along both the original and preferred alignments of the proposed pipeline. The Opal Wagon Road is eligible to the National Register. The proposed JGGC Bridger to Opal Pipeline, preferred alignment, will cross the historic Opal Wagon Road in three areas determined to be non-contributing to the sites overall eligibility. Seven aspects of integrity, location, setting, design, workmanship, materials, feeling, and association were applied to determine contributing and non-contributing segments of the Opal Wagon Road. The Opal Wagon Road retains integrity of location. Location is, however, not a determining factor in the selection of contributing segments. Setting is not considered an aspect of integrity vital to the historic property (Larson 2006:16). Two primary functions of the Opal Wagon Road were rural development and supplying the petroleum industry in southwest

Wyoming; a use pattern that continues in the region today. New oil and gas facilities therefore reflect "an adaptive reuse of the Opal Wagon Road viewshed and not an adverse impact to the setting" (Johnson 2004:13). The element of design is assigned to wagon ruts created entirely by use. There is an element of design preserved if these ruts are to be considered a preservable entity. Integrity of design is considered an aspect of integrity vital to the property. Materials and workmanship are generally not key factors in assessing eligibility or the contributing nature of a particular segment of a road. Integrity of feeling and association are considered key factors in determining if the segments of the Opal Wagon Road are contributing or non-contributing to the overall eligibility of the site. The property retains integrity of feeling and association as it is located in the place where the activity occurred. Road segments that were determined not preservable or not reflective of the period of use were found to be non-contributing (Larson 2006:17).

Additional field work conducted for the proposed JGGC projects included:

- a Class III cultural resource inventory of areas not within the existing ROW's including staging areas.
- testing for eligibility for nomination to the NRHP.

Because cultural resources that are not eligible for nomination to the National Register of Historic Places are not considered "historic properties," then by the Advisory Council's guidelines for Section 106 compliance there would be no adverse effect on any historic properties by the construction or maintenance of the proposed pipeline.

3.11.3 Traditional Cultural Properties

Native American tribes, including the Ute, Arapaho, Cheyenne, Shoshone, and Shoshone-Bannock, have been identified with tribal territories located in the general area of the pipeline route. No Native American religious concerns were identified as a result of public scoping including outreach with potentially affected Native American Tribes.

3.12 SOCIOECONOMICS

The Proposed Action would occur in unincorporated areas of southern Sublette County, northwestern Sweetwater County and northeastern Lincoln County. Given the temporary and short-term nature of the proposed natural gas pipeline, compressor station and gas plant construction project, socioeconomic effects are likely to be limited to demand for temporary housing and potential demand for law enforcement, emergency response and emergency medical services.

Detailed socioeconomic information concerning most of the Affected Environment for the Proposed Action is contained in the recently-released (January 2006) Socioeconomic Analysis Technical Support Document (SATSD) for the Jonah Infill Drilling Project FEIS, which can be accessed online at: http://www.wy.blm.gov/nepa/pfodocs/jonah/30TSDsocio.pdf. The following description of the affected environment also includes information for the Lincoln County communities of Kemmerer, Diamondville and Opal, which were not addressed in the SATSD but may be affected by the Proposed Action and Alternatives.

Current and historic population estimates for most communities near the project area are available in Table 3.2 on page 16 of the SATSD; 2004 population estimates for communities and population change between 2000 and 2004 are presented in Table 3-16 below.

Table 3-16. 2004 Population in Communities near the Proposed Action

	2004 Population	% Change 2000 - 2004
Lincoln County	15,626	7.2
Kemmerer	2,561	-2.5
Diamondville	698	-3.4
Opal	99	-2.9
La Barge	419	-2.8
Sublette County	6,654	12.4
Big Piney	444	8.8
Marbleton	789	9.6
Pinedale	1,575	11.5
Sweetwater County	37,758	0.4
Rock Springs	18, 708	0.2

Source: SWCA 2006, WEAD 2006

All Lincoln County communities near the project site lost population between 2000 and 2004, while communities in Sublette County made substantial gains. Sweetwater County and the City of Rock Springs made modest population gains during this period; less than one percent in both cases. These population estimates reflect resident population but do not reflect the substantial number or oil and gas industry employees who were in these counties and communities on temporary assignment.

Temporary housing resources are located in most communities near the Project Area. There are six motels with a total of over 200 rooms in the Kemmerer/Diamondville area, and two recreational vehicle (RV) parks with a total of almost 100 units (Kemmerer Chamber of Commerce 2006, Picerno 2001). La Barge has two motels, another small facility with trailers and rooms for rent and two RV parks (Moceika 2005).

