

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the effects that the Proposed Action and No Action alternatives presented in Chapter 2 could have on the physical, biological, and human aspects of the environment. Each alternative is also evaluated in terms of how it responds to Forest Plan direction. A section containing *Specifically Required Disclosures* is also included at the end of this chapter. This section addresses resources whose consideration is required by law or regulation, such as wetlands and floodplains.

4.1 INTRODUCTION

Chapter 4 is organized by resource areas that are key components of the affected environment (Chapter 3). Resources are grouped by physical, biological, or human elements of the environment. Each resource section is further organized into the subsections described below.

4.1.1 Resource

Section heading for the resource, for example: *Air Resources* or *Recreation*.

Indicators

The indicators for each resource are identified. Indicators are the quantitative or qualitative units of measure used to estimate effects and compare the alternatives.

Environmental Effects

The environmental effects are the impacts that would be expected to occur as the result of implementing each of the alternatives. This section provides the scientific and analytical basis for the comparison of the alternatives described in Chapter 2. In some cases, a more detailed analysis may be found in the *Project File* located at the Big Piney Ranger District Office in Big Piney, Wyoming. The *Project File* contains supporting data and analysis of environmental effects developed during the preparation of this EIS, which are hereby incorporated by reference.

Direct and Indirect Effects by Alternative

Direct effects are caused by an action, and occur at the same time and place. Indirect effects are caused by an action, but occur later in time or farther removed in distance, but are still reasonably foreseeable. For each resource, direct and indirect effects are presented by alternative.

Cumulative Effects by Alternative

This section describes the cumulative effects of the alternatives. Cumulative effects result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Forest Plan Consistency

This section indicates whether the alternatives would be consistent with the Forest Plan, and how any inconsistency would be remedied by a Forest Plan amendment if that alternative were implemented.

Irreversible and Irretrievable Commitments

Federal law and regulations require the disclosure of any irreversible or irretrievable commitments of resources that may result from the proposed alternatives. Irreversible commitments are permanent or essentially permanent resource uses or losses; they cannot be reversed, except in the extreme long term. Examples include minerals that have been extracted or soil productivity that has been lost. Irretrievable commitments are losses of production or use for a period of time. For example, some of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production loss is irretrievable, but the action is not irreversible. If the use changes, it would be possible to resume timber production.

4.2 THE PHYSICAL ENVIRONMENT

Air, water, and soil combine to create the physical environment, which is the foundation of all ecosystems. The physical environment is addressed in three sections: air, streams and watershed, and geology and soils.

4.2.1 Air Resources, Including Air Quality, Noise, and Odor

Indicators

- Emissions related to truck transport of LNG to Jackson (emission factors for heavy duty vehicles – nitrogen oxides [NO_x], carbon monoxide [CO], and volatile organic compounds [VOCs] in tons per year)
- Emissions related to treatment of natural gas by glycol dehydration and injection of air before gas enters pipeline (NO_x, CO, and VOCs in tons per year)
- Effects related to noise and odor
- Effects from fugitive dust and exhaust from construction vehicles or equipment during pipeline construction
- Effects related to operation and maintenance of pipeline
- Effects on air-quality-related values and regional haze at Class I and sensitive Class II areas
- Compliance with State of Wyoming and National Ambient Air Quality Standards

Environmental Effects

Direct and Indirect Effects by Alternative

The primary effects associated with the proposed project are fugitive (airborne) dust from construction activities, vehicle exhaust from project vehicles or tanker trucks hauling LNG to Jackson, and emissions from the proposed gas processing facility. Noise from construction activity also would be associated with the proposed project.

Emissions of air pollutants from fugitive dust, vehicle exhaust, or treatment of natural gas could include nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter with a diameter less than 10 micrometers (PM₁₀), particulate matter with a diameter less than 2.5 micrometers (PM_{2.5}), sulfur dioxide (SO₂), ozone (O₃) and non-ethane-methane volatile organic compounds (VOCs). Most of the ambient O₃ and its precursor, nitrogen dioxide (NO₂), are not directly emitted from emission sources, but are formed in the atmosphere from reactions involving NO, NO₂, VOCs, and ultraviolet light.

Alternative A - No Action

Under the No Action alternative, the proposed project would not be approved. No additional impacts or benefits to air quality would be expected to occur beyond the existing or projected pollutant concentrations.

Table 4-1 presents emissions for the tanker trucks that would transport LNG to Jackson under Alternative A – No Action. These emissions were estimated using the MOBILE6 vehicle emission estimating program. For these estimates, the vehicle year was assumed to be 2005 and projected vehicle traffic for the year was used. The emission factors (grams per vehicle miles traveled [gm/VMT]) for Heavy Duty Diesel Vehicles (HDDV) were used.

TABLE 4-1 PROJECTED EMISSIONS – ALTERNATIVE A (NO ACTION)

Round Trip Distance (miles)	Number of Vehicles	VMT per year	Emissions ¹					
			gm/VMT			ton/year		
			NO _x	CO	VOC	NO _x	CO	VOC
240	665	159,600	15.39	5.50	0.74	2.70	0.97	0.13

¹ Projected tailpipe emissions for tanker trucks in 2005

Other effects under the No Action alternative would include fugitive particulate matter from the highway surface generated by the tanker trucks transporting LNG. The most noticeable noise and odor impacts would be associated with existing highway vehicle traffic, including tanker trucks. Any effects on visual range and acid deposition at nearby Class I and sensitive Class II areas that could be directly attributed to tanker truck traffic would not be noticeable.

Continued use of tanker trucks carrying LNG would contribute to the risk of a wildland fire escaping from a highway crash involving a large, intense fire. Emissions from a wildland fire associated with LNG transportation by tanker truck would contribute to air quality impacts. Smoke from wildland fires could potentially produce gases and particulate emissions during the combustion of forest fuels. The emission rates (the amount of emissions produced per unit of time) can vary significantly depending on a variety of factors, including fuel type and amount, condition, and combustion characteristics. Smoke from wildland fires can contain high concentrations of fine particulate matter (USFS 2003a).

Alternative B - Proposed Action

Construction

Air Quality

Some temporary effects on air quality would likely occur in the immediate vicinity of the Proposed Action, caused by particulate matter and exhaust from construction activities, vehicles, and equipment. Air emissions from construction-related activities would be generated by ground clearing, trenching, and reclamation of disturbed areas. If necessary, blasting would be used infrequently for trenching and cut-and-fill operations. Emissions from these construction-related activities would include fugitive PM₁₀ and tailpipe emissions of NO_x, CO, SO₂, VOC, and PM₁₀. Emissions of NO_x and PM₁₀ associated with blasting would be infrequent and of short duration. Emissions during pipeline construction would be temporary and would be controlled with dust abatement practices included in **Appendix D**.

Noise and Odor

Equipment used during construction activity also would generate elevated noise levels associated with ground clearing, trenching, infrequent blasting, installation of the pipeline, and reclamation. Sound levels that would be generated by typical construction equipment are shown in **Table 4-2**. These levels would approximate noise levels associated with the construction of the pipeline.

The propagation of noise depends on many factors including atmospheric conditions, ground cover, and presence of any natural or man-made barriers. The unit of measure used to represent sound pressure levels, or decibels (dB), is the A-weighted scale (dBA) designed to simulate human hearing. As a general rule, noise decreases by approximately 6 dBA with every doubling of distance from the source (Bell 1982). Therefore, noise levels at various distances from a site can be predicted, as shown in **Table 4-2**.

TABLE 4-2 PROJECTED SOUND LEVELS OF CONSTRUCTION EQUIPMENT

Noise Source	Sound Level (dBA)			
	Sound Level at 15 meters ¹	Estimated at 30 meters	Estimated at 60 meters	Estimated at 120 meters
Pile Driver	101	95	89	83
Rock Drill, mounted	96	90	86	80
Truck, rear dump	88	82	76	70
Off-Highway truck	88	82	76	70
Pneumatic tool	85	79	73	67
Backhoe loader	81	75	69	63
Air Compressor	81	75	69	63
Generator	78	72	66	60

¹ Crocker 1982

Other noise and odor impacts would be associated with existing vehicle traffic on the highway, including the transport of LNG to Jackson by tanker truck.

Operations

Air Quality

The only continuous air pollutant emission sources included in the Proposed Action would be a glycol dehydration unit and a natural gas-fired 84 horsepower air compressor at the proposed gas processing facility. The dehydration unit would generate only a small amount of air emissions, including primarily VOCs, with smaller emissions of PM₁₀, SO₂, NO_x, and CO. These emissions would be generated from the glycol dehydrator heater and flash process as well as fugitive VOC emissions from various connections throughout the facility. The air compressor will be a minor source, but will require an air permit review under Wyoming rules. Vehicle traffic at the site may also generate fugitive PM₁₀.

Some intermittent and short-term effects on air quality would likely occur in the immediate vicinity of the pipeline corridor, caused by particulate matter and exhaust from vehicles and equipment used for monitoring and maintenance activities. These effects would be local and would be dispersed by prevailing winds. The effects on air quality would be minimized through dust abatement practices.

A noticeable effect of the Proposed Action would be the removal of a large portion of the tanker truck traffic transporting LNG on U.S. 189/191 to Jackson. The Proposed Action would include fewer than 50 round trips per year by tanker trucks to maintain LNG storage bullets in Jackson as a backup supply. This reduction in 18-wheel diesel truck traffic, which is projected to be almost two round trips per day by the year 2010, should result in an air quality benefit along the proposed route.

Estimated air emissions under Alternative B – Proposed Action, including emissions associated with the transport of LNG to Jackson by tanker truck and the proposed gas processing facility, are shown in **Table 4-3**.

TABLE 4-3 PROJECTED EMISSIONS - ALTERNATIVE B (PROPOSED ACTION)

Emission Source	Emissions (ton/year)		
	NO _x	CO	VOC
Tanker Trucks	0.20	0.07	0.01
Glycol Heater	0.23	0.10	0.01
Glycol Flash	-	-	0.50
Air Compressor	9.25	11.86	0.18
Total Emissions	9.68	12.03	0.70

Although PM₁₀ and PM_{2.5} emission factors for the tanker truck tailpipe emissions are not available, it is likely that these emissions would be reduced under the Proposed Action because of the reduced tanker truck traffic. Combustion of natural gas results in low emissions of particulate matter related to the formation of secondary nitrates and sulfates. In addition, combustion of natural gas results in lower emissions of SO₂ than diesel fuel combustion. Therefore, the formation of secondary sulfate particulate matter should also be less.

Fugitive particulate matter emissions from the highway surface would be reduced from the reduction of tanker truck traffic transporting LNG.

Visual range and acid deposition at Class I and sensitive Class II areas that are located near project activities should not be affected, since the Proposed Action would have low emissions of NO_x, SO₂, and PM₁₀. Class I areas include the Bridger, Fitzpatrick, Teton, and Washakie Wildernesses and Grand Teton and Yellowstone National Parks. Sensitive Class II areas would include the Gros Ventre and Popo Agie Wildernesses, the Shoal Creek and Palisades WSAs, and roadless areas.

Impacts from the use and combustion of the pipeline natural gas in the Jackson area should not be significantly different from the current use and combustion of LNG, because the chemistry of the two substances is essentially the same.

The availability of natural gas in the Jackson area once the pipeline is operational may encourage users of other fuels, such as fuel oil or wood, to convert to natural gas. Should such conversions occur, emissions of PM₁₀, PM_{2.5}, and SO₂ could be reduced in the Jackson area.

No violations of applicable state or federal air quality regulations or standards are expected to occur as a result of direct or indirect emissions of air pollutants under the Proposed Action. Applicable state and federal standards include the Wyoming Ambient Air Quality Standards (WAAQS) and the National Air Quality Standards (NAAQS). The proposed gas processing facilities may be required to file a Notice of Installation and a Chapter 6 Section 2 (Wyoming Air Quality Standards and Regulations) air quality permit application with the Wyoming Department of Environmental Quality (WDEQ).

Limited continued use of tanker trucks carrying LNG to provide a backup gas supply for the Jackson area would contribute slightly to the risk of a wildland fire escaping from a highway crash involving a large, intense fire. Emissions from a wildland fire associated with LNG transportation by tanker truck would contribute to air quality impacts. Smoke from wildland fires could potentially produce gases and particulate emissions during the combustion of forest fuels. The emission rates (the amount of emissions produced per unit of time) can vary significantly depending on a variety of factors, including fuel type and amount, condition, and combustion characteristics. Smoke from wildland fires can contain high concentrations of fine particulate matter (USFS 2003a).

Noise and Odor

The Proposed Action would result in reduced tanker truck traffic transporting LNG. This would result in a reduction of the noise and odor impacts from tanker truck fumes that would be associated with this traffic.

Odorization of natural gas with Mercaptan is required by the Department of Transportation (DOT) to allow the detection of natural gas leaks. Odorization involves installing a system that injects concentrated Mercaptan into the pipeline natural gas at a rate proportional to the gas flow rate. Odorant would be added to the natural gas at the gas processing facility. Because the injection of Mercaptan would be an enclosed process, releases of Mercaptan from this process would be unlikely as long as the injector connections are maintained in good air-tight condition.

Cumulative Effects by Alternative

The cumulative impact analysis area considered is the airshed surrounding the Project Area, encompassing a portion of northwestern Wyoming.

Alternative A – No Action

Past, ongoing, or reasonably foreseeable activities that would have a cumulative effect on air resources in the Project Area and vicinity would include the following types of effects: fugitive particulate matter from surface disturbance; air emissions, noise, and odor from the use of equipment, vehicles, or aircraft; and air emissions from prescribed or wildland fire. The following projects and activities would have a cumulative effect on air resources in the Project Area and vicinity:

- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Horse Creek Feedground Connector Road (WGFD)
- South Park River Access Site/Plan (BLM)
- Cottonwood II Integrated Projects, vegetation management of 975 acres and prescribed burning of 1,000 acres of aspen, and Maki Creek, vegetation management of 214 acres and prescribed burning of 2,000 acres (BTNF)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- High Mountains Heli-Skiing, Snake River/Wyoming Range (BTNF)

Oil and gas production activity concentrated within the northern Pinedale Anticline area and the Jonah fields near the Project Area has the potential to increase ambient levels of air pollutants in the Project Area and affect visibility at Class I and sensitive Class II areas (BLM 2000, BLM 2005a). The Questar Year-Round Drilling Project would mitigate NO_x emission increases by installing a condensate pipeline that would greatly reduce the tanker truck traffic that has previously transported the condensate (BLM 2004). The air emissions associated with construction, drilling, traffic on dirt and gravel roads, and limited flaring to evaluate production potential for three exploratory wells proposed near Hoback Ranches would not result in a noticeable increase in emissions or change in visibility or atmospheric deposition.

The air quality analysis for the Jonah Infill Drilling Project estimated cumulative visibility impacts at Class I and sensitive Class II areas resulting from project and regional source emissions to be above the “just noticeable visibility change” threshold at the Bridger Wilderness and Wind River roadless area, and there were no predicted impacts above the threshold at any other analyzed sensitive areas (BLM 2005a). BLM recently prepared supplemental air quality information for the Jonah Infill Drilling Project EIS (BLM 2005b), which is summarized in the following paragraphs.

Air quality models estimate potential concentrations of air pollutants. This information may be compared against Federal and State of Wyoming standards to make estimates of potential impacts. The model results that were prepared for this supplemental information indicate that the air quality in the Pinedale, Wyoming region is good overall. This means that concentrations of particulate matter, nitrogen dioxide and sulfur dioxide are below limits in federal and Wyoming air quality standards, and that potential atmospheric deposition is below levels of concern and within levels of acceptable change.

Visibility is the area of concern. Two types of sources may affect visibility: local and regional. Local sources include diesel-powered drill rig engines, wood stoves and fireplaces, and traffic on dirt and gravel roads. At the regional scale, visibility impacts may be attributed to major sources, like power plants and petroleum refineries.

Visibility may be measured by the number of days the view is hazy. Another visibility measurement is the number of miles an observer can see. Visibility monitoring indicates that visibility was fairly stable (little change) through 2003. The model results indicate that visibility in Pinedale and other local communities, as well as in the Bridger and Fitzpatrick wilderness areas, may be noticeably impacted in the future by a change in visibility over several days per year. The following Wyoming communities may be affected by changes in visibility: Pinedale, Big Piney, Boulder, Sandy, Cora, Farson, Merna, LaBarge, and Daniel.

Air quality and visibility monitoring instruments were recently installed near Pinedale and surrounding communities. Federal land management agencies, EPA, and WDEQ monitor concentrations of air pollutants, visibility, and atmospheric deposition. Concentrations monitored include: nitrogen compounds (nitrogen dioxide, nitric acid, nitrate and ammonia), particulate matter, ozone, and sulfur compounds (sulfur dioxide and sulfate). Visibility monitoring includes communities and Class I airsheds such as Yellowstone National Park and the Bridger Wilderness. Atmospheric deposition monitoring includes nitrogen and sulfur deposition and the chemistry of sensitive alpine lakes.

The following are examples of air quality and/or visibility impacts in recent years. In February 2004 flaring from the completion of a gas well occurred outside Pinedale. The flare temporarily created visibility impacts to Pinedale and nearby communities. In late spring 2005 smoke from wildfires in Arizona, Nevada and Utah caused significant visibility impacts in Pinedale and surrounding communities. In February 2005 ozone levels monitored in the Jonah Field may have “exceeded” national health-based standards. Resolution and verification of monitored ozone thresholds has not yet been completed.

Forest fires can generate significant amounts of fine particulate matter and impact health and visual range. Smoke from wildland or prescribed (management-ignited) fire is a complex mixture of carbon, tars, liquids, and different gases. The major air pollutants are particulate matter (PM₁₀ and PM_{2.5}). At close range, these fires can also generate significant amounts of carbon monoxide (CO), which is usually more of a concern for fireline personnel than others located away from the fire. Equipment used for fire suppression or project implementation can also generate emissions of air pollutants.

Wildland fire would generate temporary effects on air quality in the immediate vicinity of the ignitions. Smoke from wildland fires can contain very high concentrations of fine particulate matter. The conditions

and limits for smoke emissions from wildland fires are not controlled, thus these unplanned ignitions have the potential for greater impacts than prescribed fire.

Prescribed fires (such as Monument Ridge, Hoback Ranches, Cottonwood II, and Maki projects) would result in lower smoke emissions than wildland fires because ignitions would occur during optimal climate conditions to limit impacts, and fire managers would limit the acreage burned. The effects of prescribed fires would be temporary and would occur sporadically over several years, mostly during spring through fall. The effects of prescribed fires would be mitigated through the implementation of a burn plan.

Highway travel would generate particulate matter and exhaust from vehicles. Other effects would include fugitive particulate matter from the highway surface. The most noticeable noise and odor impacts would be associated with highway vehicle traffic. Highway reconstruction and improvements would occur for extended periods and result in fugitive particulate matter, air emissions, noise, and odor from the use of equipment and vehicles.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects on air resources. The air compressor included in the proposed project would be a minor source of air emissions, with no noticeable effect on air quality, visibility, or atmospheric deposition.

The proposed project would contribute to a small improvement in ambient concentrations of NO_x, PM₁₀, and PM_{2.5} along U.S. 189/191, although this improvement would not be noticeable.

Some intermittent and short-term effects on air quality would likely occur in the immediate vicinity of the pipeline corridor, caused by particulate matter and exhaust from vehicles and equipment used for monitoring and maintenance activities. These effects would be local and would be dispersed by prevailing winds. The effects on air quality would be minimized through dust abatement practices.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

There would be no irreversible air quality commitments under any alternatives. No violations of applicable state or federal air quality regulations or standards are expected to occur as a result of direct or indirect emissions of air pollutants under the Proposed Action.

4.2.2 Streams and Watershed

Indicators

- Effects on stream channel conditions and stability
- Effects on natural flow characteristics, water quality, and quantity
- Effects on streambank stability
- Potential sedimentation

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A - No Action

Under the No Action alternative, effects on streams and watersheds would remain at or near their current levels. There would be no removal of streambank vegetation, and no alteration of natural drainage channels. Water quantity in the Project Area would not change, nor would the volume or timing of peak flows. Streambanks in the Project Area would remain in moderate condition.

Stream sedimentation would continue at current rates over the short term. The sediment produced from road traffic would not be reduced. By 2010, tanker trucks would make 665 round trips per year transporting LNG to Jackson, and sediment produced by this traffic would also increase over time.

Alternative B- Proposed Action

The proposed project may affect stream health and watershed conditions during construction activities. The effects on stream health and watershed conditions would include potential increases in sedimentation to streams, potential effects on streambank stability, removal of riparian vegetation, and disruption of streambeds and aquatic habitat during pipeline construction activities. These effects would be reduced by the implementation of design criteria included in **Appendix D**. If pipeline maintenance activities were needed at a stream or river crossing, effects similar to construction effects, but of a lesser magnitude and duration, would occur.

The character of the effects at proposed stream crossings under Alternative B would be similar to the effects described by Reid and Anderson (1998), based on a review of 27 pipeline water crossing effects monitoring studies undertaken by the pipeline industry and resource management agencies over 25 years in North America. Conventional or open-cut water crossings reviewed in the study are those pipeline installations that occur without any isolation or diversion of flow away from the work area. The trench for the pipe is generally excavated and backfilled by backhoe within the active (flowing) channel. Conventional open-cut crossings are often the only feasible construction method. Reid and Anderson (1998) found that open-cut crossings typically resulted in elevated downstream sediment loads during and shortly after the period of construction. Most of these studies reviewed indicated that sediment released during instream construction caused short-term changes to downstream aquatic life and their habitats. Identified effects included alterations to streambed conditions; reductions in the abundance and diversity of benthic invertebrate communities; and reductions in the abundance of fish populations. Effects were typically non-residual, and recovery was usually evident within a year. In addition to sediment related effects, habitat at the crossing site was affected by the excavation and backfilling of the pipeline trench and associated changes to bank conditions and riparian vegetation.

Reid and Anderson (1998) found the most visible result of instream pipeline construction to be the generation of a plume of turbid water downstream. Levels of suspended sediment increased rapidly at the onset of instream activity but were not uniform throughout construction. Discrete peaks of high suspended sediment concentration occurred during activities such as blasting, trench excavation, and backfilling. During pipeline trench excavation and backfilling, suspended sediment concentrations were observed to exceed several thousand mg/L. These peaks declined rapidly when the streambed was not disturbed, although some residual increases due to scour of the trench, erosion of exposed surfaces at the crossing site, and the resuspension of settled material occurred. For properly stabilized crossings at the end of construction, sediment loading was found to be restricted to the duration of instream construction. Inputs of sediment into the watercourse persisted in some cases if the approach slopes of the crossing had been inadequately stabilized or revegetated. Crossings of small watercourses (< 10 meters wide) were

often completed in less than a day; one to three days were generally required for medium sized crossings (10 - 20 meters wide).