There are an estimated 950 “non-traditional” housing units in Sublette County which include motel rooms, RV’s and construction camps. There are an estimated 526 motel rooms in Sublette County and of those an estimated 450 are available for rent to gas field workers. During the non-winter months nearly all of these rooms are booked, often for weeks at a time. During non-winter months RV parks are similarly full. There are three construction camps in the county that house an estimated 300 workers during non-winter months (Jacquet 2006).

In Sweetwater County, Rock Springs has 31 hotels/motels with a total of 1,680 rooms, and an RV park with 50 spaces (SWCA 2006).

Emergency response services in southern Lincoln County are provided by the South Lincoln Fire District and the South Lincoln Medical Center. A fire station staffed with volunteers and an ambulance staffed with EMTs are located in La Barge, which also provide services to the unincorporated areas near the town. People requiring emergency medical assistance are typically transported to the South Lincoln Medical Center in Kemmerer, an 18 bed hospital. Severe cases are transported by helicopter to hospitals in Salt Lake City (Walton 2005). The Town of La Barge has its own Police Department, currently staffed with one officer, the Chief,

and one part-time officer. Law enforcement in the unincorporated portions of the county is provided by the Lincoln County Sheriff's Department. There are three deputies based in Kemmerer who respond to calls and provide other law enforcement services for an area that extends from Cokeville to La Barge (Miller 2005).

Emergency services in the Big/Piney/Marbleton area are provided by the volunteer fire department located in Marbleton and by ambulances from the Marbleton/Big Piney Medical Clinic, which is staffed with two physicians, two physician's assistants and nurses and other support staff (Hanson 2005). Law enforcement services are provided by the Sublette County Sheriff's Department, which has a contract to provide law enforcement services to Marbleton and Big Piney through the department's Metro Services division. There is a deputy dedicated to Marbleton and Big Piney and other deputies respond to calls in the area (Koessel 2005). The Pinedale Medical Clinic serves the northeastern portion of the county with three physicians and a physician's assistant (SWCA 2006). Serious trauma cases are referred to Jackson or Rock Springs, or to Idaho Falls or Salt Lake City by air ambulance.

The portion of Sweetwater County that includes the project area is served by emergency response organizations (fire suppression, emergency medical and ambulance) located in the Eden/Farson area and the Town of Granger, with support from agencies in Green River and Rock Springs. Eden and Farson have a resident sheriff's officer and highway patrolman, a 26-member volunteer fire department and ambulance service (SWCA 2006). Sweetwater County also has mutual aide agreements with emergency response agencies in Lincoln and Sublette counties, and fire and ambulance agencies in Kemmerer and the Big Piney Marbleton area are likely to respond to accidents and emergencies if they are the closest agencies. Routine injuries may be treated at the medical center in Kemmerer, the Marbleton/Big Piney Medical Clinic, or at Memorial Hospital in Rock Springs. Cases requiring specialized treatment are transported to Salt Lake City by air ambulance services dispatched from Salt Lake City (Valentine 2003).

Environmental Justice

Minority individuals comprise about 2.5% of the Lincoln County population, 3.2% of the Sublette County population, and 11% of the Sweetwater County, as compared to 8.9% for the State of Wyoming as a whole. Individuals with incomes below the poverty level include 10.8% of the Lincoln County population, 8.4% of the Sublette County population, and 8.0% of the Sweetwater County population, compared to the Wyoming statewide average of 11.9% (SWCA 2006).

3.13 TRANSPORTATION

The regional transportation system serving the proposed project area includes an established system of interstate and state highways and county roads. Local traffic on federal land is also served by BLM roads and operator-maintained gas field roads.

3.13.1 Highway Access to the Project Area

Highway access to the project area from I-80 and Rock Springs/Green River, the anticipated origin of most heavy truck traffic, is provided by the following routes:

- US Highway 30, a paved two-lane, principal arterial highway which travels 31 miles from

I-80 west of Green River to Opal and and15 miles west from Opal to Kemmerer.

- WY 240, a two-lane paved major collector highway which travels 12 miles north from US 30 at Opal to US 189 northwest of Kemmerer and provides access to the Pioneer Gas Plant.

- Wyoming State Highway 372 (WY 372), a two-lane, paved major collector highway which travels 38 miles northwest from I-80 to Fontenelle and another 11 miles west to its intersection with US 189 about 24 miles northeast of Kemmerer.

- US Highway 189, a paved, minor arterial highway that provides access from US Interstate 80 through La Barge, Big Piney and Marbleton to Daniel, where it combines with US 191 to provide access to Jackson.

- US 191,a paved two-lane principal arterial highway which travels from I-80 east of Rock Springs north for 36 miles to Eden, north an additional 4 miles to Farson and then north 59 miles to Pinedale.

Recent traffic volumes on Wyoming federal and state highways are listed in Table 3-17. Traffic on US 30, WY 240 and WY 372 all had slight decreases in average annual daily traffic (AADT) between 2003 and 2004; US 189 and US 191 both had increases.

3.13.2 County and BLM Road Access

Road access to and within the project area includes an existing road network developed to service prior and ongoing oil and gas drilling and production activities and ongoing livestock grazing activities. BLM Road 4202 and a number of other BLM and gas field roads have been developed to accommodate gas field traffic and are maintained by the operators under ROW grants.

At the southern end of the Project Area, access to the pipeline route will be provided from US 30 by WY 240 and BLM 4209.

Table 3-17. Traffic and Level of Service on Highways Providing Access to the Project Site.

Route	2004 AADT	2003 AADT	1994 AADT
US 30 @ Jct. WY 240	1,800 (900 trucks)	1,880 (990 trucks)	1,960 (1,300 trucks)
WY 240 @ Jct. Exxon Plant Road	260 (90 trucks)	310 (70 trucks)	150 (60 trucks)
WY 372 @ (Sweetwater/ Lincoln County Line)	250 (40 trucks)	260 (40 trucks)	380 (75 trucks)
			740

Route	2004 AADT	2003 AADT	1994 AADT
US 189 @ Jct. Fontenelle Townsite Road)	860 (150 trucks)	830 (100 trucks)	(155 trucks)
US 189 @ Jct County Road 315 West	1,510 (270 trucks)	1,110 (260 trucks)	1,200 (205 trucks)
US 191 @ Sweetwater/ Sublette County Line	2,570 (480 trucks)	1,930 (330 trucks)	1,320 (145 trucks)
US 191 @ Jct. WY 351	1,740 (250 trucks)	1,350 (180 trucks)	1,200 (130 trucks)

Source: WYDOT 2004, Jones 2003

From WYO 372, access to the pipeline corridor is provided by a short (less than one mile) stretch of Lincoln County Road (LCR) 311, a two-lane gravel road which is treated with dust suppressant (Dana 2003). Immediately after the Lincoln/Sweetwater County line, Sweetwater County Road (SCR) 8 crosses the Green River on a bridge that is adequate for most loads; however, oversize wide loads have damaged the guard rails in the past. On the east side of the bridge, SCR 8 connects with SCR 52, which travels about three miles north to connect with BLM Road 4202. BLM Road 4202 travels north and provides access to the pipeline route via a series of unnamed roads.

Access from US 191 to the northern end of the project area and the Bridger compressor station would use BLM 5409 (Luman Road). BLM 5407, BLM 4208 (Burma Road), BLM 4207, BLM 4205, BLM 4203, BLM 4202 and a number of un-named roads would be used to reach the pipeline corridor.

Access to the 230kV powerline route from US 189 will be provided by BLM 4203 and the same roads that provide access to the northern end of the pipeline route as well as a number of un-named roads.

Traffic coming from La Barge and the Big Piney/Marbleton area may use BLM 4203 or LCR 318, which intersects with US 189 about five miles south of La Barge, and travels about a mile east and becomes BLM Road 4210 which intersects with BLM Road 4202. LCR 318 also has a one-lane bridge over the Green River, which has had its guard rails damaged by over-sized wide loads. Another route for traffic coming from the north involves Lincoln County Road 313, which leaves US 189 and heads about 4 miles east toward Fontenelle Dam and then heads south on LCR 316 for about three miles, and connects with LCR 311 at Fontenelle. This road receives intensive use and requires frequent maintenance including dust suppression. (Dana 2003).

3.14 HEALTH AND SAFETY

Existing health and safety concerns in and adjacent to the BTOPA include hazards associated with existing oil and gas exploration and operations. Occupational hazards associated with oil

and gas operations generally affect workers in the fields and at oil and gas facilities. Two types of workers are employed in oil and gas fields: oil and gas workers, who had a1998 annual accident rate of 4.0 per 100 workers, and special trade contractors, who had a non-fatal accident rate of 8.9 per 100 workers (U.S. Department of Labor, Bureau of Labor Statistics 2000). These rates compare with an overall private industry average for all occupations of 6.2 per 100 workers.

There are also existing low-level risks associated with natural gas pipelines, although these risks are statistically very small. Nationwide, injuries associated with gas transmission pipelines averaged 14 per year from 1990 through 1996, fatalities averaged one per year and incidents such as ruptures averaged 79 per year (U.S. Department of Transportation 1998). Finally, there are risks associated with hazardous materials used or stored at oil and gas facilities. The USDI-BLM, OSHA, USDOT and Wyoming OGCC and OHSA each regulate certain safety aspects of oil and gas operations.