Reid and Anderson (1998) also described the deposition and subsequent flushing of sediment downstream of the crossing. As the material excavated is larger and in greater quantity than that transported under normal flow conditions, substantial deposition of released sediments occurs within a short distance downstream. This immediate deposition is generally dominated by the coarser fraction of the excavated sediments. Deposition of finer sediments such as clays and silts will tend to occur further downstream as a light coating on the streambed, or in low energy environments such as backwater areas. Sediment (especially silts and clays) deposited downstream of the crossing site can filter through the interstitial spaces in the streambed and change its porosity and composition. Large depositions in slow velocity areas such as shallow side pools, behind boulders and instream debris have been observed to require longer periods or higher flows for complete removal. Full recovery of affected habitats has been suggested to be dependent on high flow conditions associated with storm events, or spring meltwater conditions flushing deposited sediments downstream. Complete removal of deposited sediments has been reported to occur within 6 weeks to 2 years after construction.

Reid and Anderson (1998) also reported that crossings under very low flow conditions resulted in minimal dilution and high suspended sediment concentrations. However, downstream transport was minimized under these flow conditions. At the other extreme, high flows associated with storm events increased background levels and also eroded exposed substrates at the crossing location. High flows increased the width of the water crossing and generally hampered construction operations.

Pipeline construction under Alternative B would remove vegetation, disturb soil, divert water, cross streams, and result in consumptive and non-consumptive water use. Implementation of the BMPs and design criteria described in **Appendix D**, would reduce the transport of sediments to streams and reduce damage to aquatic habitats by decreasing peak flows that could cause erosion of the streambed and banks. Aquatic habitat could also be degraded by water diversions, changed flow regimes, riparian damage, or large sediment loads. However, BMPs and specific design criteria to reduce soil compaction and sediment transport would be implemented. Selection of BMPs and design criteria would be based on the effectiveness of specific BMPs and design criteria in mitigating the proposed type of disturbance and site characteristics that would be encountered, including, stream type, location in the watershed, hydrologic position, slope gradient, climate, and streambank vegetation.

Analysis indicators were selected to assess the location of the project activity in relation to a water influence zone (WIZ) along stream channels. Disturbances within the WIZ were analyzed in accordance with the standards and guidelines in the Forest Plan.

Alternative B may temporarily affect stream channel conditions and stability. The proposed pipeline would require nine crossings of the Hoback River, one crossing of the Upper Hoback River, and one crossing of Cliff Creek. These crossings would be installed by open-cutting the river or stream during low flows and burying the pipeline. Effects may result from the diversion of water, operation of construction equipment in the channel, removal of channel substrate, and emplacement of the pipeline in the streambed. These effects may include changes in stream morphology, which can result in siltation of downstream riffles and eddies. Depending on the size, timing, and method of pipeline crossing construction, changes in stream morphology can occur several hundred yards from the crossing. Alteration of stream morphology that causes siltation can have noticeable effects on the long-term health of fisheries. Full recovery of streambed conditions has been reported to occur between 6 weeks and 2 years after construction (Reid and Anderson 1998). Design criteria and BMPs specifically selected to minimize the effects on stream channel conditions from instream construction activities include:

- Minimizing disturbance through selection of the narrowest crossing location, limiting the number of equipment trips across a stream during construction, and minimizing the number and size of work areas;
- Constructing pipeline crossings of riparian areas and streams at right angles to minimize area of disturbance;
- Maintaining a buffer zone of undisturbed material between the work and the existing stream;
- Conducting operations in riparian areas by diverting water away from the area of operation;
- Depending on the species present, placing instream restrictions from March 15 to July 31 and/or September 15 to November 30
- Contacting the Wyoming Game and Fish Department (WGFD) to determine whether the proposed project would affect spawning habitat

Alternative B may temporarily affect natural flow characteristics, and water quality. Water quality parameters that could be affected include turbidity, total suspended solids, nutrients, and bed load. Turbidity would generally be limited to the duration of instream construction (Reid and Anderson 1998). Associated direct effects on aquatic biota would generally be limited to the same time frame. However, excavated sediment deposited downstream can cause more protracted effects on fish habitat. Sediment transport to water bodies would depend on the location of the sediment source zone and the sediment transport efficiency in the watershed. Only one stream crossing would occur in soils that are sensitive to erosion and compaction. The use of BMPs, such as minimizing soil disturbance in the WIZ and reclaiming all temporary work areas after construction is completed, would minimize potential sedimentation in stream channels. The implementation of these measures would not eliminate effects on stream health and watershed conditions in the Project Area, but would ensure compliance with applicable Forest Plan guidance.

Flat Creek, a WDEQ 303(d) listed stream in the Project Area, currently has impaired stream health because of physical degradation. The proposed action is not likely to further contribute to degradation of this segment because there would be no surface disturbance in the WIZ along Flat Creek during construction activities. Alternative B is unlikely to have an effect on the designated beneficial uses of Flat Creek.

The stability of streambanks along Muddy Creek and Cliff Creek may be affected by Alternative B over the short term. These creeks have low geomorphic integrity ratings or greater than 20 percent of riparian miles functioning at risk or non-functioning. Removal of vegetation at stream crossings and TWAs could leave streambanks vulnerable to excessive erosion; however, the preservation of adequate vegetative cover to dissipate the erosive forces acting upon the channel banks during periods of high stream flows would be required, as specified in **Appendix D**. To minimize the potential effects, less than 1 acre of TWAs would be located in the WIZ along Cliff Creek. Only 1 acre of short-term disturbance and less than 1 acre of long-term disturbance would occur in the WIZ along Cliff Creek. There would be no TWAs in the WIZ along Muddy Creek and both short-term and long-term disturbance would be less than 1 acre. The following design criteria and BMPs, specified in **Appendix D**, would be applied to minimize the potential effects on streambank vegetation;

- Restoring and stabilizing streambanks to preconstruction elevations within 24 hours of completing instream construction activities;
- Locating construction staging and equipment service areas outside the riparian zone;
- Revegetation in accordance with a plan approved by the Forest Service;
- Streambank revegetation with plant communities rather than monocultures;
- Proper handling and storage of plants to assure healthy plantings;
- Establishing the plants used to stabilize the lower banks by transplanting; and
- Restricting access to the revegetated areas until community is established.

Alternative B may cause an increase in sedimentation related to TWAs, pipe installation, and stream and river crossings. Depending on the relationship between project activities and the WIZ, some of this sediment may enter stream channels and be transported downstream. Over the short term during construction activities, the WIZ along perennial streams or rivers would be affected by 25 acres of disturbance (pipeline, 22 acres and TWAs, 3 acres). The pipeline construction corridor would also affect 2 acres in the WIZ along intermittent streams. The potential for sediment from the construction corridor or TWAs to enter streams would be minimized by avoiding operations in the WIZ to the extent possible and using sediment barriers to keep sediment from entering surface waters.

Over the long term, the 20-foot wide pipeline maintenance corridor would affect 11 acres in the WIZ along perennial streams or rivers and 2 acres along intermittent streams. Sediment loads would decrease to background levels in the long term as vegetation becomes established in construction corridors and TWAs once these areas are reclaimed after pipeline installation.

The integrity of the constructed pipeline would be tested in sections, in accordance with permit conditions established by WDEQ, with water obtained from the Hoback River or other sources through a Water Use Agreement with the State Engineer and negotiations with water rights owners. In all, approximately 2 acre-feet of water would be used and then discharged to WDEQ-authorized outfalls on the Hoback River, designed in accordance with all federal, state, and local requirements and BMPs for protection of water quality and stream flows. No rust inhibitors would be added to the test water, and the water discharged would only contain minor amounts of sediment and iron oxide from the weld areas. In order to minimize water use and discharge impacts, the test water would be moved from the tested section to other sections for reuse during subsequent tests. The discharge rate would be regulated, and appropriate BMPs would be used to prevent erosion, streambed scour, suspension of sediment, and excessive streamflow. This hydrostatic testing of the pipeline would not be expected to cause noticeable impacts to water quality or quantity in the Hoback River.

Cumulative Effects by Alternative

The cumulative impact analysis area for streams and watershed resources encompasses the watersheds that contain the Project Area.

Alternative A - No Action

Past, ongoing, or reasonably foreseeable activities or events would have a cumulative effect on streams and watershed resources under Alternative A. Current and historic land uses and ongoing management activities in the Project Area contribute to the cumulative effects on streams and watershed resources. The effects from roads are currently evident and are likely to become more evident over time. The documented effects on stream health and watershed condition are primarily related to the following management activities; historic grazing, Hoback Canyon highway, flooding on Lamb and Kilgore Creeks, erosion from salvage sales, trail-stream crossings on Fisherman Creek and in the Shoal Creek Wilderness Study Area and portions of the Gros Ventre Wilderness, and poor location of existing roads. Effects on stream health and watershed conditions resulting from existing roads, grazing practices, natural hillslope instability, past flood damage, and weed invasions would continue. Watersheds with moderate or low geomorphic integrity ratings would continue to degrade without revised management.

Cumulatively, activities on adjacent lands that may affect streams and watersheds include vegetation management, fuel treatments, rangeland management, residential and commercial areas, road construction and maintenance, and recreational activities. The cumulative effects from these activities should be short-lived because effective design criteria, BMPs, and reclamation procedures would be implemented. Events,

such as wildland fires, also would have a cumulative effect on streams and watersheds. Although BMPs and design criteria would not apply to wildland fires, burned area recovery plans would be developed to rehabilitate affected areas.

Specific current and foreseeable projects that may affect streams and watershed include:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Horse Creek Feedground Connector Road, construction of approximately 500 feet of low service road on the Horse Creek Plateau (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)
- Cottonwood II Integrated Projects, vegetation management of 975 acres and prescribed burning of 1,000 acres of aspen, and Maki Creek, vegetation management of 214 acres and prescribed burning of 2,000 acres (BTNF)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- Wyoming Range Allotment Complex, sheep grazing, projected sedimentation to Hoback watershed (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

The effects of the projects listed would occur sporadically over several years, mostly during spring through fall, and would continue for the duration listed. Highway reconstruction and improvements would occur for extended periods. Prescribed fire would be used to restore the vigor of aspen and improve habitat. Other vegetation treatments, including prescribed fire, also would be used to improve the health and structure diversity of forested areas and shrublands over the long term.

Over the long term, 90 percent of all wildland fires would be controlled at less than one acre (USFS 2004b). Effects on streams and watersheds have occurred in the past and would be expected in association with future wildland fires. Large intense fires would be infrequent, but could result in considerable erosion and sedimentation in watersheds where vegetative cover is lost.

The management of Snake River flows may negatively affect riparian areas and watershed resources. Riparian cottonwood communities depend on periodic flooding to remain vigorous. Within the Jackson area, natural flooding patterns have been modified through controlled releases of water from Jackson Lake Dam and the construction of flood prevention dikes along some river segments. This interference with the natural pattern of river flows has the potential to adversely impact watershed resources.

Alternative B- Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects. Alternative B may cause a slight increase in cumulative effects on streams and watershed in conjunction with all other past, present, and reasonably foreseeable future activities in the region. Reasonably

foreseeable Forest Service management activities in the Project Area would not be expected to contribute to cumulative conditions that would not meet Forest Plan guidance.

The effects on stream health and watershed conditions related to the proposed pipeline would be small compared with the effects from other ongoing and foreseeable management activities. Most effects from the proposed pipeline would be short-term and localized because of the implementation of design criteria and BMPs that would reduce the transport of sediment and prevent most project-related sediment from reaching streams that are down gradient. The short-term impacts observed as a result of pipeline water crossings would be minor and transitory when compared with the more chronic degradation of stream and river ecosystems caused by sediment loading from other land uses, including urban development and various agricultural, forestry, and mining practices (Waters 1995).

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

There would be no irreversible commitments of streams and watersheds under any alternatives. No violations of applicable state or federal water quality regulations or standards are expected to occur as a result of activities under the Proposed Action.

4.2.3 Soils and Geology

Indicators

- Soil disturbance (acres)
- Disturbance in sensitive soils susceptible to erosion, compaction, or revegetation failure (acres)
- On-site erosion (tons per acre – first year following pipeline installation)
- On-site erosion (tons per acre – fifth year following pipeline installation)
- Disturbance in areas with steep slopes or slope stability concerns (acres)
- Disturbance in active or potentially active landslides or debris flows (acres)
- Compliance with Soil Management Standard for special geotechnical/slope stability design to control risk of mass wasting and sedimentation (Forest Plan, page 136)

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A - No Action

Soils

There would be no effects on soil resources in the Project Area under the No Action alternative. Sensitive soils would remain, but they would not be affected beyond the current condition. Soil erosion in the Project Area would depend on future and current management activities.

Under the No Action alternative, projected annual soil loss from sensitive soils under the existing conditions in the Project Area ranges from approximately 0.02 to 1.66 tons per acre per year. These calculations are documented in the *Project File*.

Geology

There would be no effects on geologic resources in the Project Area under the No Action alternative that would be associated with the transport of LNG to Jackson by tanker truck along existing highways. Movement on slides would be in response to natural processes and current conditions under the No Action alternative. Bedrock slump blocks, translational landslides, debris slides, earth flows, and debris flows have occurred in the Project Area and would be expected to continue to occur where slope hazards and landslides exist. The following causes of landslides apply to the Project Area: increase in water content initiated by abnormally high rainfall or snowmelt; seismic shaking; liquefaction, weathering of rock material; and expansion of clays. The estimate for potential movement in a slide event under current conditions ranges from a few inches to tens of feet.

Alternative B- Proposed Action

Soils

The most noticeable effects on soil resources would occur during and immediately following installation of the proposed pipeline, within the first year following the disturbance during construction. Pipeline construction activities would potentially affect soil surface cover, soil productivity, sedimentation, runoff, and erosion. These effects would decline in the years following the disturbance because of implementation of BMPs and design criteria included in **Appendix D**, including specifications for the removal, storage and replacement of topsoil (A-horizon) and subsoil (B-horizon), revegetation procedures, and installation of short- and long-term erosion and sediment controls. As time passes following reclamation of the areas disturbed during construction, the magnitude and intensity of soil erosion would decline considerably. Soil erosion would be minimal 5 years following implementation of the proposed project.

Effects on soils and their productivity resulting from the implementation of Alternative B would be relatively localized. Effects are expected to be relatively short-term (e.g., less than 5 years in the case of erosion). Design criteria would reduce short-term effects considerably and help eliminate most long-term soil effects. The effects on soil resources in the Project Area would result from pipeline construction activities including clearing and grading, excavation, and pipe installation. The grading, construction traffic, equipment storage, and excavation associated with TWAs would also affect soil resources.

The disturbance of sensitive soils (i.e.; high erosion and compaction ratings, severe to very severe revegetation limits, and stability ratings of marginally unstable or unstable) resulting from construction activities along the pipeline corridor and in TWAs would be limited to 1 acre of disturbance associated with stream crossings, 3 acres of short-term disturbance associated with the construction corridor, and 2 acres of long-term disturbance associated with the 20-foot wide pipeline maintenance corridor.

TWAs would be used for construction activities requiring additional workspace. Soil erosion would be increased where the removal of vegetation is required. The exposure of unconsolidated cut and fill slopes also would increase soil erosion. None of the TWAs would affect sensitive soils.

An estimated 4 acres of short-term disturbance would occur on sensitive soils (1 percent of the total short-term disturbance of 370 acres). Long-term disturbance affecting 2 acres of sensitive soils would represent about one percent of the long-term disturbance of 120 acres. Pipeline construction activities may adversely affect the productivity of sensitive soils primarily due to accelerated water erosion caused by soil exposure to rain drop impact, reduced infiltration and permeability caused by compaction, modification of surface drainage patterns, and disruption of vegetation, surface litter, and soil organic matter. Soils would be displaced by the operation of construction equipment and excavation of trenches.

The average annual soil erosion rates for Alternative B were estimated according to the type of disturbance on sensitive soils proposed using the Revised Universal Soil Loss Equation (RUSLE) (Renard, et al. 1997). The RUSLE is a technology for estimating potential soil loss from most native lands, lands undergoing construction, newly reclaimed lands, and reclaimed lands with established vegetation (Toy and Foster 1997). The approach is based on the Universal Soil Loss Equation (USLE) described by Weischmeier and Smith (1965, 1978). The RUSLE equation is described in *Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06* (Toy and Foster 1997) and *Design Hydrology and Sedimentology for Small Catchments* (Haan, et al. 1994, pages 249-284). It is important to note that the RUSLE approach is a relative predictor of soil loss from hillslopes, it does not predict erosion rates at the level of precision indicated by the calculated values, and it does not estimate sediment yield. Sediment yield would be less than soil loss because some of the eroded soils would not reach streams.

Soil loss rates were estimated in tons per acre per year for the year following construction (Year 1), and four years following construction (Year 5), for each sensitive soil. These calculations are documented in the *Project File*. These time periods were selected based on management guidance in the Forest Plan. The estimated average annual erosion rates for Year 1 and Year 5 are based on estimates of soil loss. These erosion rates were calculated on a per-acre basis following disturbance in Year 1 based on the construction activities proposed and general site characteristics (e.g. slope and soil type). The estimated land disturbance was multiplied by the predicted annual erosion rate on a per-acre basis to model the estimated soil loss following disturbance in Year 1 (0.76 to 4.91 tons per acre per year). The modeled soil loss in Year 5 would be 0.16 to 1.06 tons per acre per year, compared with the projected annual soil loss under the existing conditions (0.02 to 1.66 tons per acre per year). The range of estimates for soil loss in Year 5, compared with existing conditions for sensitive soils, indicates management guidance in the Forest Plan that requires a 95 percent reduction in soil loss within 5 years following project implementation would be met under Alternative B.

Effects on soil resources would be avoided or minimized by following BMPs specific to the BTNF and the design criteria in **Appendix D**. The soil-limiting properties and the types of disturbance were used to develop the BMPs described in **Appendix D**. The BMPs would be implemented regardless of the overall sensitivity of the soils. Selection of BMPs and design criteria were based on the effectiveness of specific BMPs and design criteria in treating the site characteristics that would be encountered, including the proposed type of disturbance, soil type, landscape and hydrologic position, slope aspect and gradient, climate, and sensitivity of nearby resources.

The mixing of topsoil with subsoil during pipeline trenching, backfilling and grading activities could result in a loss of soil productivity. During soil storage and following soil replacement, BMPs and design criteria in **Appendix D** would be implemented to minimize these potential effects. Topsoil would be removed and replaced as soon as practical, and the A horizon would be separately segregated, stored temporarily, and then evenly redistributed during site reclamation. The B horizon would be treated in the same manner, unless it is greater than 40 percent clay. Temporary storage locations for topsoil would be located outside the influence of construction activities, would not be in or immediately adjacent to drainages, and would be located where full retrieval of topsoil is feasible. Topsoil would be stored in a manner that maximizes surface area and minimizes depth. If needed, surface mulch or other comparable erosion control practices would be applied to the stored soil to reduce erosion losses during pipeline construction activities. Sediment controls (e.g. silt fences, straw bales, berms, sediment traps) would be installed to prevent sediment transport offsite and prevent effects on undisturbed lands, stream, rivers and drainages. During backfilling, the stored subsoil (B horizon) would be placed back into the trench first, followed by the topsoil (A horizon). The reclaimed trench would be mounded above the predominant grade so that after settling occurs, the original contour of the ground surface would be restored.

The grading, construction traffic, and excavation associated with pipeline construction and TWAs could cause soil erosion. Soil erosion would be minimized using BMPs and design criteria in **Appendix D** that address short- and long-term erosion control techniques, such as surface roughening, mulching, erosion control fabric, revegetation and installation of surface drainage systems. Sediment control would take into account drainage density, slope position and configuration, and subsurface flow conditions. Sediment controls such as silt fencing, rock and straw bale check dams would also be implemented. Slopes greater than 40 percent would be furrowed on the contour.

Clearing and grading, construction traffic, and equipment storage could cause soil compaction. Soil compaction would be minimized by limiting vehicle and equipment use on snow, frozen, or saturated soil conditions. In addition, disturbed areas would be scarified following soil replacement and prior to reseeded. A minimum of 80 percent of the reclaimed area would be left in a condition of acceptable soil productivity potential.

Establishing a permanent vegetative cover over reclaimed areas would minimize effects on soil resources. Revegetation would be initiated as soon as possible or within one month after completion of ground disturbing activities, which ever is shorter, unless otherwise directed by the Forest Service. Seeding would be done on slopes greater than 25 percent, in areas with low initial herbaceous cover, on all areas in a dry year, and in all areas where there is resource damage potential (e.g.; upslope of stream). The Forest soil scientist or reclamation specialists would be consulted immediately prior to construction activities to determine those areas that would not require seeding. Where the re-establishment of desired species of native vegetation is likely to occur without seeding, this revegetation process is preferred over seeding. Where seeding is required, it would be applied directly at a competitive density during the fall. Forest Service recommended seed mixes with native species or species that would not prevent the eventual establishment of native vegetation, specific to the community type, would be used. All areas would be mulched with certified weed-free hay at a rate of 2 tons per acre. Hay would be crimped into the soil surface on slopes greater than 20 percent. Woody nursery stock would be used where revegetation limitations are severe and the predisturbance community is composed of woody vegetation.

The implementation of the BMPs and design criteria described in **Appendix D** would reduce detrimental soil effects of erosion, compaction, and alteration soil structure associated with Alternative B, but would not eliminate soil disturbances associated with Alternative B in the Project Area. Surface disturbing activities under Alternative B would not be expected to contribute to soil effects that would not meet Forest Plan management guidance.

Geology

Bedrock slump blocks, translational landslides, debris slides, earth flows, and debris flows have occurred in the Project Area and would be expected to continue to occur under Alternative B in response to natural processes and current conditions where slope hazards and landslides exist. The greatest alteration of existing factors influencing slope stability under Alternative B would occur during and immediately following the installation and reclamation of the proposed pipeline. As time passes, the magnitude and intensity of these effects would decline as vegetation re-establishes on disturbed areas.

Geologic effects focus on the factors that influence landslides and slope hazards in the Project Area and the potential effects of pipeline construction activity on slope failures. Proposed project activities under Alternative B could activate or contribute to the activation of new landslides, or enlarge existing landslides. The design criteria described in **Appendix D** would be implemented to minimize slope movements that could be related to implementation of Alternative B. Special design criteria identified through geotechnical evaluations (Plumley 2005) would be incorporated to comply with Forest Plan standards, as needed, to control the risk of mass wasting. The implementation of these measures would

not necessarily ensure that the hazards associated with movement of the landslides in the Project Area could be eliminated. However, these measures should reduce the likelihood of slope movements caused by the implementation of the proposed project.

Activation and enlargement of existing landslides or development of new landslides could cause significant damage to private property, structures, and U.S. Highway 189/191, damming of the Hoback River, and possibly injuries. Landslides have been credited with a large percentage of ruptures in modern pipeline engineering (Plumley 2005). Movement of landslides progressively strains the pipe until a buckling or wrinkling of the pipeline results in failure. Ruptures caused by landslides typically result in gas ignition. Approximately 9 acres of the pipeline construction corridor and TWAs are located in potential landslide areas (2 percent of the proposed disturbance area). Therefore, the proposed pipeline could potentially affect and be affected by landslides.

The causes of potential slope movements that could be related to pipeline construction would be excavation at the toe of a slope, addition of material on slopes, shocks and vibrations from equipment operation and tree felling, increased water content and removal of lateral support caused by the removal of trees and clearing of vegetation, increased snow accumulation on the pipeline corridor, or the concentration of runoff from TWAs. The conditions of gradient and material mass must be present to initiate movement.

The pipeline would cross an area covered by a series of landslide deposits immediately south of Camp Creek Saddle. Results of surface and subsurface investigations by Plumley (2005) indicate that a buried pipeline in this area could affect several active earth flows. Experience with similar slides indicates that these landslides become reactivated during high precipitation events. A wet precipitation cycle can trigger movements of up to several feet or more (Plumley 2005). Ground deformation associated with the landslide movement can cause bending and subsequent rupture of a buried pipeline.

The risk associated with the Camp Creek Saddle earth flow would be reduced by installation of the pipeline on the surface (Plumley 2005). Surface installation has been used to mitigate damage associated with pipeline burial in active landslide areas. Monitoring would be used to determine when intervention is necessary to avoid the possibility of translational movement of the earth flows overriding the pipeline (Plumley 2005). The monitoring program would include regular visual inspection and strain gauge monitoring of the slide area to track earth flow movements. A contingency plan for intervention that would include excavating the pipeline to free the pipe of the impinging soil mass, or taking the pipeline temporarily out of service to readjust the pipe and relieve strain. An adequate monitoring program for the pipeline and a contingency plan for intervention would mitigate potential effects of continued ground movements in the Camp Creek Saddle area..

An estimated 6 acres of short-term disturbance associated with the pipeline construction corridor would occur in areas with landslides and slope stability concerns (2 percent of the total short-term disturbance of 370 acres). Long-term disturbance associated with the pipeline maintenance corridor would affect 3 acres in areas with landslides and slope stability concerns, or about 2 percent of the total long-term disturbance of 120 acres. Areas that would be affected have been evaluated in a geotechnical investigation (Plumley 2005) and the recommendations of that investigation have been followed in designing the proposed pipeline. No areas with landslides or slope stability concerns have been identified within any TWAs that would be used during construction activities.

Cumulative Effects by Alternative

The cumulative impact analysis area for soils and geology encompasses the watersheds that contain the Project Area.

Alternative A - No Action

Past, ongoing, or reasonably foreseeable activities or events would have a cumulative effect on soils and geology under Alternative A. Grazing, roads, logging, and recreation have historically affected the land. The effects from these land uses include soil erosion, soil compaction, and loss of productivity. The effects from roads are currently evident and are likely to become more evident over time.

Current management activities include vegetation management, fuel treatments, road construction and improvements, and rangeland management. The cumulative effects of these activities on soil resources would be a short-term soil loss followed by reclamation activities appropriate for the type of disturbance. This soil loss would be small compared with the contribution from historic land uses described above. Reasonably foreseeable Forest Service management activities in the project area would not be expected to contribute to cumulative conditions that would exceed soil disturbance or productivity standards in the Forest Plan. Cumulatively, activities on adjacent lands that may affect soils and geology include vegetation management, fuel treatments, agriculture, residential and commercial areas, road construction and maintenance, and recreational activities.

Movement on landslides would be in response to natural processes and current conditions under the No Action alternative. Landslides could be triggered during management activities including road construction or vegetation management, or after vegetative cover is destroyed by a wildland fire. Roads and large, intense wildland fires likely pose the highest risk to geologic stability in the Project Area. Bedrock slump blocks, translational landslides, debris slides, earth flows, and debris flows have occurred in the Project Area and would be expected to continue to occur where slope hazards and landslides exist. Effects from landslide movements could be extensive, including blockage of highways and roads, damage to developed structures, erosion, and sedimentation. A landslide occurring along a highway corridor or in an area that receives high recreation visitation, such as the Project Area, could injure Forest visitors.

The cumulative effects from management activities should be short-lived because effective design criteria, BMPs, and reclamation procedures would be implemented. Events, such as wildland fires, also would have a cumulative effect on soils and geology. Although BMPs and design criteria would not apply to wildland fires, burned area recovery plans would be developed to rehabilitate affected areas. Specific current and foreseeable projects that may affect soils and geology include:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Horse Creek Feedground Connector Road, construction of approximately 500 feet of low service road on the Horse Creek Plateau (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)
- Cottonwood II Integrated Projects, vegetation management of 975 acres and prescribed burning of 1,000 acres of aspen, and Maki Creek, vegetation management of 214 acres and prescribed burning of 2,000 acres (BTNF)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)

- Wyoming Range Allotment Complex, sheep grazing in Hoback watershed (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

The effects of the projects listed would occur sporadically over several years, mostly during spring through fall, and would continue for the duration listed. Highway reconstruction and improvements would occur for extended periods. Prescribed fire would be used to restore the vigor of aspen and improve habitat. Other vegetation treatments, including prescribed fire, also would be used to improve the health and structure diversity of forested areas and shrublands over the long term.

Over the long term, 90 percent of all wildland fires would be controlled at less than one acre (USFS 2004b). Effects on soils and geology have occurred in the past and would be expected in association with future wildland fires. Large intense fires would be infrequent, but could result in mass wasting and considerable erosion and sedimentation in watersheds where vegetative cover is lost.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects. Alternative B may cause a slight increase in cumulative effects on soils and geology in conjunction with all other past, present, and reasonably foreseeable future activities considered. Reasonably foreseeable activities in the Project Area would not be expected to contribute to cumulative conditions that would not meet Forest Plan guidance.

The effects on soils and geology conditions related to the proposed pipeline would be small compared with the effects from other ongoing and foreseeable management activities. Most effects from the proposed pipeline would be short-term and localized because of the implementation of design criteria and BMPs that would reduce soil erosion, compaction, and the transport of sediment related to pipeline construction. Slope stability in the Project Area could potentially be affected by pipeline construction. While design criteria and BMPs would be implemented for all foreseeable projects, the combination of multiple land uses and continuing alteration of the surface could cumulatively affect slope stability and geologic resources.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

There would be no irreversible commitments of soils and geology under any alternatives. Any noticeable soil impacts related to Alternative B would be short-term and should have not long-term consequences. Soil lost during project activities would represent an irretrievable commitment of resources.

4.3 THE BIOLOGICAL ENVIRONMENT

The biological environment is made up of vegetation and animals. When combined with the physical environment, they interact to form an ecosystem. The biological environment is discussed in two subsections: vegetation (including wetlands, rangeland resources, special status plant species, and noxious weeds) and wildlife and fisheries (including special status species).

4.3.1 Vegetation, Including Wetlands, Rangeland Resources, Wildland Fire Hazards, Special Status Species, and Noxious Weeds

Indicators

- Effects on vegetation, by vegetation type
- Wetland and riparian disturbance (acres)
- Effects on streambank vegetation
- Effects on rangeland resources and livestock grazing
- Effects on wildland fire hazards
- Effects on Special Status Plant Species - Proposed, Threatened and Endangered Species, Forest Service Sensitive Species, and Management Indicator Species (MIS)
- New disturbed areas susceptible to noxious weed infestation (acres)

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A -- No Action

Under Alternative A, the proposed pipeline would not be built and no land disturbance associated with the proposed project would occur. Tanker trucks would continue to transport LNG to Jackson along the existing highway.

Noxious weed infestations typically occur along roads and other transportation corridors. Currently, any known populations are monitored and treated accordingly. This practice would continue for all existing and newly discovered infestations. Under Alternative A, tanker trucks transporting LNG to the Jackson area would not directly affect vegetation resources. However, existing tanker truck traffic and projected increases in tanker trucks could potentially contribute to the spread of weeds along the highway corridor.

The spread of invasive species has the potential to indirectly affect other vegetation resources. Invading species can drastically shape the landscape by out-competing native and desirable species. This can be problematic for sensitive species and can occur in all vegetative communities. Wetlands are particularly susceptible to weed colonization due to the availability of free water and the effective dispersion of weed seeds by flowing water. Though livestock avoid many weed species, they can also spread weed seeds. Their avoidance of weed species can increase the weed density in grazed pastures through selective grazing. Weeds can also contribute to fuel loading and wildland fires, such as with cheatgrass.

Tanker truck incidents involving a fire are more likely to occur than pipeline incidents involving a fire. The use of tanker trucks to deliver gas to Jackson under the No Action alternative is more likely to involve the risk of a wildland fire escaping from the scene of an incident.

While incident accounts of LNG tanker truck crashes indicate the release of LNG is not common (CH-IV International 2006), a 1980's test of a pool fire involving 10,000 gallons of LNG, the amount of LNG transported in one tanker truck, generated a cone-shaped fire 60 feet in diameter and 250 feet high (Daily Astorian 2007).

There would be no other direct or indirect effects on vegetation resources, including forested vegetation, special status plant species, wetland and riparian areas, or rangeland resources under Alternative A.

Alternative B – Proposed Action

Proposed pipeline construction would alter vegetative communities, including an overall reduction in forested habitat. However, due to the limited area affected, the reduction in forested habitat would have minimal impact on vegetation resources. The incidental removal of individual trees within the pipeline construction corridor would have no effect on timber or habitat type and would not fragment existing habitats. Wetlands would be temporarily affected by construction activities, but these habitats are limited in extent, which would reduce overall impacts. Grazing and fuels are not likely to be affected by activities implemented in compliance with the design criteria in **Appendix D**. Special status plant species could potentially be affected by the destruction of individuals and habitat. The potential for the spread of weeds would be high due to projected surface disturbance and use of existing roads and highways during pipeline construction. Additional discussion of these projected impacts is provided below.

Vegetation within the Project Area would be altered by the removal of most existing vegetation within the 75-foot construction corridor during the installation of the proposed pipeline. Most of the disturbance, including disturbance of forested habitats, would occur within 125 feet of the existing highway. An estimated 370 acres would be disturbed in the construction corridor and temporary work areas. Of that total, 250 acres would be reclaimed and restored to preexisting conditions. The remaining 120 acres would be revegetated with grasses and other herbaceous plants only (no shrubs or trees) and maintained as a 20-foot wide pipeline maintenance corridor. This would result in a net loss of forested habitat within the Project Area that would be converted to non-forested cover types.

Vegetation Types

Table 4-4 shows the projected disturbance to vegetation types within the Project Area from implementation of Alternative B. Approximately 34 acres of forested habitat would be disturbed during construction of the pipeline, of which 13 acres would remain in a non-forested cover type as part of the pipeline maintenance corridor.

TABLE 4-4 PROPOSED VEGETATION DISTURBANCE – (ACRES)

Vegetation Type	Short-Term Disturbance	Long-Term Disturbance
Aspen	9	3
Douglas-fir	4	2
Lodgepole pine	17	6
Engelmann spruce/Subalpine fir	4	2
Riparian	15	6
Non-forested	109	40
No Data (outside National Forest)	212	61
Total Disturbance	370	120

Along portions of the proposed pipeline that are not adjacent to the existing highway, west of the Rim in T.37N. R.111W. and T.37N. R.112W., the pipeline corridor would cut through forested habitat along an existing powerline right-of-way. The proposed disturbance is not extensive enough, nor would it alter enough of a single habitat type to contribute to habitat fragmentation. Habitat fragmentation would require disturbance on a much larger scale than the proposed disturbance. The proposed disturbance of forested habitat could create an edge effect, which could allow potentially undesirable species to enter the affected forested areas along the pipeline corridor.

Wetlands and Riparian Areas

A total of 53 jurisdictional wetlands covering 30.68 acres, provisionally identified within or immediately adjacent to the proposed pipeline disturbance corridor, would be affected temporarily by the proposed project. Wetland vegetation and function would be restored in accordance with **Appendix D** after construction activities are completed. No loss of wetland acres or function is anticipated over the long-term.

Five sites provisionally identified as Waters of the U.S. (WUS) and encompassing 1.84 acres, occur within the proposed pipeline disturbance corridor and would be affected by the proposed project. WUS are located in the following areas along the proposed pipeline disturbance corridor:

- T.36N. R.112W., Sections 1 and 2;
- T.36N. R.112W., Section 12;
- T.36N. R.112W., Section 25;
- T.38N. R.113W., Section 33; and
- T.38N. R.114W., Section 5.

A total of 15 acres within riparian areas on NFS lands would be temporarily affected. Riparian vegetation would be restored in accordance with **Appendix D** after construction activities are completed. No loss of riparian areas is anticipated over the long term.

The riparian areas along the Hoback River are within the existing highway corridor, and were previously affected by highway construction. These riparian areas would be trenched for the installation of the pipeline. Topsoil would be salvaged and then replaced after the pipe is installed. Any surface water in the pipeline corridor would be diverted away from the construction zone by a small dam upstream of the construction zone. Water would be pumped downstream, outside the construction zone. This diversion would typically be completed within 48 hours, so it would be unlikely that vegetation damage would occur because of extended periods without water. Additionally, construction would occur during low flow (August through October) in riparian areas. Vegetation would only be cleared to provide sufficient workspace and temporary fill would be used to stabilize the working area. Timber mats or other supportive material would be placed to protect saturated soils. The excavated trench would be 4 to 5 feet wide and 6 feet deep. Should standing water or unstable soils interfere with construction, the trench would be dewatered by pumping. The water removed from the trench would be disposed of in accordance with WDEQ regulations.

Within 24 hours after construction activities are completed, the banks would be regraded to the preexisting elevation profile and stabilized. Additionally, the width of the construction corridor would be reduced at stream crossings. None of the wetlands delineated within the Project Area are a forested wetland type. Occasional trees would be removed during construction in wetland areas, but removal would not affect the overall community type. Streambank vegetation would be restored in riparian areas in accordance with **Appendix D** after construction activities are completed.

Aspen

An estimated 9 acres of NFS lands in an aspen cover type would be affected by the proposed project. No data are available on vegetation types occurring on non-NFS lands. Because older age classes dominate in aspen stands in the Project Area, limited removal of aspen in the construction corridor by cutting could stimulate sucker growth or reinvigorate a stand. Eventual regrowth of aspen outside the pipeline maintenance corridor following installation of the pipeline would diversify aspen stand structure by providing 3 acres in a stand initiation structure (seedling/sapling category).

Rangeland Resources

Effects on livestock grazing and rangeland resources would be low because of the large size of the allotments compared with the small area disturbed during construction (**Table 4-5**). Temporary fencing would most likely be installed, as needed, to reduce conflicts with construction activities. There would be no effects on livestock grazing after construction is completed, as the disturbed areas would be revegetated in accordance with the design criteria in **Appendix D**. Weeds could be introduced into disturbed areas by construction activities or livestock. New weed infestations would be treated in accordance with the design criteria in **Appendix D**.

TABLE 4-5 PROPOSED DISTURBANCE BY GRAZING ALLOTMENT (ACRES)

Allotment	Size	Short-Term Disturbance	Long-Term Disturbance
Fisherman Creek C&H Allotment	47,676	47	17
Graveyard Hill C&H Allotment	1,182	18	7
Hoback C&H Allotment	108,913	35	13
Jack Creek C&H Allotment	32,385	4	1
Total Disturbance in Allotments		104	38

Wildland Fire Hazards

Direct effects on wildland fire hazards and fuels from construction activities would be minimal. Only areas cleared for construction would likely be affected. All woody material removed from the construction zone would be temporarily stockpiled and disposed of according to direction provided by the Forest Service or the affected landowner, and in accordance with **Appendix D**. This could include, but would not be limited to, placing fuels along a public road for removal for firewood, burning, or using onsite for erosion control or wildlife habitat. Any fuels left for removal as firewood would be placed near a road where there would be little effect on the spread of potential wildland fires. Use for erosion control or wildlife habitat would have little effect because only a small amount of fuels would be distributed over a large area. Burning in slash piles would follow strict guidelines provided by the Forest Service and would be closely monitored. Burning would also be completed where woody material is unusable and would require consultation with the Forest Service.

Accidental ignitions by construction crews or equipment could result in a wildland fire. A fire prevention program would reduce the risk. Requirements included in **Appendix D** would reduce the potential risk of a wildland fire caused by project construction activities.

Although pipeline incidents involving a fire are unlikely to occur, it is possible that a pipeline incident involving a fire could occur. A pipeline incident involving a fire could involve the risk of a wildland fire escaping from the scene of the incident.

Special Status Species

Special status plant species could potentially be affected by the destruction of individuals and habitat. There are no known occurrences of, and therefore no direct or indirect effects to, any Proposed, Threatened, or Endangered plant species within the Project Area. Effects on other special status plant species (Forest Service Sensitive Species and MIS, and State of Wyoming Species of Concern) are summarized below in **Table 4-6** and in **Appendix F**, which contains the Biological Evaluation for the proposed project.

As shown in **Table 4-6**, three Forest Service Sensitive Species, soft aster, Payson’s milkvetch (also a Management Indicator Species or MIS), and Payson’s bladderpod, and one other MIS (boreal draba) are known to occur and could potentially be affected; however, there are no known occurrences within the construction corridor or temporary use areas. Habitat for soft aster is widespread within the Project Area, but known populations are located outside the construction corridor. Activities associated with pipeline installation could create new habitat for Payson’s milkvetch, which is associated with disturbed areas. The pipeline route avoids habitats where Payson’s bladderpod and boreal draba are found.

Under Alternative B, surface disturbing activities would affect 9 acres of aspen, an MIS ecological indicator species for aspen habitat, in the short term and 3 acres of aspen over the long term. Aspen cut during pipeline construction activities would be expected to respond with stimulated sucker growth, which would invigorate the affected stands. The projected short-term disturbance to aspen, 9 acres out of 2,957 acres of aspen occurring in the project area, represents a very small percentage of aspen in the project area that would be affected. Long-term disturbance to 6 acres of aspen also represents a small percentage. Aspen is very abundant on the BTNF, with 145,746 acres Forest-wide included in cover types that contain more than 30 percent aspen. Therefore, the proposed project is unlikely to affect aspen populations or trends Forest-wide.

The proposed project is unlikely to affect populations or trends Forest-wide for MIS plant species. Additional information on populations and trends for MIS plant species is contained in the *Project File* at Big Piney Ranger District Office in Big Piney, Wyoming.

Three State of Wyoming Species of Concern, flat-top broomrape, fragile rockbrake, and creeping campion, are known to occur within the Project Area (**Table 4-6**). Only one known occurrence of flat-top broomrape is located within the 75-foot construction corridor. Although this occurrence is documented to be 50 feet away from the proposed pipeline, it could be affected by construction activities.

TABLE 4-6 EFFECTS ON SPECIAL STATUS PLANT SPECIES

Common Name	Species Status	Summary of Effects
Sweet-flowered rock jasmine	Forest Service Sensitive Species, BTNF MIS	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs at higher elevations on rocky soils or beneath shrubs in leaf litter. Impacts to this species are likely to be minimal because the Project Area is at the lower end of the elevation range for this species.
Soft aster	Forest Service Sensitive Species	Occurs in sagebrush grasslands at the edge of aspen or pine woodlands. Known populations are located within the Project Area but outside the construction corridor. Construction activities could affect this species because of its widespread habitat within the Project Area.
Meadow milkvetch	Forest Service Sensitive Species	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs in moist meadows in sagebrush valleys. Construction activities could affect this species because of the widespread habitat within the Project Area.
Starveling milkvetch	Forest Service Sensitive Species	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs in dry barren ridges and bluffs. Impacts to this species are likely to be minimal because the proposed pipeline was designed to avoid these types of habitats because of slope stability issues.

TABLE 4-6 EFFECTS ON SPECIAL STATUS PLANT SPECIES

Common Name	Species Status	Summary of Effects
Payson's milkvetch	Forest Service Sensitive Species, BTNF MIS	Occurs in disturbed settings. Known populations are located within the Project Area, but outside the construction corridor. Construction activities could affect this species because of the widespread habitat for the species within the Project Area. Activities associated with pipeline installation could also create new habitat for the species.
Shultz milkvetch	BTNF MIS	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs at high elevations in subalpine forb communities. Impacts to this species are likely to be minimal because the Project Area is at the lower end of the elevation range for the species.
Slender moonwort	Forest Service Sensitive Species	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs in disturbed settings, though little is known about its preferred habitat in the area. Construction activities could affect this species because of the widespread disturbed settings within the Project Area. Activities associated with pipeline installation could also create new habitat for the species.
Fragile Rockbrake	State of Wyoming Species of Concern	Occurs on moist, north-facing cliffs and slopes and along shady streambanks. One known occurrence in the Project Area is located outside the construction corridor. Construction activities could affect this species because the elevation of the Project Area is within the range for the species. Activities should not affect the species substantially as impacts to these habitats would be minimal because steep cliff habitat would be avoided and construction disturbance in streamside habitats would be reduced.
Wyoming tansymustard	Forest Service Sensitive Species, BTNF MIS	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs on sparsely vegetated sandy slopes at the base of cliffs. Impacts to this species are likely to be minimal because the Project Area is at the lower end of the elevation range for this species and the proposed pipeline was designed to avoid these types of habitats because of slope stability issues.
Boreal draba	BTNF MIS	Occurs in moist habitats such as north-facing limestone cliffs and along shady streamsides. Known populations are located within the Project Area but outside the construction corridor. Impacts to both of these habitats would be minimal because steep cliff habitat would be avoided and construction disturbance in streamside habitats would be reduced.
Payson bladderpod	Forest Service Sensitive Species	Occurs on rocky sparsely vegetated slopes. Known populations are located within the Project Area, but outside the construction corridor. Impacts to this species are likely to be minimal because the proposed pipeline was designed to avoid these types of habitats because of slope stability issues.
Flat-top broomrape	State of Wyoming Species of Concern	There is one known occurrence of flat-top broomrape along the 75-foot construction corridor. This occurrence was last documented in 1998 and is located approximately 50 feet southwest of the proposed pipeline near Cliff Creek, and likely would be just outside the construction corridor. This species is parasitic and is extremely difficult to locate when not in flower. Flat-top broomrape often persists for years underground without flowering. Construction activities could affect this species because habitat for the species is widespread within the Project Area and there is a known occurrence along the construction corridor.