Currently within the BTOPA there are risks associated with vehicular travel on improved and unimproved county, BLM and private roads; with firearms accidents during hunting season and by casual firearms use such as plinking and target shooting; and with natural events such as flash floods, landslides, earthquakes and range fires, which can also result from human activities.

3.15 NOISE

On-going drilling and production operations and related traffic create most sound disturbances within and in the immediate vicinity of the BTOPA. Aircraft overflights (generally at high altitudes) and localized vehicular traffic on US 189, US 191, WY 240, WY 372, WY 351, and county, BLM and two-track roads in the project area also create short-term, localized sound disturbances. For a comparison of typical noise values, refer to Figure 3-8.

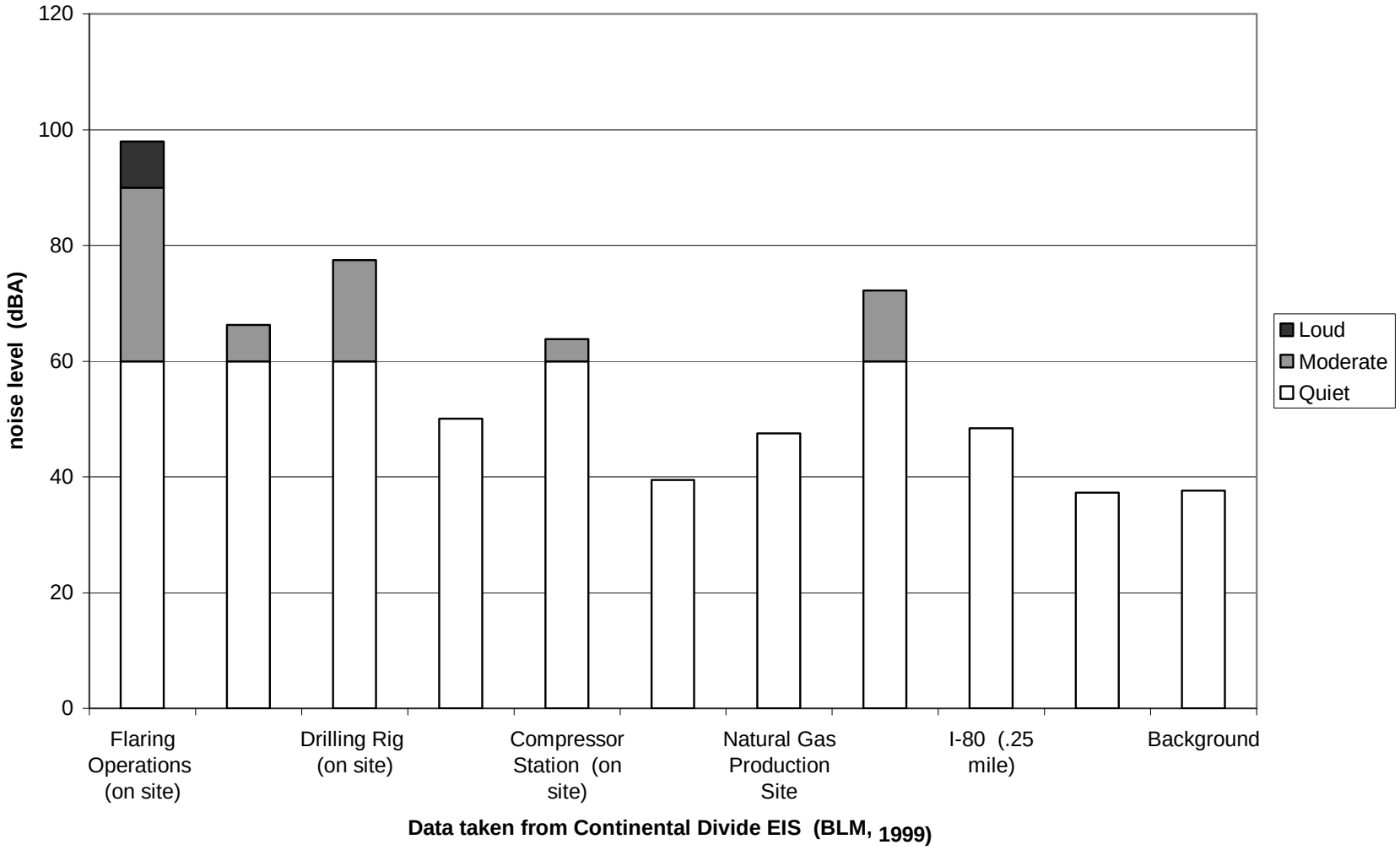


Figure 3-8. Typical Noise Levels near Oil & Gas Operations