TABLE 4-6 EFFECTS ON SPECIAL STATUS PLANT SPECIES

Common Name	Species Status	Summary of Effects
Creeping twinpod	Forest Service Sensitive Species	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs in barren, rocky, calcareous hills and slopes. Impacts to this species are likely to be minimal because the proposed pipeline was designed to avoid these types of habitats because of slope stability issues.
Greenland primrose	Forest Service Sensitive Species	This species has not been documented within the Project Area (WYNDD 2004), though potential habitat exists. Occurs in wet meadows and bogs along streams. Construction activities could affect this species because the elevation of the Project Area is within the range for the species, but would be unlikely to impact the species substantially because disturbance in streamside habitats would be reduced.
Creeping campion	State of Wyoming Species of Concern	This species is known from the Hoback Canyon area. Occurs on rocky slopes and ridges. One known population in the Project Area is located outside the construction corridor. Construction activities could affect this species because the elevation of the Project Area is within the range for the species, but would be unlikely to impact the species substantially because the proposed pipeline was designed to avoid these types of habitats to mitigate visual and slope stability issues.

Noxious Weeds and Invasive Species

The potential for weeds to spread would be high due projected surface disturbance and use of existing roads and highways during pipeline construction. An estimated 370 acres would be disturbed during construction activities using 50 or more pieces of heavy duty equipment and vehicles. Existing roads would experience increased traffic during construction by 150 or more workers. Numerous weed occurrences have been documented throughout the Project Area, primarily along existing roadways. With the increased traffic to more remote areas of the proposed pipeline, there could also be an increase in weed populations in these areas. Implementation of project design criteria in **Appendix D** would mitigate the potential effects of increased weed populations through requirements for monitoring and treatment.

The spread of invasive species has the potential to indirectly affect other vegetation resources. Invading species can drastically shape the landscape by out-competing native and desirable species. This can be problematic for sensitive species and can occur in all vegetative communities. Wetlands are particularly susceptible to weed colonization due to the availability of free water and the effective dispersion of weed seeds by flowing water. Though livestock avoid many weed species, they can also spread weed seeds. Their avoidance of weed species can increase the weed density in grazed pastures through selective grazing. Weeds can also contribute to fuel loading and wildland fires, such as with cheatgrass.

Cumulative Effects by Alternative

The cumulative impact analysis area for vegetation resources is the Project Area.

Alternative A – No Action

Past, ongoing, or reasonably foreseeable activities or events would have a cumulative effect on vegetation resources under Alternative A. Grazing, road construction and maintenance, logging, and fire suppression have historically affected the land. The effects from these land uses have included general shifts in vegetation types. Cumulatively, ongoing or projected activities or uses on adjacent lands that may affect vegetation resources would include vehicle traffic, highway maintenance, recreational activities,

residential areas, commercial developments, livestock grazing, use of available forage by wildlife, vegetation management, and fuels reduction. Events, such as wildland fires, also would have a cumulative effect on vegetation resources.

Specific current and foreseeable projects that may affect vegetation resources include:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Horse Creek Feedground Connector Road, construction of approximately 500 feet of low service road on the Horse Creek Plateau (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

The effects of the projects listed above would occur sporadically over several years, mostly during spring through fall, and would continue for the duration listed. While some of these projects may provide for enhancement of vegetation resources or forest health, others may alter habitats by removing vegetation or disturbing soil.

Projects contributing to cumulative effects in the Project Area include road construction and maintenance. Highway reconstruction and improvements would occur for extended periods over several years. New road construction and new disturbance along existing roads or highways could result in habitat fragmentation or provide corridors for weed seed transport. These factors would allow weeds to colonize previously unavailable areas.

Ongoing effects from removal and alteration of existing vegetation in the Project Area would contribute to cumulative effects on vegetation resources. Several fuels reduction projects are proposed within the Project Area. These activities could include, but are not limited to, prescribed burns, removal of standing and downed fuelwood, brush removal, and selective thinning and pruning. These activities typically would not change the overall vegetation type throughout the landscape, only stand density and understory composition in treated areas. New disturbance could result in habitat fragmentation or provide corridors for weed seed transport.

Vegetation treatments, including prescribed fire, would be used to reduce fuels and improve the long-term health of treatment units in forested areas and shrublands. Effects on vegetation would include pruning or cutting of dense or decadent vegetation followed by removal, mastication, chipping, prescribed broadcast burning, or pile burning to reduce fuels. Reasonably foreseeable Forest Service management activities would not be expected to contribute to cumulative conditions that would exceed vegetation management guidance in the Forest Plan.

Over the long term, wildland fires would occur in the Project Area, and 90 percent of all ignitions (fire starts) would be controlled at less than one acre (USFS 2004b). Effects on vegetation resources, including damage and destruction, have occurred in the past and would be expected in association with future wildland fires in the Project Area. Natural processes including weather conditions and the maturing of vegetation, and human-caused changes such as fire suppression and some ignitions, would result in the long-term alteration of vegetation structure in affected forested areas or shrublands. Large intense fires would be infrequent, but could result in the destruction and renewal of considerable vegetation resources. Burned areas could result in habitat fragmentation or provide corridors for weed seed transport.

Continued fire suppression is likely to advance the shift towards conifer dominated habitats. Over the long term, fire suppression would tend to preserve mature or decadent vegetation, and reduce the diversity of vegetation structure. The health of vegetation types dependent on young vigorous vegetation, such as aspen, would decline over time where wildland fires are actively suppressed.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects. Alternative B may cause a slight increase in cumulative effects on vegetation resources when considered with all other past, present, and reasonably foreseeable future activities in the Project Area.

The following effects would be added to the cumulative effects for Alternative A. Projected vehicle traffic during the construction phase of the project under Alternative B would increase the risk for the spread of noxious weeds and invasive species. Special status plant species could potentially be affected by the destruction of individuals and habitat.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

Available forage on 370 acres that would be disturbed during construction activities would be lost and not available to livestock or wildlife until revegetation of the disturbed areas is completed.

The permanent pipeline corridor (120 acres) represents a commitment to a vegetation type without trees or shrubs along the proposed route. A considerable portion of the area committed to this corridor would coincide with the existing highway corridor.

4.3.2 Wildlife and Fisheries, Including Special Status Species

Indicators

- Effects on species and habitats
- Effects on big game populations
- Effects on existing elk feedgrounds
- Effects on Federally Listed Species
- Effects on Forest Service Sensitive Species
- Effects on Management Indicator Species (MIS)
- Effects on migratory birds

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A - No Action

Under the No Action alternative, the proposed pipeline project would not be built and liquid natural gas (LNG) would continue to be transported by tanker truck to Jackson along the existing highway. An estimated 500 to 600 round trips per year by tanker trucks along public highways would occur over the next five years. No land disturbance would occur under the No Action alternative.

Collisions between wildlife and tanker trucks transporting LNG could occur under the No Action alternative, injuring or killing those individuals involved in the accidents. Tanker truck traffic could cause disturbance to nesting birds during the breeding season where nests or lek sites are located near the highway. However, there are no known nest or lek occurrences along the highway corridor, other than the Porcupine Creek, Hoback Junction, and Hoback Campground bald eagle nesting territories. Tanker truck traffic along the highway corridor would be unlikely to affect bald eagle nesting territories. There would be no other direct or indirect effects on wildlife and fisheries under this alternative.

Alternative B – Proposed Action

Alternative B would result in a reduction of traffic by tanker trucks transporting LNG along public highways to the Jackson area. This would decrease the potential for disturbance to all wildlife species from tanker truck traffic and reduce the risk of collisions between wildlife and tanker trucks along the highway.

Short-term disturbance would result from construction activities along the pipeline corridor and use of temporary work areas (TWAs). State of Wyoming wildlife management areas and other wildlife habitats within the BTNF are restricted during designated times of the year when wildlife use these areas. Construction through wildlife habitats would be conducted during periods when use of these areas is not restricted.

Construction activities would be constrained to not affect the following species, habitats, and periods of use that are applicable to the Project Area.

- Crucial big game winter range from Nov 15 through Apr 30 (state feedgrounds)
- Crucial big game winter range from Dec 1 through Apr 30 (NFS lands)
- Elk calving areas from May 15-Jun 30 (NFS lands)
- Management zones I or II of active bald eagle nest sites (Feb 1 through Aug 15)
- Active peregrine falcon eyries (Mar 1 through Jul 31) or hack sites (Jul 1 through Sep 15)
- No instream construction from Mar 15 through Jul 31 to protect spawning trout.

Proposed construction to install the gas pipeline and processing facility could cause temporary displacement of wildlife and fish over a period of six months during construction activities. Displacement would be in response to habitat disturbance or the bustle of nearby activity, including the presence of materials, staging areas, construction workers, and equipment during the installation of the pipeline. Displacement of big game could be up to 0.5 mile during construction activities, however, most disturbance would be confined to areas within about 125 feet of the existing U.S. highway, in an existing linear disturbance area. Therefore, displacement and avoidance of edge effects or cleared areas would not be expected to vary from existing conditions. Long-term disturbance would result from a 20-foot wide corridor that would serve as a maintenance corridor during pipeline operations.

Short-term disturbance of 370 acres would remove vegetation and disturb soil along the proposed route and disturb channels at nine crossings of the Hoback River. This disturbance would result in small reductions in available forage and habitats for wildlife and fisheries along the proposed pipeline route until construction and reclamation of the pipeline corridor is completed. Long-term disturbance of 120 acres would occur along a permanent pipeline corridor 20 feet wide. This area would be revegetated with grasses and forbs that would provide forage for wildlife species, however, shrubs and trees would be excluded from the permanent pipeline corridor, which would affect habitats that depend on these vegetation types.

Operation, maintenance, and monitoring of the pipeline and processing facility would not be expected to have a noticeable effect on wildlife or fisheries. Pipeline markers and valves placed along the pipeline route would not be expected to interfere with wildlife movements. The processing facility would affect less than one acre of land, which would be fenced to exclude big game.

Operation, maintenance, and monitoring of the pipeline would include periodic aerial and ground patrols of the pipeline corridor and corrosion/leak detection surveys to identify conditions that may endanger the integrity of the pipeline. Maintenance and monitoring activities would consist of periodic inspection of the pipeline and processing facility using aircraft, pickups or other vehicles, all-terrain vehicles (ATVs) or snowmobiles. These activities would be scheduled to adhere to applicable travel restrictions associated with the protection of wildlife habitats (**Figure 2-4 and Appendix D**).

Most wildlife species are sensitive to noise or human presence and may respond to the appearance and noise of helicopters, and the presence and noise of people by avoiding areas of disturbance. The length of this modified behavior may vary depending on previous experience with such activities and the timing and location of the disturbance. Some individuals may undergo higher physiological stress and additional energy expenditure as they avoid human disturbance, which may indirectly affect their well-being and productivity. However, monitoring patrols would be periodic and would not be expected to noticeably modify behavior of wildlife, except as noted in the analysis for specific species.

The pipeline would not act as a barrier to the movement of big game because the majority of it parallels the highway and the corridor would be reclaimed immediately after construction. Implementation of design criteria in **Appendix D** would provide for the movement of wildlife and livestock during construction activities. All of the pipeline would be buried except for a 1,500-foot section of pipeline near Camp Creek Saddle. Surface installation of the pipe would allow any landslide movement that may occur to be directed under the pipeline. Visibility across the corridor appears to be a major factor affecting the willingness of all ungulates to cross above-ground pipelines (Jalkotzy et al. 1997). The steel pipe installed on the surface would be 6 inches in diameter, which would not impair visibility across the pipeline or act as a barrier to big game movements.

Effects on fisheries anticipated under the Proposed Action would be localized in extent and short-term in duration. Recovery of streambed conditions and fisheries communities to pre-construction conditions would be expected within a year based on monitoring studies of similar projects, as described below.

As reported by Reid and Anderson (1998) based on their review of 27 pipeline water crossing effects monitoring studies undertaken by the pipeline industry and resource management agencies over 25 years in North America, few studies have characterized direct effects of sediment released during instream pipeline construction activities on fish. The effects of an open-cut pipeline crossing were studied by Anderson et al. (1998). The results of their monitoring study are summarized below and judged to be representative of the character of fisheries effects that would be anticipated under Alternative B. Design criteria in **Appendix D** would reduce the effects on fisheries by delaying the initiation of instream construction activities until August 1.

Anderson et al. studied the effects of a stream crossing involving a 42-inch pipeline on a small coldwater stream, about 6 miles long and draining 6,000 acres in a sensitive area in northern Ontario, beginning in 1992. The stream studied had abundant woody debris, a resident population of brook trout, and several beaver dams. Pipeline activities at the crossing studied also included the removal of a beaver dam and the construction of temporary road access, activities which are not included in Alternative B. Results of the study by Anderson et al. (1998) indicated that the suspended sediment loads of up to 3,000 mg/L caused by pipeline construction were sufficient to cause changes to channel morphology and fish and invertebrate communities; however, impacts were localized in extent and short-term in duration.

The results of the study by Anderson et al. found that one week after pipeline installation, brook trout abundance within 1,500 feet of the crossing had decreased from twenty to six trout. Within 12 weeks following construction, partial recovery was apparent. Within a year, full recovery of the brook trout population was evident. The recovery of the fish communities was in concert with the recovery of streambed conditions and benthic invertebrate populations to pre-construction levels. The results of this study are consistent with other research investigating the impacts of pipeline construction (Reid and Anderson 1998), which also found that impacts were localized in extent and short-term in duration.

According to Reid and Anderson (1998), potential direct effects on fish from suspended sediment exposure during instream construction include changes to fish behavior (habitat selection), abundance of food sources, survival or development of eggs, and survival of individuals due to increased stress. Sediment deposition can modify the suitability of downstream fish habitats. Adherence to instream construction timing restrictions (to avoid periods of spawning or egg incubation) during water crossing construction, avoided the risk of some of the above mentioned potential effects from occurring.

As reported by Reid and Anderson (1998) in the same study, changes in observed benthic invertebrate communities tended not to be long-term. Full recovery of benthic invertebrate communities was identified within six months to a year after construction. The rapid recovery of these invertebrate communities has been attributed to the flushing and downstream transport of deposited sediment during both normal and high flow conditions and invertebrate recolonization from upstream sites.

Federally Listed Wildlife Species

The effects of the Proposed Action on federally listed species and experimental populations would be limited to potential effects on individuals. As explained below, adverse effects on individuals are unlikely for Canada lynx and gray wolf. Project design criteria would mitigate potential effects. A more detailed analysis for each species is contained in the Biological Assessment in the *Project File* at the Big Piney Ranger District office in Big Piney, Wyoming. Supporting analysis is summarized below by species.

The proposed project could alter Canada lynx movement by creating disturbance during construction, operation, maintenance, or monitoring. Existing conditions preclude anything other than a slight chance for an incidental occurrence of Canada lynx. No meaningful change in the availability or condition of potentially suitable habitat would result from project implementation. The workforce and machinery required for pipeline construction could temporarily affect any gray wolves present in the area; however, displacement is not likely to occur. The proposed pipeline is not expected to create a barrier to wolf movement or affect connectivity of wolf habitats. Wolves are highly mobile and occupy large home ranges and the addition of a pipeline corridor adjacent to the existing highway is not likely to affect wolves known to occur in the area.

Canada Lynx

The workforce and machinery required for pipeline construction could temporarily affect Canada lynx, if present, however, displacement would not be likely. The proposed project could alter Canada lynx movement by creating disturbance during construction, operation, maintenance or monitoring, but would not be expected to adversely affect lynx due to their secretive nature and tendency to avoid human disturbance.

Habitat modification through construction activities may indirectly impact Canada lynx. However, the Project Area is at the lower elevation limit for Canada lynx. Existing habitat conditions preclude anything other than a slight chance for an incidental presence in the Project Area. Lynx have very large home ranges; localized disturbance adjacent to a highway would have very little effect on a lynx home range if any lynx occur near the Project Area.

Lynx Analysis Units (LAUs) encompass lynx habitat (which may or may not be in suitable condition) and non-habitat areas (such as lakes or rock talus). Portions of six LAUs would be affected by the proposed project: Big Twin-Middle Beaver, Fall Creek South, Flat Creek, Lower Hoback Middle, Upper Hoback North, and Upper Hoback South. (**Figure 3-5**). Short-term disturbance resulting from construction activities along the pipeline corridor and use of TWAs (174 acres) is shown in **Table 4-7** by LAU for suitable habitat. After the pipeline corridor is reclaimed when construction activities end, habitat loss would be reduced. The projected long-term disturbance (64 acres) is also shown in **Table 4-7** by LAU.

Short- and long-term disturbance of suitable habitat (15 acres, short-term and 5 acres, long-term, **Table 4-7**) would be minimal when compared with the extent of suitable habitat on NFS lands within the Project Area (14,108 acres or 35 percent of the NFS lands within the Project Area, **Table 3-24**) and the extent of suitable habitat within the Project Area LAUs (260,441 acres or 49 percent of the NFS lands within the LAUs that contain the Project Area, **Table 3-23**), as shown in **Figure 3-5**. Implementation of the proposed project would not result in a meaningful change in the availability or condition of lynx habitats in the six LAUs that would be affected by disturbance of suitable habitat (**Table 4-7**) or two other LAUs containing portions of the Project Area, but with no anticipated effect on suitable habitat (Lower Hoback North and Lower Hoback South). No change to the percentage of suitable lynx habitat shown for each Project Area LAU in **Table 3-23** would be anticipated.

TABLE 4-7 CANADA LYNX HABITAT DISTURBANCE ON NFS LANDS (ACRES)

Lynx Analysis Unit (LAU)	All Short-Term Disturbance	Short-Term Disturbance Suitable Habitat	All Long-Term Disturbance	Long-Term Disturbance Suitable Habitat
Big Twin-Middle Beaver	2	1	1	0
Fall Creek South	15	2	6	1
Flat Creek	1	0	0	0
Lower Hoback Middle	89	5	32	2
Upper Hoback North	51	7	19	2
Upper Hoback South	16	0	6	0
Total	174	15	64	5

Gray Wolf

The workforce and machinery required for pipeline construction could temporarily affect any gray wolves present in the area; however, displacement is not likely to occur. Alternative B could alter gray wolf movement by creating a disturbance during construction, operation, maintenance, or monitoring, but

would not be expected to adversely affect gray wolves due to their secretive nature and tendency to avoid areas of human disturbance.

Wolves regularly cross highways throughout the Greater Yellowstone Ecosystem (GYE) and may pass through the Project Area. The existing highway does not create a barrier to wolf movement. The proposed pipeline is not expected to change this situation or affect connectivity of wolf habitats. Wolves are highly mobile and occupy large home ranges and the addition of a pipeline corridor adjacent to the existing highway is not likely to create movement barriers.

Wolves are known to occur in the area and may travel through the Project Area. The Daniel wolf pack may be within the Project Area and the Teton wolf pack may be adjacent to the Project Area. Habitat modification through construction activities may indirectly impact the gray wolf. Although some habitat in the Project Area may be considered suitable, most of it is marginal and not highly utilized by gray wolves due to the high human presence and the existence of the highway through the Project Area. Preferred wolf prey species of deer, elk and moose are all found within the Project Area. Alteration of prey habitat may indirectly affect the suitability of wolf habitat within the Project Area. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. In the short term, 34 acres of disturbance are anticipated within coniferous or aspen forests that may contain gray wolf prey habitat. After the pipeline corridor is reclaimed when construction activities end, habitat loss would be reduced. In the long term, 13 acres of disturbance are anticipated within coniferous or aspen forests that may contain gray wolf prey habitat. Disturbance to forested habitat would be minimal when compared with the available coniferous or aspen forests within the Project Area.

Forest Service Sensitive Species

Based on this analysis, implementation of Alternative B, as described, would have no impact on the trumpeter swan. For the remainder of the Forest Service sensitive species, Alternative B may adversely impact individuals, but is not likely to result in a loss of viability in the Project Area, nor cause a trend to federal listing or a loss of species viability range-wide. Effects would not be expected to be measurable and would be discountable (extremely unlikely). A more detailed analysis and determination for each species is contained in the Biological Evaluation included as **Appendix F**.

Management Indicator Species

Implementation of Alternative B would not alter current trends for Management Indicator Species (MIS) habitats and populations. Habitat and population trend information for each MIS species is contained in the MIS report in the *Project File* at the Big Piney Ranger District office in Big Piney, Wyoming. The following sections summarize the effects analysis for the selected MIS.

Elk

The workforce and machinery required for pipeline construction could temporarily displace elk from areas along the pipeline corridor. Elk are more sensitive to human activities than antelope or mule deer and may be displaced during construction by 0.75 – 2 miles (Brekke 1988). To reduce impacts to elk during winter and the calving season, construction activity would adhere to seasonal range timing restrictions within crucial winter ranges and calving areas (**Appendix D, Figure 2-4**). In addition, no construction activities would occur on elk winter feedgrounds between November 15 and April 30.

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity would occur along the pipeline corridor. Elk may respond to the appearance and noise of helicopters, and the presence and noise of people during operation, maintenance or monitoring activities by avoiding areas of disturbance. The length of this modified behavior by elk may vary depending on their previous experience with such activities and the timing and location of the disturbance. Some elk

may undergo higher physiological stress and additional energy expenditure as they avoid human disturbance. However, these aerial and ground activities would be periodic and would not be expected to cause undue stress to elk. Ground patrols would avoid elk calving areas from May 15 through June 30 if elk are present in the area.

Habitat modification through surface disturbing activities may indirectly impact elk by removing habitat in crucial winter range, calving areas, and elk winter feedgrounds. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. In the short term, 5 acres of disturbance are anticipated within the Camp Creek and Horse Creek winter feedgrounds. The anticipated disturbance of elk crucial winter range, calving areas, and herd units is shown in **Table 4-8**.

TABLE 4-8 DISTURBANCE TO ELK HABITAT (ACRES)

	Short-Term	Long-Term
Crucial Winter Range	47	17
Calving Areas	11	4
Total	58	21
Herd Units	Short-Term	Long-Term
Fall Creek	127	60
Hoback	83	36
Piney	15	9
Green River	21	13
Total	246	118

In the long term, 3 acres of disturbance are anticipated within the Camp Creek and Horse Creek winter feeding grounds. Long-term disturbance to elk crucial winter range, calving areas, and herd units would be minimal when compared with the available crucial winter range (10,164 acres), and calving areas (2,735 acres) within the Project Area. In addition, there are many more acres of crucial elk winter range and calving areas outside the Project Area (**Figure 3-7**).

The pipeline would not act as a barrier to elk movement. Implementation of design criteria in **Appendix D** would provide for the movement of wildlife and livestock during construction activities. All of the pipeline would be buried except for a 1,500-foot section of pipeline that crosses existing landslides near Camp Creek Saddle, and also crosses the WGFD elk feedground in the Camp Creek area. Surface installation of the pipe would be used in this area to allow any landslide movement that may occur to be directed under the pipeline. Visibility across the corridor appears to be a major factor affecting the willingness of all ungulates to cross above-ground pipelines (Jalkotzy et al. 1997). The steel pipe installed on the surface would be 6 inches in diameter, which would not impair visibility across the pipeline or act as a barrier to elk movements when the area is snow-free. Snow cover would obscure the pipeline in the vicinity of the elk feedground when elk are present during the winter.

Mule Deer

The workforce and machinery required for pipeline construction could temporarily displace mule deer from areas along the pipeline corridor. To reduce impacts to mule deer, construction activity would adhere to seasonal range timing restrictions within crucial winter ranges (**Appendix D, Figure 2-4**). No mule deer fawning areas occur within the Project Area.

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity would occur along the pipeline corridor. Mule deer may respond to the appearance and noise of helicopters, and the presence and noise of people during operation, maintenance, and monitoring

activities by avoiding areas of disturbance. However, these aerial and ground activities would be periodic and would not be expected to cause undue stress to mule deer.

Habitat modification through surface disturbing activities may indirectly impact mule deer by removing habitat in crucial winter range. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. Within mule deer crucial winter range, 20 acres of disturbance are anticipated. Within the Sublette mule deer herd unit, 247 acres of disturbance are anticipated.

In the long term, 9 acres of disturbance are anticipated within crucial winter range. Within the Sublette mule deer herd unit, 119 acres of disturbance are anticipated. Disturbance to mule deer habitat would be minimal when compared with available crucial winter range (6,140 acres) within the Project Area. In addition, there are many acres of crucial mule deer winter range outside the Project Area (**Figure 3-7**).

The pipeline would not act as a barrier to the movement of mule deer. Design criteria in **Appendix D** would provide for the movement of wildlife and livestock during construction activities. All of the pipeline would be buried except for a 1,500-foot section near Camp Creek Saddle. Surface installation of the pipe would allow any landslide movement that may occur to be directed under the pipeline. Visibility across the corridor appears to be a major factor affecting the willingness of all ungulates to cross above-ground pipelines (Jalkotzy et al. 1997). The steel pipe installed on the surface would be 6 inches in diameter, which would not impair visibility across the pipeline or act as a barrier to movements.

Moose

The workforce and machinery required for pipeline construction could temporarily displace moose from areas along the pipeline corridor. To reduce impacts to moose, construction activity would adhere to seasonal range timing restrictions within crucial winter ranges and calving areas (**Figure 2-4**).

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity would occur along the pipeline corridor. Moose may respond to the appearance and noise of helicopters, and the presence and noise of people during operation, maintenance, and monitoring activities by avoiding areas of disturbance. However, these aerial and ground activities would be periodic and would not be expected to cause undue stress to moose. Ground patrols would avoid moose calving areas from May 15 through June 30 if moose are present in the area.

Habitat modification through surface disturbing activities may indirectly impact moose by removing habitat in crucial winter range or calving areas. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. In the short term, 255 acres of disturbance are anticipated in moose crucial winter range and calving areas within the Sublette moose herd unit. In the long term, 119 acres of disturbance are anticipated in moose crucial winter range and calving areas within the Sublette moose herd unit. Long-term disturbance to moose habitat would be minimal when compared with the available crucial winter range (20,855 acres), and calving areas (19,023 acres) within the Project Area. In addition, there are many more acres of crucial moose winter range and calving areas outside the Project Area.

The pipeline would not act as a barrier to the movement of moose. Implementation of design criteria in **Appendix D** would provide for the movement of wildlife and livestock during construction activities.

Bighorn Sheep

The workforce and machinery required for pipeline construction could temporarily displace bighorn sheep along the pipeline corridor within Hoback Canyon. To reduce impacts to bighorn sheep, construction activity would adhere to seasonal range timing restrictions within crucial winter ranges (**Appendix D, Figure 2-4**). No bighorn sheep lambing areas occur within the Project Area.

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity occurs along the pipeline right-of-way. Bighorn sheep may respond to the appearance and noise of helicopters, and the presence and noise of people during operation, maintenance, and monitoring activities by avoiding areas of disturbance. However, these aerial and ground activities would be periodic and would not be expected to cause undue stress to bighorn sheep.

Habitat modification through surface disturbing activities may indirectly impact bighorn sheep by removing habitat in crucial winter range. Bighorn sheep prefer open, grassy slopes adjacent to steep cliffs that would generally be avoided by the pipeline. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. In the short term, 8 acres of disturbance are anticipated in bighorn sheep crucial winter range. Within the Jackson bighorn sheep herd unit, 213 acres of disturbance are anticipated.

In the long term, 4 acres of disturbance are anticipated in bighorn sheep crucial winter range. Within the Jackson bighorn sheep herd unit, 99 acres of disturbance are anticipated. Long-term disturbance to bighorn sheep habitat would be minimal when compared with available crucial winter range (2,812 acres) within the Project Area. In addition, there are many more acres of crucial bighorn sheep crucial winter range outside the Project Area.

The pipeline would not act as a barrier to bighorn sheep movement. Implementation of design criteria in **Appendix D** would provide for the movement of wildlife and livestock during construction activities. All of the pipeline would be buried except for a 1,500-foot section of pipeline near Camp Creek Saddle. Surface installation of the pipe would allow any landslide movement that may occur to be directed under the pipeline. Visibility across the corridor appears to be a major factor affecting the willingness of all ungulates to cross above-ground pipelines (Jalkotzy et al. 1997). The steel pipe installed on the surface would be 6 inches in diameter, which would not impair visibility across the pipeline or act as a barrier to bighorn sheep movements.

Pronghorn Antelope

The workforce and machinery required for pipeline construction could temporarily displace antelope that migrate through the area. No crucial winter range or fawning areas occur within the Project Area.

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity occurs along the pipeline corridor. Antelope may respond to the appearance and noise of helicopters, and the presence and noise of people during operation, maintenance, and monitoring activities by avoiding areas of disturbance. However, these aerial and ground activities would be periodic and would not be expected to cause undue stress to antelope.

Habitat modification through surface disturbing activities could indirectly impact antelope by removing habitat, however, no crucial winter range or fawning areas for pronghorn antelope occur within the Project Area. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. Within the Sublette antelope herd unit, 201 acres of disturbance are anticipated.

In the long term, 96 acres of disturbance are anticipated within the Sublette antelope herd unit. Disturbance to antelope habitat would be minimal when compared with the available non-forested habitat that may be used by antelope within the Project Area.

Pine Marten

The workforce and machinery required for pipeline construction could temporarily displace pine marten if this species occurs in the area, however, most of the pipeline would be constructed adjacent to the

highway in unsuitable habitat for pine marten. In addition, pipeline construction would not occur during the winter, when pine marten are most active.

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity would occur along the pipeline corridor. Marten are tolerant of human activity as long as the animals are not trapped (Ruggiero et al. 1994). Monitoring patrols would be periodic and would not be expected to cause undue stress to pine marten.

Habitat modification through surface disturbing activities may indirectly impact the pine marten by removing suitable habitat. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. In the short term, 34 acres of disturbance are anticipated within coniferous or aspen forests that may contain habitat for pine marten foraging and denning. In the long term, 13 acres of disturbance are anticipated within coniferous or aspen forests that may contain habitat for pine marten foraging and denning. Disturbance to pine marten habitat would be minimal when compared with the available coniferous or aspen forests within the Project Area.

The pipeline would not act as a barrier to pine marten movement. Design criteria in **Appendix D** would provide for the movement of wildlife during construction activities. The pipeline would be buried, except for a 1,500-foot section near Camp Creek Saddle. The steel pipe installed on the surface near Camp Creek Saddle would be 6 inches in diameter, and would not act as a barrier to pine marten movements.

Brewer's Sparrow

Brewer's sparrows are an MIS and a neotropical migrant that summers in North America and winters in Central or South America.

The workforce and machinery required for pipeline construction could temporarily displace Brewer's sparrows if this species occurs in the area. However, most of the pipeline would be constructed adjacent to the highway in unsuitable habitat for Brewer's sparrow. In addition, no nesting Brewer's sparrows have been documented within the Project Area (WYNDD 2004).

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity would occur along the pipeline corridor. Monitoring patrols would be periodic and would not be expected to disturb Brewer's sparrows.

Habitat modification through surface disturbing activities may indirectly impact the Brewer's sparrow by removing suitable habitat. Much of the non-forested area is classified as range and contains sagebrush. Short-term disturbance would result from construction activities along the pipeline corridor and use of TWAs. In the short term, 109 acres of disturbance are anticipated within non-forested habitat that may contain sagebrush that could be used by Brewer's sparrows for nesting and foraging. It is unknown how much of this non-forested area contains sagebrush suitable for Brewer's sparrow nesting and foraging. In the long term, 40 acres of disturbance are anticipated within non-forested areas that may contain habitat that could be used by Brewer's sparrows for nesting and foraging. Disturbance to potential Brewer's sparrow habitat would be minimal when compared with the available non-forested habitat within the Project Area. The proposed pipeline would not be expected to affect connectivity of Brewer's sparrow habitat within the BTNF.

Cutthroat Trout (all subspecies)

Disturbance to riparian areas and potential erosion and siltation from pipeline construction could lead to injury or mortality of cutthroat trout (all subspecies), however, project design criteria and best management practices for watershed protection in **Appendix D** would greatly reduce potential fisheries impacts. The alignment of river and stream crossings to reduce disturbance to riparian and wetland vegetation, channels, and banks, and minimize the duration of the disturbance would minimize the effects

on cutthroat trout. The implementation of the design criteria in **Appendix D** would reduce effects on streams, wetlands, and riparian areas. If pipeline maintenance were required at a river crossing, mitigation measures would be implemented to protect riparian areas and fish habitat.

Equipment would operate instream only where the width of the crossing exceeds the reach of the equipment and equipment would be limited to that needed to construct the crossing. Streambanks would be restored to preconstruction elevations and stabilized within 24 hours of completing instream activities. Temporary sediment barriers would be installed at the edges of banks and maintained until adjacent upland disturbance areas have been successfully restored. Instream construction activities, such as excavation, pipe installation, backfill, and streambed restoration, would typically be completed at a crossing within 48 hours. BTNF guidelines for fish habitat management, streambank stability, sensitive cutthroat trout habitat, and fish passage standards would be followed during pipeline construction.

Habitat modification through surface disturbing activities may indirectly impact cutthroat trout (all subspecies) by altering prey in aquatic habitat. Short-term disturbance would result from construction activities and use of TWAs. In the short term, 15 acres of disturbance are anticipated within riparian areas. In the long term, 6 acres of disturbance in riparian areas are anticipated. Disturbance to riparian habitat would be minimal when compared with the available riparian habitat within the Project Area. To minimize effects on riparian areas, project design criteria in **Appendix D** would be implemented for streams, wetlands, and riparian areas during the life of the project.

Boreal Toad and Boreal Chorus Frog

Under Alternative B, the proposed pipeline would cross the Hoback River nine times and also would cross other perennial or intermittent streams located along the route. It is unlikely that the high gradient and fast flowing Hoback River would support important boreal toad and boreal chorus frog breeding sites. However, the perennial or intermittent streams within the Project Area may support such breeding sites. One documented occurrence of the boreal toad is located within the Project Area in the Hoback Basin north of Bondurant (WYNDD 2004) (**Figure 3-6**).

Disturbance to wetland areas could lead to injury or mortality of boreal toads or boreal chorus frogs, however, project design criteria and best management practices in **Appendix D** would greatly reduce potential impacts to wetland habitats. The alignment of river and stream crossings to reduce disturbance to riparian and wetland vegetation, channels, and banks, and minimize the duration of the disturbance would minimize the effects on these amphibians. If pipeline maintenance were required at a river crossing, mitigation measures would be implemented to protect wetlands habitat.

Habitat modification through surface-disturbing activities may indirectly impact boreal toads or boreal chorus frogs by altering prey or food sources in wetlands habitat. Short-term disturbance would result from construction activities and use of TWAs. To minimize effects on wetland habitats, project design criteria in **Appendix D** would be implemented for streams, wetlands, and riparian areas during the life of the project.

Migratory Birds

Migratory birds use a variety of habitat types within the Project Area. The workforce and machinery required for pipeline construction could temporarily displace migratory birds if they occur in the area. However, most of the pipeline would be constructed adjacent to the highway in already disturbed habitat.

Direct effects would be greatly reduced during the operation and maintenance phase, when very little human activity would occur along the pipeline corridor. Monitoring patrols would be periodic and would not be expected to disturb migratory birds.

Habitat modification through surface disturbing activities may indirectly impact the migratory birds by removing suitable habitat. About 370 acres could be affected over the short term during construction activities. Over the long term, 120 acres would be included in a pipeline maintenance corridor.

Although the proposed alternative could potentially displace or adversely impact individual birds and their nests, the project will not likely cause a trend toward federal listing or a loss of population viability for any species.

Cumulative Effects by Alternative

The cumulative impact analysis area considered for big game species encompasses the affected herd units. For all other wildlife species, the cumulative impact analysis area is the Project Area. For fisheries, the cumulative impact analysis area encompasses the watersheds that contain the Project Area.

Alternative A

Past, ongoing, or reasonably foreseeable activities or events would have a cumulative effect on wildlife and fisheries under Alternative A. Cumulatively, activities on adjacent lands that may affect wildlife and fisheries include vehicle traffic, highway maintenance, pedestrian traffic, aircraft flights, hunting, camping, trail use, skiing, snowmobiling, river floating, or fishing. Other land uses, such as residential areas, commercial developments, grazing, vegetation management, and oil and gas development, and events, such as wildland fires, also would have a cumulative effect on wildlife and fisheries.

Specific current and foreseeable projects that may affect wildlife and fisheries include:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Horse Creek Feedground Connector Road, construction of approximately 500 feet of low service road on the Horse Creek Plateau (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)
- Poison Creek Open Space Land Purchase (BTNF)
- Cottonwood II Integrated Projects, vegetation management of 975 acres and prescribed burning of 1,000 acres of aspen, and Maki Creek, vegetation management of 214 acres and prescribed burning of 2,000 acres (BTNF)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- High Mountains Heli-Skiing – Snake River/Wyoming Range (BTNF)
- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)
- Wyoming Range Allotment Complex, sheep grazing in Hoback watershed (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

While some of these projects may provide for protection of wildlife habitats (Poison Creek Land Purchase), others may alter habitats or cause disturbance, displacement, injury, or mortality to populations or individuals during implementation. The effects of the projects listed would occur sporadically over several years, mostly during spring through fall, and would continue for the duration listed. Highway reconstruction and improvements would occur for extended periods and result in a noticeable bustle of activity, including construction workers and equipment.

Prescribed fire would be used to restore the vigor of aspen and improve habitat and forage for wildlife. Other vegetation treatments, including prescribed fire, also would be used to improve the health and structure diversity of forested areas and shrublands, and contribute to species diversity over the long term.

Over the long term, wildland fires would occur in the Project Area, and 90 percent of all ignitions (fire starts) would be controlled at less than one acre (USFS 2004b). Effects on wildlife and fisheries, including injury, mortality, displacement, habitat alteration, and habitat destruction, have occurred in the past and would be expected in association with future wildland fires in the Project Area. Natural processes including weather conditions and the maturing of vegetation, and human-caused changes such as fire suppression and some ignitions, would result in the long-term alteration of habitats, especially those dependent on forested areas or shrublands. Large intense fires would be infrequent, but could result in the destruction of considerable wildlife habitat and the degradation of fisheries due to erosion and siltation in watersheds where vegetative cover is lost. Over the long term, fire suppression would tend to preserve mature vegetation, reducing the effectiveness of habitats dependent on young vegetation.

In addition to human-related disturbances, the management of the Snake River flows may negatively affect riparian habitat. Riparian cottonwood communities depend on periodic flooding to remain vigorous. Within the Jackson area, natural flooding patterns have been modified through controlled releases of water from Jackson Lake Dam and the construction of flood prevention dikes along some river segments. This interference with the natural pattern of river flows has the potential to adversely impact the Snake River's cottonwood communities and species dependent upon riparian and aquatic habitat, such as the bald eagle, peregrine falcon, cutthroat trout, big game, and wintering trumpeter swans.

Federally Listed Species

Collisions between wildlife and highway vehicles could occur under the Alternative A, injuring or killing those individuals involved in the accidents. Collisions could increase over time as traffic volumes are expected to increase. Traffic volumes that affect mortality and dispersal of Canada lynx have not been studied, but volumes of more than 2,000 vehicles per day are known to be problematic (Ruediger et al. 2000). Canada lynx have been documented using a travel corridor that crosses the highway near The Rim in the southern portion of the Project Area (Mlodik 2005). Gray wolves also may be at risk for vehicle collisions.

The cumulative effects on suitable habitat for Canada lynx would be minimal, with little change in overall percentage of suitable habitat in the affected LAUs within the Project Area.

Included as past, ongoing, and reasonably foreseeable activities and events that alter lynx habitat conditions, and also would affect other species dependent upon forested areas, are burned areas and timber clearcuts. Wildland fires, prescribed burns, and timber clearcuts can change suitable lynx habitats to currently unsuitable by removing forested vegetation or altering the forest stand structure and age. **Table 4-9** summarizes the estimated extent of currently unsuitable lynx habitat associated with burned areas and clearcuts by LAU. These currently unsuitable habitat areas represent a small portion of the suitable lynx habitat shown in **Table 4-9**. The acreage shown in **Table 4-9** is considered currently

unsuitable because of the likelihood these stands would recover to a suitable condition over time. Based on this likelihood, these currently unsuitable habitat areas are distinct from otherwise unsuitable habitats because unsuitable lynx habitats (for example, rock outcrops, shrublands, or rangelands) are not expected to mature into suitable condition because they lack the necessary forested community type.

TABLE 4-9 ESTIMATE OF CURRENTLY UNSUITABLE LYNX HABITAT IN LAUS (ACRES)

Lynx Analysis Unit (LAU)	Suitable Lynx Habitat	Currently Unsuitable Lynx Habitat¹
Big Twin-Middle Beaver	22,206	23 (0.1)
Fall Creek South	40,290	2,616 (6.5)
Flat Creek	40,975	29 (<0.01)
Lower Hoback Middle	26,441	18 (<0.01)
Lower Hoback North	34,520	4,050 (11.7)
Lower Hoback South	33,200	627 (1.9)
Upper Hoback North	36,701	632 (1.7)
Upper Hoback South	26,849	1,781 (6.6)

¹ Acres of lynx habitat currently in currently unsuitable condition due to fire and clearcuts. For each LAU, the percent of suitable lynx habitat that is currently unsuitable is in parentheses.

Forest Service Sensitive Species

Collisions between wildlife and highway vehicles could occur under Alternative A, injuring or killing those individuals involved in the accidents. Collisions could increase over time as traffic volumes are expected to increase. Highway traffic could cause disturbance to nesting birds during the breeding season where nests or lek sites are located near the highway. However, there are no known nest or lek occurrences along the highway corridor.

Gravel trucks and other motorized vehicles traveling on the Ross Plateau road would cause direct disturbance to the Porcupine Creek bald eagle nesting territory. In compliance with the Greater Yellowstone Bald Eagle Management Plan, access is restricted on this road from February 1 through August 15 to minimize disturbance impacts to eagles. Pickup trucks and smaller vehicles use the road during this time period, but gravel hauling is prohibited until the nestling eagles have fledged.

Management Indicator Species

Collisions between wildlife and highway vehicles could occur under Alternative A, injuring or killing those individuals involved in the accidents. Collisions could increase over time as traffic volumes are expected to increase. Highway traffic could cause disturbance to nesting birds during the breeding season where nests are located near the highway. However, there are no known nest occurrences along the highway corridor.

Alternative B

- The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A. Because of the reduction in tanker truck traffic under Alternative B, collisions between wildlife and highway vehicles would be expected to decrease. Alternative B may cause a slight increase in cumulative effects on wildlife and fisheries in conjunction with all other past, present, and reasonably foreseeable future activities in the region.

The cumulative effects on Canada lynx under Alternative B would not be expected to vary noticeably from those described above for Alternative A - No Action, except that the proposed project would also contribute to the cumulative effects. In **Table 4-10** suitable lynx habitat and a projection for currently unsuitable habitat under Alternative B are shown for the six LAUs that would be affected by surface disturbance associated with the proposed project. This projection of currently unsuitable lynx habitat shows cumulative effects over the short-term and long-term; acres are also presented as a proportion of the suitable lynx habitat in each affected LAU.

TABLE 4-10 PROJECTION OF CURRENTLY UNSUITABLE LYNX HABITAT IN AFFECTED LAUS UNDER ALTERNATIVE B (ACRES)

Lynx Analysis Unit (LAU)	Suitable Habitat	Currently Unsuitable Habitat ¹	
		Short-Term	Long-Term
Big Twin-Middle Beaver	22,206	24 (0.1)	23 (0.1)
Fall Creek South	40,290	2,618 (6.5)	2,617 (6.5)
Flat Creek	40,975	29 (<0.01)	29 (<0.01)
Lower Hoback Middle	26,441	23 (<0.01)	20 (<0.01)
Upper Hoback North	36,701	639 (1.7)	634 (1.7)
Upper Hoback South	26,849	1,781 (6.6)	1,781 (6.6)

¹ Acres of lynx habitat currently in an unsuitable condition due to fire and clearcuts. For each affected LAU, the percent of suitable lynx habitat that is currently unsuitable is in parentheses.

Alternative B, in conjunction with these projects in the cumulative impact analysis area, may result in increased fragmentation and a reduction of habitat for some species. In addition, construction or implementation of these projects, in conjunction with Alternative B, may lead to increased disturbance to wildlife during the breeding season.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

DFC 10 and DFC 12 include a sight distance guideline, hiding and security cover guideline, management activity guideline, and big-game habitat guideline. These guidelines provide protection of wildlife habitat from projects that remove large amounts of forested habitat, such as timber harvest or fuel reduction projects. Over the long term, Alternative B would affect 120 acres of vegetation along the pipeline maintenance corridor, and would not be expected to alter current habitat trends within DFC 10 or 12.

Irreversible and Irretrievable Commitments

During construction activities over a six month period from spring through fall, and continuing until revegetation of disturbed areas is completed, forage on 370 acres disturbed would be lost and not available to livestock or wildlife.

The permanent pipeline corridor (120 acres) represents a commitment to a vegetation type without trees or shrubs along the proposed route. A considerable portion of the area committed to this corridor would coincide with the existing highway corridor. The lack of shrubs or trees in the 20-foot wide pipeline corridor would preclude this corridor from being suitable habitat for some wildlife species.

4.4 THE HUMAN ENVIRONMENT

Humans have an undeniable effect on ecosystems, especially in changing the physical and biological environments. The human environment is presented in seven sections: heritage resources, land use, recreation, transportation, pipeline safety, scenic resources, and social and economic resources.

4.4.1 Heritage Resources

Indicators

- Potential effects on heritage resources
- Potential effects on eligible sites
- Potential effects on unknown sites

Environmental Effects

Direct and Indirect Effects by Alternative

Potential effects on heritage resources, eligible sites, or unknown sites may include immediate physical damage or intrusion upon the characteristics that make the resource important. Sites and resources can include prehistoric or historical districts, sites, buildings, structures, or objects. Physical damage to buildings or standing structures can be easily avoided by routing the pipeline construction away from the buildings and structures. Because the proposed project would be a small, buried pipeline, indirect impacts, such as visual or auditory intrusion on the historic setting and feeling of a heritage resource, would be short-term impacts during construction and surface reclamation. Direct impacts to sites consisting of artifacts and surface features that are significant for their prehistoric or historic information potential may also be avoidable. If any of these sites cannot feasibly be avoided, a data recovery plan will be developed to mitigate the impacts.

Alternative A - No Action

The No Action Alternative would not involve the construction or maintenance of a pipeline or any associated facilities. This Alternative would not result in adverse effects to any heritage resources, eligible sites, or unknown sites.

Alternative B - Proposed Action

Cultural resource investigations have reported 18 prehistoric and historical sites in the Area of Potential Effects (APE) of the Proposed Action. Eight of these heritage resources are listed on the National Register, recommended as eligible for listing on the National Register, or have not been evaluated for eligibility.

The Proposed Action would have no direct adverse impacts on known eligible or potentially eligible sites (prehistoric and historic components). The setting and feeling of three eligible or unevaluated historic sites located close to the proposed construction corridor may be affected indirectly over the short term, however, the proposed project is unlikely to have a permanent impact on these sites. Project design criteria in **Appendix D** would mitigate potential impacts.

Potential exists for a small number of unknown heritage resources in buried contexts or in areas of poor surface visibility along some portions of the APE, which could be affected by project activities. The potential for buried sites is low along most of the APE. Holocene and Pleistocene terrace settings near

creeks, where unanticipated discoveries may occur, should be monitored during surface clearing and trenching activities (**Appendix D**). Other areas that should be monitored include a site located on a Pleistocene alluvial flat south of Fisherman Creek that yielded a Paleoindian point base, and sites located in the vicinity of Game Creek that have yielded buried cultural resources, including a Late Archaic point fragment. If potential heritage resources are identified during project implementation, the Forest Service would immediately implement practices to avoid and protect them.

Cumulative Effects by Alternative

The cumulative impact analysis area for heritage resources is the Project Area.

Alternative A - No Action

Several ongoing or anticipated projects, activities, and events in the Project Area may also affect heritage resources, eligible sites, and unknown sites. These include wildland fires, the proposed Monument Ridge Fuel Treatment Project, the Hoback Ranches Community Fuels Reduction and Fire Prevention Plans, highway reconstruction and improvement projects along U.S. 89/191 and 189/191, three proposed exploratory gas wells in the Upper Hoback area near the Hoback Ranches subdivision, and the South Park site plan for river access. The fuel treatment and fuel reduction projects are likely to affect prehistoric and historical sites, but would also reduce the potential for extensive damage from wildland fires and fire suppression activities. Highway reconstruction and improvement would parallel many portions of the proposed pipeline route. Highway construction and maintenance would be more extensive than the pipeline construction and would have a greater potential for adverse impact to heritage resources, particularly along Flat Creek and the Snake River Valley at the north end of the Proposed Action, and in the area of Bondurant from the east end of Hoback Canyon to Muddy Creek. Highway work is more likely to involve unavoidable direct and indirect impacts to historic buildings and standing structures. The exploratory gas wells will likely have limited impacts to heritage resources.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the potential cumulative effects on heritage resources. When added to other past, present, and reasonably foreseeable future actions, short-term cumulative impacts on heritage resource settings from the proposed project would be small and short-term, during construction of the pipeline.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

The surface disturbance associated with the pipeline corridor represents an irreversible and irretrievable commitment of heritage resources occurring along the proposed route, unless the pipeline corridor can be realigned to avoid the heritage resource sites that would be affected by the proposed project. A data recovery plan will be developed to mitigate the impacts of sites that would be affected. A considerable portion of the area committed to a pipeline corridor would coincide with previously disturbed areas in the existing highway corridor.

4.4.2 Land Use

Indicators

- Effects on existing land uses
- Effects on landlines, private property, and federally recognized conservation easements

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A - No Action

Under the No Action alternative, the proposed pipeline project would not be built and liquid natural gas (LNG) would continue to be transported by tanker truck to Jackson along the existing highway. No land disturbance would occur and there would be no effect on existing land uses, property boundaries and landlines, private property, or federally recognized conservation easements.

Alternative B – Proposed Action

The proposed pipeline could affect existing land uses, private interests, and federally recognized conservation easements. Proposed construction activities to install the gas pipeline and processing facility could cause temporary inconvenience or disruption to existing land uses and local road access along the proposed pipeline route during construction activities over a period of 6 months. About 370 acres would be affected along the pipeline route. The community of Bondurant and other residents along the pipeline route would be affected by travel delays of up to 15 or 20 minutes in duration along the highway and the bustle of activity, including the presence of materials, staging areas, construction workers, and equipment during the installation of the pipeline.

A permanent pipeline corridor 20 feet wide would include 120 acres over the long term. Operation and maintenance of the pipeline and processing facility would not have a noticeable effect on existing land uses. The processing facility would exclude less than one acre of land from other uses. Pipeline markers and valves placed along the pipeline route would not interfere with other uses of the land. The exclusion of shrubs and trees from the permanent pipeline corridor would not affect other uses of the land. Maintenance and monitoring activities would consist of periodic inspection of the pipeline and processing facility using aircraft, pickups or other vehicles, and all-terrain vehicles (ATVs) or snowmobiles.

During site-specific project design, property boundaries, landlines, and non-recreation special use permits would be reviewed to determine whether the proposed project would affect private interests or authorized uses. Mitigation measures would be developed to protect private interests and authorized uses that would be affected by the project. If crossed, existing non-recreation special uses along the pipeline route, such as telephone or fiber optic lines, would be protected or moved to the pipeline trench, by agreement of all parties involved.

Private properties with conservation easements that protect scenic, wildlife, and agricultural open space values would be crossed in three areas by the proposed pipeline route (**Appendix E**). These easements protect the subject properties from development and other activities or uses that are not consistent with the preservation of their scenic characteristics. Generally, the placement of utilities is not a prohibited use of conservation easement properties. During construction activities, less than 5 acres of new disturbance would occur in the short term in conservation easement areas outside the existing highway right-of-way. In the long term, a permanent pipeline corridor 20 feet wide, containing pipeline markers and reclaimed

with herbaceous species only (no shrubs or trees), would affect less than 4 acres in conservation easement areas for the foreseeable future. The length of the permanent pipeline corridor across conservation easements would be slightly more than 8,000 feet (about 1.5 miles). The effects on the easement properties crossed are detailed below. Terms and conditions for the pipeline crossing of the easement properties would be established by agreement of all parties involved.

- **Melody Ranch, Teton County (Teton County Scenic Preserve Trust)**
A construction corridor along 3,213 feet of the affected properties near U.S. Highway 89/191 in T.40N. R.116W., Sections 20 and 21, and a temporary work area 100 feet by 40 feet located at the eastern boundary of the property, in all, would disturb a little more than 2 acres in the short term. A permanent pipeline corridor containing pipeline markers and reclaimed with herbaceous species only (no shrubs or trees) would continue to affect almost 1.5 acres in the long term.
- **Poison Creek, Teton County (Jackson Hole Land Trust)**
A construction corridor along 999 feet of the affected property near U.S. Highway 189/191 in T.38N. R.115W., Section 4, would be located entirely in the existing highway right-of-way for this property and would disturb no new area in the short term. A permanent pipeline corridor containing pipeline markers and reclaimed with herbaceous species only (no shrubs or trees) would affect almost 0.5 acres outside the existing highway right-of-way in the long term.
- **River Bend Ranch, Sublette County (Jackson Hole Land Trust)**
A construction corridor along 3,795 feet of the affected property near U.S. Highway 189/191 in T.37N. R.113W., Sections 23 and 24, and three temporary work areas 100 feet by 50 feet located along the highway, in all, would disturb almost 3 acres in the short term. A permanent pipeline corridor containing pipeline markers and reclaimed with herbaceous species only (no shrubs or trees) would continue to affect almost 2 acres in the long term.

Cumulative Effects by Alternative

The cumulative impact analysis area considered for land use is the Project Area.

Alternative A – No Action

Past, ongoing, or reasonably foreseeable activities in the Project Area that would have a cumulative effect on existing land uses, private interests, or federally recognized conservation easements in the Project Area include the following:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Horse Creek Feedground Connector Road (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention (BLM/BTNF/Private)
- Poison Creek Open Space Land Purchase (BTNF)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)

Residents of Bondurant, Hoback Ranches, and others along the pipeline route are likely to experience temporary inconvenience or disruption of their daily activities involving the use of the land from the cumulative effects of the implementation of the projects listed above. These effects would occur sporadically over several years, mostly during spring through fall, and would continue for the duration of the projects listed. Highway reconstruction and improvements would occur for extended periods and result in travel delays of up to 15 or 20 minutes in duration along the highway and a noticeable bustle of activity, including construction workers, and equipment.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the temporary inconvenience or disruption of daily activities and land use described above.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

The permanent pipeline corridor (120 acres) represents an irreversible or irretrievable commitment of resources along the 49.8-mile proposed route. A considerable portion of the area committed to a pipeline corridor would coincide with the existing highway corridor.

This commitment includes about 1.5 miles (less than 4 acres) across existing conservation easements. The commitment of conserved open space to a pipeline corridor would not remove the affected lands from open space, since the developed use across the easement properties would be underground. Pipeline markers and the lack of shrubs or trees in the 20-foot wide pipeline corridor would be the only visible effect of the commitment to a developed use.

4.4.3 Recreation

Indicators

- Effects on Gros Ventre Wilderness and the Shoal Creek wilderness study area (WSA)
- Effects on recreation values along segments and corridors of the Hoback River and its tributaries (Shoal, Cliff, Granite, and Willow Creeks) within the Nationwide Rivers Inventory (NRI) that are eligible for designation as wild, scenic, or recreation rivers
- Effects on the undeveloped character of roadless areas
- Effects on recreation opportunities and Recreation Opportunity Spectrum (ROS) Class
- Effects on recreation use, including displacement of recreation activities
- Effects on existing recreation facilities (campgrounds, trailheads, other facilities)
- Effects on recreation special uses

Environmental Effects

Direct and Indirect Effects by Alternative

Changes in recreation opportunities or a reduction in the quality of recreation experiences would affect many visitors to the highly visible Project Area.

Alternative A – No Action

Under the No Action alternative, the proposed pipeline would not be built and liquified natural gas (LNG) would continue to be transported by tanker truck to Jackson on a daily basis along the existing highway that crosses NFS lands. Round trips by tanker trucks along public highways would increase to 665 round trips by 2010. Increases in tanker truck traffic over time may contribute to a perceived negative effect on the recreational experience for travelers on the scenic byway, recreationists along the Hoback River, and Forest visitors at Kozy and Hoback Campgrounds.

Highway use by tanker trucks could affect scenic, recreational, fisheries, or wildlife values that make Hoback River eligible for designation. The likelihood of incidents with environmental damage involving tanker trucks that would affect these values would increase with the projected increase in tanker truck traffic on U.S. 189/191.

Under Alternative A, the No Action alternative, recreation management in the Project Area would be relatively unchanged. There would be no change in the determining factors for ROS class, and no currently planned addition or closure of roads or trails. Recreation special uses would continue with only normal variations in use patterns and permittees, and impacts from naturally occurring events. There would be no other direct or indirect effects on recreation under this alternative.

Alternative B – Proposed Action

Pipeline installation and associated construction activities could impact recreation activities temporarily by altering the physical setting and visual quality of the recreation experience, changing access opportunities, directly disrupting recreation activities, and affecting the recreation opportunity spectrum (ROS) class characteristics. The concern regarding the quality of scenery is high for recreationists that take advantage of developed and dispersed recreation activities in the Project Area, including hiking, horseback riding, hunting, photography, skiing, fishing, wildlife viewing and rafting. Mitigation of impacts to recreational opportunities would primarily address short-term impacts from construction activities. The majority of these impacts would be related to the impact on the river corridor and the associated transportation system. Resource protection measures proposed for scenic resources, transportation, erosion control, vegetation, wildlife and fisheries, and water quality would also mitigate impacts to recreational opportunities and are described in **Appendix D**.

Over the short and long term under Alternative B there would be little, if any, impact associated with recreation opportunities. At times, access may be temporarily impacted, however, access to the National Forest, including developed sites and uses, and dispersed opportunities, would not be precluded. There would be no noticeable or measurable effect on the local economy associated with temporary impacts on recreation opportunities.

Characteristics of all ROS class settings in the Project Area include a natural or natural-appearing environment. Implementation of the design criteria in **Appendix D** would reduce the visibility of areas disturbed and then reclaimed during installation of the pipeline. The visibility of effects on vegetation would be short-term within the construction corridor, and the areas affected by construction would retain the appearance of a natural or natural-appearing environment following reclamation. Topsoil would be

stockpiled for use in reclaiming affected areas. Native species of vegetation would be utilized for revegetation efforts. Surface disturbing activities would affect approximately 370 acres along the nearly 50-mile long pipeline route. This disturbance would occur within the 75-foot construction corridor and in nearby temporary work areas (TWAs). A permanent pipeline corridor 20 feet wide would include 120 acres impacted over the long term. Pipeline markers and the lack of shrubs or trees would be the only long-term visible effect of the permanent maintenance corridor.

The installation of the gas pipeline and processing facility may cause temporary inconvenience or disruption to recreation users along the proposed pipeline route during construction activities. Travel delays, disruptions of activities, the bustle of construction activity, and inconvenience to travelers along the scenic byway, recreationists along the Hoback River, and Forest visitors at Kozy and Hoback Campgrounds and other areas, may contribute to a perceived negative effect on the recreational experience. Direct effects of pipeline construction activities would include travel delays of up to 15 or 20 minutes in duration along the highway and the bustle of activity, including the presence of materials, staging areas, construction workers, and equipment along the highway corridor during the installation of the pipeline. The proposed pipeline route is located very near but outside Hoback Campground. The pipeline route would affect the west side of Kozy Campground, where the Hoback River would be crossed. Installation of the pipeline would affect the recreational experience of campers until work is completed.

Based on a normal construction schedule, installation of the pipeline and gas processing facility would be completed in about 180 days between May and October, and the pipeline should be operational by the beginning of the winter season. Instream construction activities would not occur before August 1. Disruptions and inconvenience to recreational activities would occur during this timeframe. Construction activities within Hoback Canyon would cause disruptions for about 70 days. Nine crossings of the Hoback River, one crossing of the Upper Hoback River, and one crossing of Cliff Creek would each be completed in about a week, on average, with instream construction activities typically completed within 24 to 48 hours.

Effects on the recreation experience resulting from the construction would be short-term and would include reduced visual quality, noise disturbance, and access restrictions along the pipeline corridor for wilderness, highway, campground and river users. The required vegetation removal would be within the construction corridor only and would not have a long-term impact on recreation users. Native species would be utilized for revegetation to bring the pipeline corridor back to current conditions as quickly as possible.

Operation and maintenance of the pipeline and processing facility, along with required pipeline markers and valves placed along the route, would not have a noticeable impact on recreation users. The shrubs and trees removed from the permanent pipeline corridor would be replaced with native grasses and forbs, which would minimize the visibility of the corridor.

During site-specific project design and implementation, the wilderness boundary, campgrounds, river access sites, trailheads, dispersed access sites and special use permits would be reviewed to determine whether the proposed project would affect authorized uses. Specific mitigation measures would be developed to protect private interests and authorized uses that would be affected by the project.

Wilderness and Wilderness Study Area

Although none of the pipeline construction corridor encroaches on the Gros Ventre Wilderness or the Shoal Creek Wilderness Study Area (WSA), there are several system and non-system trails (Dell Cr., Shoal Cr., Granite Cr., Cow Cr. and Poison Cr.) that would have access impacted and/or restricted for short periods of time during construction. The proposed project would not have a direct physical impact

on the Gros Ventre Wilderness or the Shoal Creek WSA. The impact on wilderness and roadless values, in a physical sense, would be minimal. There would be noise impacts resulting from construction and associated support activities. Road access to trailheads would be impacted for short time periods.

Roadless Characteristics

There would be minimal impact on roadless values. Areas affected by construction would have natural appearance following reclamation using design criteria in **Appendix D**. Natural integrity would be unchanged over the long term; there would be a temporary effect on natural processes during installation of the pipeline. Apparent Naturalness would remain unchanged. Over most of the proposed pipeline route (about 42 miles), disturbance would be confined to areas within about 125 feet of the existing U.S. highway. The disturbance, including tree removal incidental to pipeline installation, would blend in with the existing linear disturbance area along the highway. The sights and sounds of the activity associated with a mainline pipeline crew consisting of 100 to 150 workers, a crossing crew consisting of 20 workers, and a Hoback Canyon crew consisting of 30 workers, using an estimated 80 pieces of equipment and vehicles to install the pipeline would affect the sense of remoteness and solitude temporarily for anyone within sight or sound of the pipeline installation activity. The effects would be concentrated along the U.S.189/191 highway corridor through Hoback Canyon and in the Camp Creek saddle area where the pipeline route diverts from the highway corridor for about 8 miles. Over the long term, there would be little, if any, impact on primitive recreation opportunities. At times, access may be temporarily impacted. Pipeline installation could alter the physical setting and visual quality of the recreation experience temporarily, causing wildlife to avoid the area during construction activities.

Recreation Values along Hoback River within the Nationwide Rivers Inventory (NRI)

Recreation activities and values would be impacted to some degree during the life of the project from Bondurant to the confluence of the Hoback and Snake Rivers. The Snake River from Jackson to the mouth of the Hoback River has been determined eligible and suitable for classification as a Recreational River under the Wild and Scenic Rivers Act. The Upper Hoback River from the source to the National Forest boundary is eligible and suitable for classification as a Wild River. The Hoback Canyon section from Cliff Creek to the confluence with the Snake River is eligible and suitable for classification as a Recreation River. The Hoback Canyon section, because of topographic features and proximity to U.S.189/191, has the greatest potential for short-term impacts. The potential for impacts and disruption of activities would be a focal point at the nine crossings of the Hoback River, one crossing of the Upper Hoback River, and one crossing of Cliff Creek during construction activities. There would be short periods when the river would not be accessible at a crossing site while the pipeline is being constructed under the river bed. Design criteria in **Appendix D** would prevent any long-term impacts. Potentially, river users (fishing, floating, etc) would be the most likely affected in the short term. The project design would prevent any activities from occurring that would, in any way, affect the overall integrity of the river or its eligibility for future designation. A pipeline incident with environmental damage that could affect the scenic, recreational, fisheries, or wildlife values that make the Hoback River, Upper Hoback river, or Cliff Creek eligible for designation would be unlikely to occur.

Developed Recreation

The two campgrounds and several trailheads that are within the project corridor would not be directly affected by extended closures, but the recreational experience may be affected by noise and the bustle of activity. Additionally, there may be short-term delays in gaining access to the facilities because of disturbance along the highway corridor near these sites. The most likely affected sites include Kozy and Hoback campgrounds, and facilities accessed by the Granite Creek Road (FDR 30500). Granite Creek Road provides access to Granite Hot Springs, Granite Campground, numerous summer home sites, the

Girl Scout Camp, American Wilderness Leadership School, and several trailheads (Cliff Creek, Granite Creek, Bryan Flat and Horse Creek).

Recreation Use

Recreation activities, other than those associated with developed sites, occur typically in a semi-primitive or primitive setting. These include both motorized and non-motorized activities along with various river uses. There may be some short-term displacement of recreation users during construction at site-specific areas. The periods of impact would be dependent on construction schedules but should not be more than two-three days at any time unless there may be unforeseen circumstances.

Motorized uses, particularly snowmobile use in the area south of Bondurant, would not be affected by project construction activities during the spring through fall. Non-motorized activities that may be affected include hiking, horseback riding, hunting, photography, fishing, wildlife viewing, and rafting. In most instances these activities would not be directly impacted other than possible inconvenience for access. The indirect impacts would include noise, visual impairment, and minor amounts of vegetative disturbance.

Special Uses

Special use permits for recreation activities in the Project Area could be restricted for short periods during construction activities. Where possible, the activity could be relocated, if necessary, to avoid an undesirable impact on permittees.

Cumulative Effects by Alternative

The cumulative impact analysis area for recreation is the Project Area.

Alternative A – No Action

Past, ongoing, or reasonably foreseeable activities or events would have a cumulative effect on recreation under Alternative A. Grazing, road construction and maintenance, logging, and fire suppression have historically affected the land. The effects from these past activities and land uses have included surface disturbance that has affected the recreation experience by changing the appearance of the Project Area.

Cumulatively, ongoing or projected activities or uses on adjacent lands that may affect recreation would include vehicle traffic, highway maintenance, recreational activities, residential areas, commercial developments, vegetation management, and fuels reduction. Events, such as wildland fires, also would have a cumulative effect on recreation.

Specific current and foreseeable projects that may affect recreation include:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Horse Creek Feedground Connector Road, construction of approximately 500 feet of low service road on the Horse Creek Plateau (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)

- Snake River Campground Projects (WYDOT and BTNF)
- High Mt. Heli-Skiing, mid Dec. to mid April each year –Snake River/Wyoming Range (BTNF)
- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special use authorizations in/near the Project Area (BTNF)
- Wyoming Range Allotment Complex, sheep grazing in Hoback watershed (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)

The effects of the projects listed above would occur sporadically over several years, mostly during spring through fall, and would continue for the duration listed. While some of these projects may provide for enhancement of recreation resources or values, others may alter the recreation experience.

Projects contributing to cumulative effects in the Project Area include road construction and maintenance. Highway reconstruction and improvements would occur for extended periods over several years. New disturbance along existing roads or highways would have limited effects on recreation users other than travel delays and temporary disruptions to access or activities. Highway improvements could affect parking areas for dispersed recreation users and bicyclists on the highway between Jackson and the Rim.

Forest Service campground facilities located along the highway between Alpine and Hoback Junction are being redesigned and reconstructed in conjunction with planned highway improvements. Within the Wolf Creek and Cabin Creek sections, some of the recreation facilities will be affected. Because of a loss of campsites in the Wolf Creek and Cabin Creek sections, WYDOT has agreed to relocate campground facilities to a Forest Service-approved area. The Cabin Creek campground will be closed upon the construction of a new site at the Wolf Creek staging area. The access at the Sheep Gulch boat ramp will be changed to a T intersection. These actions will address resource concerns at existing campgrounds, retain the camping capacity from Fall Creek road to the Sheep Gulch boat ramp, enhance bald eagle habitat, and improve public safety at recreation sites. During construction activities currently scheduled to end in 2005, there will be limited camping opportunities at times and delays in accessing sites and the boat ramp.

The South Park river access project has potential to have a considerable impact on recreation users for a fairly lengthy period of time. The river access project would alter the recreation experience for boat/bank anglers, scenic floaters, hikers, wildlife watchers, sightseers, picnickers, kayakers, hikers, cyclists, and others by redeveloping river access facilities in the South Park area along the Snake River south of Jackson.

Proposed heli-skiing operations in the Wyoming Range would not contribute to the cumulative effects of Alternative A on recreation. The heli-skiing project would involve recreation activities and helicopter use in undeveloped areas of the Wyoming Range during the winter season. It would not contribute to the cumulative effects of Alternative A (highway use by tanker trucks transporting LNG to Jackson) and other projects with a similar range of effects.

Ongoing and projected effects from vegetation management in the Project Area would contribute to cumulative minimal effects on the recreation experience. Several fuels reduction projects are proposed within the Project Area. These activities could include, but are not limited to, prescribed burns, removal of standing and downed fuelwood, brush removal, and selective thinning and pruning. These activities typically would not change the overall vegetation type throughout the landscape, only stand density and

understory composition in treated areas. Project activities and smoke from prescribed burning may temporarily affect recreation users and scenic viewing.

The fuels reduction program at Hoback Ranches would occur in semi-primitive motorized and non-motorized areas where the primary recreation uses are hunting, OHV use and dispersed camping. Primary impacts to recreation would be in the form of noise and temporary travel and access delays.

Over the long term, wildland fires would occur in the Project Area, and 90 percent of all ignitions (fire starts) would be controlled at less than one acre (USFS 2004b). Effects on recreation resources and values could occur in association with future wildland fires in the Project Area. Large intense fires would be infrequent, but could alter the recreation experience in burned areas. Smoke from wildland fires may temporarily affect recreation users and scenic viewing.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects. Alternative B may cause a slight increase in cumulative effects on recreation, when considered with all other past, present, and reasonably foreseeable future activities in the Project Area.

The following effects would be added to the cumulative effects for Alternative A. Short-term effects on the recreation experience would result during the construction of the pipeline over a period of six months. These effects would include temporary reductions in visual quality, noise disturbance, and disruptions or access restrictions along the pipeline corridor on wilderness, highway, campground and river users. The cumulative effects of specific current and foreseeable projects that may affect recreation, listed above under alternative A, would not vary based on the inclusion of the effects of the proposed pipeline project.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

There would be no irreversible or irretrievable commitments of recreation resources under any alternative.

4.4.4 Transportation

Indicators

- Effects of pipeline construction, operation, and maintenance on the highway corridor, existing road facilities and structures, and public travel
- Effects on a portion of the Wyoming Centennial Scenic Byway (U.S. 189/191), a sensitive travel route
- Effects of LNG delivery by tanker truck on highway corridors, existing road facilities and structures, and public travel

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A - No Action

Under the No Action alternative, the proposed pipeline project would not be built and LNG would continue to be transported by tanker truck to Jackson along the existing highway that crosses NFS lands. There would be no changes to the existing transportation system and public and commercial travel would continue as projected.

Delivery of LNG to the Jackson area requires that tanker trucks travel on public highways (U.S. highways 287/191/26 and 89/191) on a daily basis. Currently, tanker trucks make 500 or more round trips per year. By 2010, 665 round trips per year are expected (DOT 2004). Because delivery of LNG by tanker truck to the Jackson area would continue and the number of daily deliveries along highway corridors would increase over time, it is likely that the risk to public safety related to trucking accidents involving LNG would increase over time. A traffic accident involving a tanker truck loaded with LNG could result in a fire, should leaking LNG ignite.

Long-term effects of the increased number of round trips by tanker trucks, each carrying 10,000 gallons of LNG to Jackson, include increased road use and potential roadway deterioration that could increase the need for maintenance activities on the existing highway corridor. Effects on public travel and highway safety would include a continued potential for occurrence of crashes, damage to property, and fatalities over time (**Table 3-32**). Delivery of LNG by tanker truck poses the risk of an accident involving a tanker truck carrying LNG. The flow of traffic and access to areas in Sublette and Teton Counties, including NFS lands and the Wyoming Centennial Scenic Byway (U.S. 189/191), may be intermittently slowed down or less convenient as tanker truck round trips increase over time. Increases in tanker truck traffic over time may contribute to a perceived negative effect on scenic and historical experiences for travelers on the scenic byway.

Increasing traffic volumes on a substandard highway also could compound existing roadway deficiencies and affect public safety (DOT 2004). By 2021, traffic volumes on the highway used for trucking LNG to the Jackson area (U.S. 189/191) are projected to increase by 50 percent. Existing design and safety deficiencies on U.S. 189/191 are likely to be compounded by the projected increase in traffic volumes and truck deliveries of LNG, which in turn would likely elevate the potential for trucking accidents and spills along the transportation route.

Under Alternative A, with the projected increase in the number of tanker trucks needed to transport LNG along public highways, the risk of trucking incidents and the risk to public safety would increase slightly over time. Continued reliance on transport of LNG along public highways could leave the Jackson area vulnerable to interruptions in gas supply during times when highways are impassable.

Alternative B – Proposed Action

Project activities could affect transportation in the Project Area by impacting traffic flow, public travel, and safety on a portion of the Wyoming Centennial Scenic Byway (U.S. 189/191), a sensitive travel route, during pipeline construction activities. Effects on the scenic byway are discussed later in this chapter in the Scenic Resources section.

Installation of the pipeline would reduce the potential safety hazards associated with LNG transport by tanker trucks on highways. Transportation of natural gas by pipeline to LVE's Jackson facility would considerably reduce the number of trucks using public highways for transport and delivery of LNG to the

Jackson area, eliminating the need for 500 or more round trips per year by tanker trucks. Reduced reliance on the transport of LNG along public highways would reduce the potential vulnerability of the Jackson area to interruptions in gas supply during times when highways are impassable.

Pipeline Construction

Effects on public travel and the transportation system during pipeline construction would be low and short-term. Traffic flow would be intermittently slowed down and the traveling public would be inconvenienced over the short term, during the 6 months or so that pipeline construction activities are occurring.

Direct effects of pipeline construction activities would include travel delays of up to 15 or 20 minutes in duration along the highway and the bustle of activity, including the presence of materials, staging areas, construction workers, and equipment along the highway corridor during the installation of the pipeline. Construction traffic would include transport of equipment and materials to the pipeline corridor and private vehicles transporting workers to the site.

Construction activities would involve excavation of the pipeline trench, construction of proposed equipment parking areas, proposed dirt storage areas, temporary work areas (TWAs), proposed block valves, a gas processing facility, and 29 road crossings. The detailed route alignment for the proposed pipeline and the locations of TWAs are shown in **Appendix D. Table D-2** shows TWAs including road crossings, staging areas, spoil areas, traffic control areas, a contractor yard, and equipment storage. Existing pullout areas along the highway would be used during construction activities to minimize the amount of new disturbance required to install the pipeline. The access roads that would be used are listed in **Table 2-1**. Construction traffic would be limited to these access roads. Functional use of access roads would be maintained at all times. Access to state highways, county roads, FDRs, and private roads would be maintained.

Design criteria and mitigation measures would be implemented to reduce impacts to public travel. Traffic flow would be maintained and pipe would be installed in a manner that would not block the passage of vehicles. Where needed, steel plates would be installed at the end of the work day. Traffic controls would be implemented to reduce impacts to public travel. Highway crossings would be implemented by horizontal or directional bores and each crossing would be completed in 2 to 3 days. This procedure would allow for the pipeline to be installed below the highway surface with little disruption to traffic flow.

Unexcavated portions of the trench line would be spaced at intervals to allow passage of vehicles. Plank bridges would be used where the open trench interferes with driveways or roadways. Access to ranches, homes, businesses, and community facilities in Bondurant, and Forest Service facilities would be maintained.

Additionally, safety practices such as use of construction cones or barriers, flagpersons, lights, warning signs, and walkways would be implemented to reduce impacts to public travel and safety.

Increases in average annual daily traffic (AADT) counts due to construction traffic would not be noticeable. Increases in traffic levels occurring at any one time would be expected to fall within the current capacity of the roads.

Pipeline construction activity could contribute to roadway deterioration in the short term and increase maintenance costs to the agencies that administer the roads. However, all roads affected by pipeline construction activities would be repaired by LVE or its contractor, as needed, and would be maintained to pre-construction conditions.

Delivery of LNG by tanker trucks would continue during construction. The number of tanker trucks, and effects on public travel, would not be reduced until the pipeline is operational. Impacts from LNG delivery would have added impact on public travel during construction, but the impact would not be noticeable relative to overall impacts from pipeline construction.

Construction activity may contribute to a perceived negative scenic and historical experience for travelers on the scenic byway over the short term during pipeline installation.

Pipeline Operation

In the long term, the number of round trips by tanker truck would be greatly reduced. Road use, roadway deterioration, and road maintenance activities would decrease over time. Effects on public travel and safety would decrease as round trips by tanker truck decrease. Access to areas in Sublette and Teton Counties, including NFS lands and the Wyoming Centennial Scenic Byway (U.S. 189/191), would be relatively unchanged over the long term. The flow of traffic would return to the existing condition and may improve over time as tanker truck round trips are decreased. A decrease in tanker truck traffic may lead to a perceived improvement of scenic and historical experiences for travelers on the scenic byway.

Decreases in Average Daily Traffic (ADT) due to pipeline operation would not be noticeable. ADT counts for traffic at Daniel Junction in 2003 were approximately 1,900 to 2,400 (eastbound) and 1,800 to 2,100 (westbound). A decrease of approximately 665 round trips annually by tanker trucks is projected by 2010, which would reduce the ADT count by 1.8 vehicles per day in each direction. A decrease in ADT of 1.8 vehicles per day would not be noticeable. The projected decrease in tanker truck traffic would decrease the potential for accidents involving tanker trucks.

Routine maintenance of the pipeline would occur and workers would make periodic trips to inspect the pipeline. However, the frequency of these trips would be low and effects on the transportation system would not be noticeable.

Cumulative Effects by Alternative

The cumulative impact analysis area considered for transportation is the Project Area.

Alternative A – No Action

Past, ongoing, or reasonably foreseeable activities that would have a cumulative effect on the transportation system in the Project Area include the following:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Horse Creek Feedground Connector Road (WGFD)
- South Park River Access Site/Plan (BLM)
- Snake River Campground Projects (WYDOT and BTNF)
- Monument Ridge Fuel Treatment Project (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention (BLM/BTNF/Private)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)

- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Wyoming Range Allotment Complex, sheep grazing in Hoback watershed (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)

Travelers along U.S. 189/191 in the Project Area are likely to experience temporary inconvenience from the cumulative effects of the implementation of the projects listed above. These effects would occur sporadically over several years, mostly during spring through fall, and would continue for the duration of the projects listed. Highway reconstruction and improvements would occur for extended periods and result in travel delays of up to 15 or 20 minutes in duration along the highway and a noticeable bustle of activity, including construction workers, and equipment.

Projected oil and gas development in the Pinedale Anticline area southeast of the Project Area, including the Questar Year-Round Drilling Project and the Jonah Infill Drilling Project, likely would increase the ADT count along U.S. 189/191. Recreational visits to the BTNF and outfitter and guide activities in and near the Project Area also would generate increased traffic on U.S. 189/191.

Under Alternative A, the delivery of LNG by tanker truck to the Jackson area and traffic volumes on U.S. 189/191 would increase over time. When added to other past, present, and reasonably foreseeable future actions, the potential for negative impacts to public travel and safety would increase over time. Increased tanker truck traffic would contribute to small increased negative impacts to public travel and roadway deterioration. However, the planned FHWA/WYDOT highway reconstruction and improvement projects would offset some negative impacts to the roadway surface, public travel and safety.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the temporary inconvenience of travel along the highway corridor, as described above.

When added to other past, present, and reasonably foreseeable future actions, short-term cumulative impacts from the proposed project would be small. Cumulative impacts to public travel and traffic flow could be increased in the short term when other planned projects with expected traffic impacts overlap in time with the Proposed Action. Mitigation measures such as traffic control and safety practices implemented during construction would minimize impacts. The flow of traffic would return to the existing condition after pipeline construction activities are completed and traffic flow may improve as tanker truck round trips are decreased.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irretrievable Commitments

The permanent pipeline corridor (120 acres) represents an irreversible or irretrievable commitment or constraint along the existing highway corridor. A considerable portion of the area committed to a pipeline corridor would coincide with the existing highway corridor. The permanent pipeline corridor would be

unavailable for uses or highway maintenance that would require excavation or vegetation with deep root structures unless the pipeline could be avoided or moved.

4.4.5 Pipeline Safety

Indicators

- Effects on public safety during pipeline construction
- Effects on public safety related to pipeline operation and maintenance

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A - No Action

Under the No Action alternative, there would be no risk to public safety from pipeline construction, operation, and maintenance because no pipeline would be constructed in the Project Area.

Alternative B - Proposed Action

Public safety issues related to the proposed pipeline were raised during the project scoping. This section analyzes the effects of pipeline construction, operation, and maintenance related to public safety and the transportation of natural gas by pipelines, including a discussion of federal pipeline safety regulations that assure safety in design, construction, inspection, testing, operation, and maintenance of natural gas pipeline facilities. Pipeline safety analysis provides public awareness and demonstrates the reliability and safety of natural gas pipelines, as related to pipeline construction, operation, and maintenance.

An independent engineering design review addressing safety issues associated with the location and design of portions of the pipeline route within the highway corridor was conducted for the Wyoming Department of Transportation (WYDOT) by PB Energy Storage Services, Inc. (2005). The results of this review recognized the adequacy of the proposed design and report recommendations were used in the design of the proposed project. Continued coordination between WYDOT and LVE since the final report was issued has resulted in joint agreement to modify some design criteria related to depth of burial that were evaluated in the design review, in an effort to reduce surface disturbance without compromising public safety. All applicable federal regulations regarding pipeline burial depth would still be met under Alternative B. Pipeline burial depths are described in Chapter 2 on pages 2-28 and 2-29.

Pipeline Construction

The pipeline project would be designed, constructed, and operated by LVE in accordance with DOT Pipeline Safety Regulations contained in 49 CFR Parts 190-199. These regulations are intended to ensure adequate protection for the public and prevent natural gas facility accidents and failures. Based on area classifications defined in 49 CFR 192, the engineering design and installation of the pipeline would meet or exceed DOT safety requirements for each class location. The pipeline constructed in the vicinity of populated areas would conform to the higher standards for those areas. Underground burial of the pipeline would meet or exceed depth requirements in DOT regulations.

One pipeline segment in the vicinity of Camp Creek Saddle would be a surface lay engineered to reduce hazards associated with an existing landslide area. Surface lay of the pipeline for a distance of about 1,500 feet would control the risk of pipeline failure. In contrast, burial of the pipeline would 'lock' the pipe in place and subject it to landslide movement. Continued landslide movement could damage or

rupture the pipe, disrupting service and risking an explosion if escaping gas were to ignite. By using a surface lay for the pipeline in this area, the stress and strain on the pipe would be reduced by allowing a small amount of slack in the pipeline and readjusting the alignment of the pipeline on the surface, as needed, to relieve stress and strain associated with land movement. These design considerations are based on geotechnical investigations conducted in the Camp Creek Saddle landslide area (Plumley 2005).

LVE would develop a monitoring program in accordance with **Appendix D** that would include regular visual inspection and strain gauge monitoring of the slide area to track earth flow movements. LVE would follow its contingency plan for intervention that would include excavating the pipeline to free the pipe of impinging soil mass, or taking the pipeline temporarily out of service to readjust the pipe and relieve strain. The Camp Creek Saddle area is not located in a developed area, and is not near the highway or the river, which would limit potential hazards to residents, motorists, and recreationists.

Over the short term, there would be an increased risk to public safety during construction and installation of the pipeline, however, project design criteria described in **Appendix D** would mitigate potential risks to highway travel, recreational use of the Hoback River, and wildland fire. Potentially hazardous conditions that could affect public safety during pipeline construction and proposed mitigation included in project design criteria are described below.

Pipeline construction activities would represent a potential safety hazard to motorists traveling along U.S. 189/191 as construction proceeds adjacent to the highway through Hoback Canyon. For road crossings and pipeline construction adjacent to the highway, measures to safeguard the public would be used, as needed, during construction and installation of the pipeline. Measures would include an adequate number of flagmen, barriers, warning signs, lights, and walkways around construction work areas, as needed. Roads would remain passable by implementing traffic control measures or providing a suitable bypass road to keep traffic moving during pipe installation and restoration of work areas. Traffic flow would be maintained where the pipeline would be installed by boring or open-cuts under a paved road surface. Where needed, steel plates would be installed at the end of the work day. All road surfaces would be kept free of debris that could be a hazard to the public.

Pipeline installation would avoid suspension or attachment of the pipeline to bridges at water crossings, including highway bridges along Hoback Canyon. By not suspending the pipeline from highway bridges, vulnerability of the exposed pipeline to traffic accidents or flooding would be reduced. Crash statistics for Wyoming indicate that 283 crashes were associated with bridges in 2006, including 5 fatal crashes (WYDOT 2007a). A large, intense fire from a crash could cause sufficient damage to a bridge to initiate a pipeline incident. A fire resulting from the crash of a gasoline tanker truck into a guard rail on a bridge overpass in California caused steel bridge supports to melt and the bridge to collapse (San Francisco Chronicle 2007).

Recreationists using the Hoback River for boating and other activities while instream construction activities are ongoing could be exposed to a potential safety hazard as they approach a construction area, because river travel across an instream construction area would not be possible. Recreationists would be warned of the need to avoid crossing areas during instream construction activities at river locations that would provide them with a safe take-out area upstream of the crossing and a safe put-in area downstream of the crossing. Only one instream construction area is likely to be active at a time.

Accidental ignitions by construction crews or equipment along the construction corridor could result in wildland fire. LVE would implement a fire prevention program in accordance with **Appendix D** that would reduce the risk of wildland fires resulting from construction activities. Vegetation would be cleared from areas used by equipment and vehicles and emergency firefighting supplies would be maintained

onsite, as specified by the Forest Service, to mitigate potential ignition sources such as welding equipment and reduce the risk of wildland fire.

Pipeline Operations and Maintenance

Over the long term, there would be minimal risk to public safety during operation and maintenance of the pipeline, provided operational and maintenance procedures outlined by the One-Call program (One-Call of Wyoming 2004), agreements between WYDOT and LVE, and in **Appendix D** are implemented. LVE would prepare and implement an operation and maintenance plan, in accordance with **Appendix D**, that would include procedures for operational activities that meet or exceed the minimum requirements of 49 CFR 192, ensure the structural integrity of the pipeline during operation, and prevent damage to the pipeline by third parties.

LVE would prepare and follow a manual of written procedures for the operation and maintenance of the proposed facilities and for emergency response. LVE's application includes information on the utility's technical and financial ability to construct and operate the pipeline. The manual would include procedures for operations, maintenance, and repair; control of corrosion; documentation of construction and operating history; data gathering for reporting incidents involving release of gas; startup and shut down; and periodic review to determine effectiveness and adequacy of operation and maintenance procedures. Pipeline pressure would be continuously monitored through LVE's monitoring system.

LVE would develop a monitoring program in accordance with **Appendix D**, which would include regular visual inspection and strain gauge monitoring of the Camp Creek landslide area to track earth flow movements. LVE would follow its contingency plan for intervention in this area that would include excavating the pipeline, as needed, to free the pipe of impinging soil mass, or taking the pipeline temporarily out of service to readjust the pipe and relieve strain.

Pipeline inspections, pipeline leak surveys, and cathodic protection maintenance would be conducted in accordance with DOT requirements and following LVE's internal requirements. Regular maintenance activities would include ensuring the built-in safety controls such as valves sensors and cathodic protection system are all functioning properly. LVE would maintain records of operation and maintenance activities, including any testing, replacements, repairs, and modifications performed. Pipeline markers and signs would be inspected and maintained or replaced, as necessary, to ensure the pipeline location is visible from the ground.

Federal regulations require companies to perform maintenance inspections on pipeline components at specified intervals. OPS regulations require that all pipe undergo at least one hydrostatic test after construction. Pipeline valves and overpressure prevention equipment must be inspected every year. The entire pipeline right-of-way must be patrolled two to four times each year, depending on how densely populated the area around the pipeline is (the higher the population, the more frequent the patrol). Corrosion prevention equipment must be inspected every two and one-half months. Leak detection surveys are conducted at least annually in unpopulated areas and four times each year in populated areas. In addition, smart pigs would be run through the pipeline to check for wear and irregularities in the pipe. Other inspection requirements are specified in the federal pipeline safety regulations.

To reduce the risk of third party damage, LVE would participate in Wyoming's One-Call underground utility locator service and adhere to agreements with WYDOT regarding procedures to enhance pipeline safety during WYDOT's highway-related work activities. Pipeline markers would be placed wherever the pipeline crosses roadways and other public access locations to alert those parties conducting ground disturbance activities in the vicinity of the buried pipeline. The pipeline markers would identify LVE as the pipeline operator and display contact information for emergencies and general inquiries. To facilitate

safe highway operations along the pipeline route and enhance the responsiveness of LVE to One-Call of Wyoming procedures, an inspector representing LVE would be onsite when excavation activities associated with WYDOT’s highway operations near the pipeline are in progress, provided LVE receives 24 hours advance notice during normal business hours (**Appendix D**).

One-Call of Wyoming procedures and adherence to agreements between WYDOT and LVE for highway operations requiring excavation would have a nominal effect on WYDOT’s programs, provided an inspector representing LVE is available to WYDOT, as needed. Use of excavation practices described in the Excavator’s Handbook (One-Call of Wyoming 2004) would moderately increase the time required to complete excavations for highway operations in close proximity to the pipeline.

Routine pipeline corridor maintenance would be conducted to facilitate periodic surveys to detect leaks and monitor corrosion, to evaluate slope and soil stability, and to control noxious weeds. Generally, over the long term, a 20-foot-wide permanent pipeline corridor would be maintained with herbaceous vegetation only, without shrubs or trees that have deep root systems that could potentially damage the protective coating of the pipe.

Cumulative Effects by Alternative

The cumulative impact analysis area considered for pipeline safety is the Project Area.

Alternative A - No Action

Under the No Action alternative, no other past, ongoing, or reasonably foreseeable activities in the Project Area could have a cumulative effect on the safety of pipelines, since no other transmission pipelines exist in the Project Area and no other transmission pipeline projects in the vicinity of the Project Area in Teton or Sublette Counties are known to be in the planning or permitting stages. Three proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision may have a temporary gas gathering pipeline associated with them, however this temporary gathering pipeline would not be expected to have any safety effect on transmission pipelines.

Alternative B - Proposed Action

The cumulative effects for Alternative B would be the same as under Alternative A, with the following exception. Past, ongoing, or reasonably foreseeable activities in the Project Area that could have a cumulative effect on the safety of the proposed pipeline project include the following:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Horse Creek Feedground Connector Road (WGFD)
- South Park River Access Site/Plan (BLM)
- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)
- Monument Ridge Fuel Treatment Project (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention (BLM/BTNF/Private)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)

- Wildland Fire
- Traffic Accidents on U.S. 189/191
- Excavation Activities by Third Parties
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)

Highway reconstruction projects on U.S. 189/191 in the region would likely improve the highway system design to accommodate the projected traffic volumes and correct existing safety deficiencies. However, projected increases in traffic volumes over time would likely result in an increase in the risk of traffic accidents occurring on the highway.

Proposed pipeline construction in 2006 would not coincide with planned WYDOT highway improvements of the U.S.181/191 corridor in Sublette County. The 6.4-mile Pfisterer segment (from Bondurant to the southeast) was constructed during 2005 and the 4.9-mile Dell Creek segment (from Hoback Canyon to Bondurant) is scheduled for construction in 2008. Installation of the pipeline following highway construction activities potentially could result in damage to the highway facilities that would require repair. Should highway construction activities coincide with pipeline construction activities, the risk of damage to the pipe would be increased, but would be mitigated by close coordination between the projects. Excavation associated with highway construction activities following installation of the pipeline could potentially result in damage to the pipe or an explosion, if gas escaping from the damaged pipeline were to ignite. Risk of damage or explosion would be mitigated by adherence to the Wyoming one-call underground utility locator service. Pipeline markers placed wherever the pipeline crosses roadways and other public access locations would alert highway construction workers in the vicinity of the buried pipeline.

Use of prescribed fire for fuels reduction in the Hoback Ranches and Monument Ridge areas prior to 2007 when pipeline construction would occur could potentially reduce the risk of wildland fire occurring in the Project Area during pipeline construction activities. Although unlikely, the potential escape of prescribed fire in the Hoback Ranches and Monument Ridge areas could add to the risk of wildland fire during pipeline construction activities. Accidental ignitions by construction crews or equipment along the pipeline corridor that could escape as wildland fires would be mitigated by the removal of vegetation to reduce fuels before construction activities begin.

Forest Plan Consistency

Alternative B is consistent with the overall management direction for the BTNF goal to help utilities provide services while providing a safe transportation system that meets the needs of commercial users of the BTNF and protecting the environment, adjacent resources, and the public investment.

Irreversible and Irretrievable Commitments

No irreversible or irretrievable commitments would occur based on the design, construction, operation, and maintenance of the proposed pipeline project in accordance with federal pipeline safety standards.

4.4.6 Scenic Resources

Indicators

- Effects on existing scenic integrity and scenic attractiveness
- Visibility from Gros Ventre Wilderness and the Shoal Creek Wilderness Study Area (WSA)
- Visibility from residential areas

- Visibility from existing recreation facilities
- Effects on the scenic byway corridor (a sensitive travel route), including compliance with the Scenic Byway and Wild and Scenic Rivers Visual Standard (Forest Plan, p. 123, as added by Attachment One to the Forest Plan Record of Decision)
- Effects on visual quality along segments and corridors of the Hoback River and its tributaries (Shoal, Cliff, Granite, and Willow Creeks) within the Nationwide Rivers Inventory (NRI) that are eligible for designation as wild, scenic, or recreation rivers, including compliance with the Wild and Scenic Rivers Standard and Visual Quality Standard (Forest Plan, p. 142, as added by Attachment One to the Forest Plan Record of Decision)
- Visual quality objectives (VQOs) of preservation or retention met or not met in the foreground viewing zone along the Hoback River and the scenic byway

Environmental Effects

Direct and Indirect Effects by Alternative

Direct visual effects generated by proposed pipeline installation and operation would be experienced by travelers on U.S. 89/191 and U.S. 189/191, residents located near the pipeline route, users of the campgrounds and trails located near the proposed pipeline construction corridor, and recreationists on the Hoback River. Because most of the proposed pipeline construction corridor would be located next to the U.S. 189/191 highway corridor, travelers on the road would experience most of the visual impact from the project. Indirect effects would involve any long-term change in the recreation-driven economy from negative impacts to the visual resource of the area. No such effects are anticipated to occur from the installation and operation of the proposed project.

Alternative A - No Action

Under Alternative A, the No Action alternative, the pipeline would not be installed and operated within the Project Area. There would be no effect on the existing visual condition from the proposed pipeline. Existing management activities and recreational use of the area would continue and the Project Area would be managed to protect and maintain existing improvements and uses. The No Action alternative would result in the continued transport of LNG to the Jackson area by tanker trucks. The effect on scenic resources from tanker trucks could involve accidents and environmental damage. The potential for adverse effects on scenic resources would be likely to increase as the number of tanker trucks on U.S. 189/191 is projected to increase by 35 percent by 2010.

The current and projected use of the highway by tanker trucks could also affect the scenic, recreational, fisheries or wildlife values that make the Hoback River eligible for designation. The likelihood of accidents or environmental damage that would affect the river would increase with the projected increase of tanker truck traffic on U.S. 189/191 through Hoback Canyon.

Alternative B – Proposed Action

Under Alternative B, the potential long-term effect on scenic resources would be from the removal of vegetation in the pipeline construction corridor that would alter existing line, form, color, and texture as viewed from sensitive viewing areas. Long-term effects would also occur from check and block valves that would be located within foreground views of U.S. 189/191 at five locations along the pipeline. Pipeline installation activities and the long-term visual effects of the 20-foot wide pipeline maintenance corridor would be limited to viewers within foreground distance zones of the Project Area because the Project Area is screened from views outside the area by the terrain and intervening vegetation. Most visual effects on the scenic quality of the landscape would be from short-term installation activities and equipment.

Effects on scenic resources from the construction of the pipeline would be primarily short-term and construction related, and would consist of the sights of construction equipment and installation activities within the construction corridor and at temporary work areas (TWAs) such as contract yards, equipment storage areas, staging areas, and spoil storage areas, that are located outside the 75-foot pipeline construction corridor. Approximately 370 acres would be disturbed within the construction corridor and TWAs during installation activities. The locations of TWAs are described in **Appendix D**.

The existing vegetation within the construction corridor consists of forested and non-forested areas containing primarily grasses and sage. Non-forested areas also include disturbed lands that about U.S. 89/191 and U.S. 189/191 in developed areas, and agricultural lands.

Minimal long-term visual effects would be associated with clearing of vegetation in non-forested plant communities in the proposed pipeline construction corridor. Once vegetation in the construction areas is reestablished, the remaining permanent pipeline corridor would be similar in appearance to the surrounding landscape. The visual impact of vegetation removal would also be minimal because of low color contrasts associated with the characteristic vegetation and the underlying soils. Once the pipeline is installed, the visual impact resulting from construction would continue until vegetation has been reestablished on disturbed areas. Non-forested portions of the construction corridor and TWAs would be vegetated with herbaceous vegetation. Once the vegetation is established, the remaining pipeline maintenance corridor would be visible as a grassy, linear feature cleared of shrubs in some areas; however, the revegetated corridor would be a minor feature in the landscape and would not be easily discernible to the average viewer.

The visual effect of vegetation removal would be more noticeable in forested areas. Most of the forested land that would be crossed by the pipeline is located in the Hoback Canyon. Areas vegetated with aspen crossed by the pipeline construction corridor occur between Little Horse Creek and Camp Creek Saddle. Other stands of trees crossed by the pipeline construction corridor are located in narrow belts along riparian areas. Potential effects in forested areas that would result from tree removal would be the contrast of a linear edge of a cleared corridor through stands of trees.

The proposed gas processing facility would be located along U.S. 189/191 on private land near the south end of the proposed pipeline route. The proposed facility, which would occupy less than one acre in Section 24, T. 36 N., R. 112 W., would be visible to passing motorists, as the site would be located near the highway just outside the fence along the highway corridor.

Sensitive Viewing Areas

The proposed pipeline construction corridor would be within the foreground distance zone of sensitive viewing areas located throughout the Project Area.

Travel Routes

Most of the proposed pipeline construction corridor would be within the immediate foreground views of travelers on U.S. 189/191. North of Hoback Junction, on U.S. 89/191, the pipeline construction corridor would be located along the highway in disturbed and agricultural lands. Once vegetation has been re-established in the corridor, the linear clearing for the pipeline maintenance corridor would be difficult to discern along the other linear man-made developments that include the highway, various access roads, and electric distribution lines.

The proposed construction corridor is also located along U.S. 189/191 east of Hoback Junction between Camp Creek and the east end of the proposed route, where the construction corridor intersects the access

road to the Williams meter site. Between Camp Creek and Hoback Canyon, the proposed route is vegetated with grasses and shrubs. Once the pipeline is installed and herbaceous vegetation is established, the pipeline permanent pipeline maintenance corridor would be difficult to discern from the surrounding vegetation to most viewers on the highway.

Most of the potential long-term visual effects that could be noticeable to viewers on the highway would occur in Hoback Canyon. The greatest constraint on installing the pipeline through the canyon is the rugged terrain. The pipeline would cross the Hoback River at nine locations, including five locations in the canyon, to avoid steep slopes. In general, the pipeline corridor would utilize existing clearings on both sides of the highway to the extent feasible. Those portions of the pipeline located within the highway corridor would not cross through stands of trees, as these segments would be within an area disturbed to some extent to accommodate the highway, the highway shoulder, and various turn-offs, and are the least likely to result in noticeable disturbance once the vegetation has been re-established. Locating the pipeline route within or close to the highway corridor would minimize visual effects from the removal of trees.

The densest stands of trees occur on north-facing slopes on the south side of the river and U.S. 189/191. Those portions of the pipeline that would be located south of the river are on slopes that are relatively less steep, allowing some flexibility in the location of the pipeline within the corridor. The portions of the pipeline that would encroach into stands of trees would be located so that there is a buffer of trees between the cleared portion of the construction corridor and viewers on the highway. The portions of the construction corridor that would be the most visible from the highway are those that would require tree removal at river or road crossings. The river and stream crossings have been aligned to minimize impacts on riparian and wetland vegetation, which would minimize the visual effect as well. Vegetation would be cleared on each stream bank only as needed to provide adequate work space

Grass and sage, interspersed with small, sparse stands of trees, dominate south-facing slopes. In general, stands of trees would be avoided by the pipeline construction corridor. Once these areas have been revegetated with the appropriate herbaceous vegetation, the 20-foot pipeline maintenance corridor would be difficult to discern by viewers on the highway.

The proposed highway crossings would be bored. There would be TWAs on either side of the crossings that would result in short-term, construction-related impacts. Pipeline construction activities and the TWAs would be visible to travelers on the highway for the duration of construction activities.

Existing public roads that would be used to access the proposed construction corridor are listed in **Table 2-1**. In addition to U.S. 189/191, access roads that include a portion of the pipeline corridor along the road corridor include Game Creek Road, which provides access to several residential subdivisions and the Game Creek Trail. The pipeline construction corridor would be located along the paved county road segment of Game Creek Road. There are very few trees along this portion of the road, as the dominant vegetation consists of grasses and shrubs. Once vegetation has been re-established in the pipeline corridor, the corridor would be difficult to discern by viewers on the road.

A portion of the proposed pipeline would be located along FDR 30461 near Camp Creek. Existing vegetation consists of grasses and shrubs. The road is used primarily by the WGF and hunters. Once vegetation in the pipeline corridor has been re-established, the corridor would be difficult to discern by viewers on the road and the surrounding area. The road also provides access to the pipeline construction corridor north of Camp Creek, including the Camp Creek Saddle. Pipeline installation and construction machinery would be visible to residents and users of the area, primarily hunters, for the duration of installation activities.

The use of the designated access roads for pipeline installation activities would occur only for the duration of pipeline installation within each spread, and would be a temporary visual disturbance within the viewshed of travelers, residents, or recreationists.

Five block valves would be located along the length of the pipeline on BTNF lands managed with a Visual Quality Objective (VQO) of the Retention. All of the valves would be within foreground views of travelers on U.S. 189/191. The estimated footprint of each valve would be 6 feet wide by ten feet long, and about 30 inches in height above ground level.

Four of the valves would be in rural areas that contain considerable human modification, including rural housing, grazing operations, fences, signs, and power distribution lines. The addition of the valves to the landscape would not change the character of the landscape. The low profile of the valves and the surrounding rural developments would prevent them from being easily noticeable to most travelers on the highway. To meet the Retention objective, the visual effect of the valve should repeat form, line, color, and texture found in the characteristic landscape. The visual impact of the valves would be minimized by painting them to match the surrounding landscape.

A valve would be located in Hoback Canyon on the north side of U.S. 189/191 in the old highway roadbed at milepost 153.5, approximately 1,500 feet east of Cow Creek. The valve site is located near a trail along Cow Creek (FDT 3120) that provides access to the Gros Ventre Wilderness. The location of the valve would be approximately 78 feet from the edge of the highway pavement near an existing trailhead and parking area on NFS lands managed with a VQO of Retention.

The visual impact of the block valve in Hoback Canyon would be minimized by painting it to match the surrounding landscape. Once the block valve is painted to harmonize with surrounding landscape colors, it would be difficult to discern by passing travelers on the highway because it would be within the viewshed of travelers for a very short period of time, and would be a relatively small scale feature in the landscape at a distance of 78 feet from the highway pavement. The valve would not likely attract the attention of the casual observer. Therefore, the proposed block valve in Hoback Canyon would be compatible with the Retention VQO standard, as viewed from the highway when the area is snow-free.

Figure 4-1 is a visual simulation depicting the linear lines and color contrasts of the proposed valve in Hoback Canyon against snow cover. The valve would be more visible to travelers on the highway during winter months when there is snow cover in Hoback Canyon. Under these conditions, the valve could draw the attention of a casual observer, and would not be compatible with the Retention VQO. The Retention VQO would be met if the valve were screened from highway views by a planting of tall clump grasses that would obscure the valve from passing travelers.

Recreation Areas

A portion of the Gros Ventre Wilderness is located just north of the proposed pipeline corridor and U.S. 189/191. The wilderness boundary is as close as about 500 feet to the proposed construction corridor. The pipeline would be installed within or very close to the highway corridor along this portion of the proposed route. Once installation has been completed, and vegetation in the corridor has been established, visual signs of the pipeline would not be evident, as most of the proposed corridor would be located along the existing linear disturbance associated with the highway.

No portion of the proposed pipeline corridor would be visible to visitors to the Shoal Creek WSA. The pipeline corridor would be screened from view by vegetation or the rugged terrain. The pipeline corridor would not be visible to locations in the WSA or the Gros Ventre Wilderness that are high enough in elevation to overlook the pipeline route and are not screened by vegetation or the terrain. Once vegetation

has been re-established, the corridor would be obscured by distance from any overlook location. Any textural contrasts from the removal of trees and shrubs would be very difficult to discern.

None of the proposed pipeline route would be visible to users on the Game Creek Trail. The pipeline construction corridor is located more than 0.5 miles from the nearest portion of the trail at the trailhead. Views of the pipeline corridor from the trailhead or any other portion of the trail are screened by the rugged terrain. The Wilson Canyon trailhead is located very close to the north end of the pipeline corridor at the existing LVE facility. Once the pipeline installation has been completed, the pipeline corridor would not be discernible in the surrounding existing industrial character of the site, which is visible for a short distance along the trail at the trailhead.

The Hoback Campground is located next to the Hoback River on the south side of U.S. 189/191. The proposed pipeline would be located on the north side of the highway within the highway corridor along this portion of the route. The elevation of the campground is below the elevation of the highway, so that the pipeline corridor would not be within the viewing area of campers. In addition, trees within the campground would provide some screening.

The Kozy Campground is located along the Hoback River between the north side of the highway and the south side of Hoback River. The proposed pipeline route crosses the river (Hoback River Crossing #3) and the highway within the west side of the campground. Installation activities would be visually intrusive during the period of time that the pipeline would be installed at this crossing. There are few trees within the campground area to screen activities located at the river crossing or along the highway in the vicinity of the campground. Once the pipeline has been installed, and vegetation in the corridor has been established, the pipeline corridor would not be discernible to most viewers, as much of the route in the immediate foreground views of campers would be along the existing linear disturbance associated with the highway.

A portion of the pipeline crossing near Camp Creek Saddle would be installed aboveground because of unstable soils in a landslide area. This portion of the pipeline would be obvious to recreationists in the area; however, the area is used primarily for hunting, and a relatively small number of people would view the pipeline. It is not anticipated that the aboveground segment of the pipeline would affect recreation or hunting opportunities in the area once installation is completed.

The Hoback Canyon valve at milepost 153.5 would be located in foreground views as seen from the trail along Cow Creek that accesses the Gros Ventre Wilderness. The valve could be visible to users of the trail. The Retention VQO would be met if the valve were screened from views of trail users by a planting of tall clump grasses, as well as painting the valve to harmonize with the surrounding landscape.

Residential Areas

The pipeline corridor would not cross through any residential subdivisions located in the Project Area; however, the pipeline construction corridor would be within the foreground distance zones of views from several residential subdivisions. Because of the size of the Project Area, the proposed corridor would be visible from many different viewpoints in subdivisions throughout the Project Area. Most of the pipeline corridor would be screened from views of residences in these areas by the rugged terrain.

Figure 4-1 Visual Simulation of Proposed Valve in Hoback Canyon

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The pipeline would not be visible to most residences between Game Creek and Squaw Creek because the pipeline corridor would be along an existing powerline right-of-way at a higher elevation than most of the residences, and because the dominant vegetation within the proposed pipeline corridor would be grasses and sagebrush. Some residences in the Glassburn and CB Ranch subdivisions that are located at higher elevations in the eastern part of the subdivisions would have a direct line of sight to portions of the proposed pipeline corridor. However, the dominant vegetation within the proposed pipeline corridor consists of grasses and sagebrush. Once the pipeline is installed, and the vegetation is re-established, the pipeline corridor would not be visible to viewers at these residences.

Some trees would need to be removed at the Squaw Creek crossing on private lands. A few residences located along Squaw Creek Road between 0.5 and 1.0 mile east of the crossing would have partial views of the cleared pipeline corridor across the creek.

The proposed pipeline route would cross private lands between the Falcon Springs Ranch and McGhee subdivisions. The pipeline corridor would be located along existing road corridors through the area. Once the pipeline is installed, and the vegetation is re-established, the pipeline corridor would not be visible along the existing linear disturbance of the road to viewers at these residences.

The pipeline corridor would be within foreground views of the Knepshield subdivision east of Hoback Junction. The pipeline would be close to the highway north of the Hoback River on land vegetated with grasses and shrubs. Once the pipeline is installed and vegetation is re-established, the pipeline corridor would not be visible along the existing linear disturbance of the road to viewers at these residences.

The pipeline corridor through the community of Bondurant and the remainder of Sublette County is located on lands disturbed by utilities and private roads adjacent to the highway corridor, or on lands vegetated with grasses and shrubs. Those residences with a direct sight line to the pipeline corridor would be able to view installation activities, however, once pipeline installation has been completed and the vegetation in the pipeline corridor has been re-established, the corridor would be difficult to discern from the surrounding grass and shrub vegetation.

Forest Service Visual Management

Most of the proposed long-term pipeline corridor on NFS lands (61 acres) would be on land managed with a Retention VQO. Most of the foreground viewing zones along U.S. 189/191 are also within the area managed with a Retention VQO.

Under Retention objectives, the visual effect of the pipeline, when installed, should repeat form, line, color, and texture found in the characteristic landscape. Changes should not be evident to a casual observer. Most of the pipeline corridor would be located along existing linear features such as highways, roads, and transmission line rights-of-way. The pipeline corridor would not be a noticeable addition to landscapes that already include these features. Once vegetation has been established in the construction corridor, visual quality of the characteristic landscape would be retained, as the revegetated pipeline maintenance corridor would not be visually evident to most viewers, as described above under sensitive viewing areas. The objectives for a Retention VQO would be met for the proposed project.

Approximately 1 acre of the pipeline corridor would be located on NFS lands managed with Partial Retention objectives. This area is along the east boundary of NFS lands that interface with private lands used for grazing. Most of pipeline corridor that crosses through NFS lands would not be visible from areas within or outside the Project Area that are managed with a VQO of Partial Retention. These areas are screened from views of the pipeline corridor by the terrain, vegetation, or distance.

The proposed pipeline along U.S. 189/191 through Hoback Canyon is located within about 500 hundred feet or less of the Gros Ventre Wilderness, which is managed with Preservation VQO objectives. None of the proposed route is within the wilderness or on lands managed with Preservation objectives.

Wild and Scenic Rivers

The entire length of the of the Hoback River segments that have been determined to be eligible for inclusion in the National Wild and Scenic Rivers system is within the Project Area along the proposed pipeline route. According to the Wild and Scenic Rivers System standard, the Hoback River and a corridor at least 0.25 mile on either side of the river would be managed to protect or enhance the outstanding values that make the segments eligible for inclusion in the system. As described in the visual effects analysis of Travel Routes above, there would be no noticeable effect on the outstanding visual quality of landscapes along the Hoback River from the installation and operation of the pipeline, once vegetation within the pipeline corridor has been re-established. The outstanding scenery values would not be affected by the proposed project.

Teton County

Teton County Scenic Preserve Trust (TCSPT) easements are located in scenic areas in the vicinity of subdivisions within the Project Area. The only TCSPT easement that would be crossed by the pipeline corridor would be a portion of the South Highway 89 (U.S. 191) Scenic Area south of the Melody Ranch subdivision. The TCSPT easement is also within a designated county Scenic Area. The pipeline route would be on the west side of the U.S. 89/191 highway corridor through the TCSPT easement. Most of the pipeline corridor would be located adjacent to the highway corridor and on an existing frontage road that crosses through the TCSPT easement. Existing vegetation cover within the corridor consists of disturbed areas along the highway and the frontage road. Once the pipeline has been installed, and the vegetation within the pipeline corridor has been established, there would be no discernible visual effect on the scenic quality of the TCSPT easement.

The visual qualities that have resulted in the county designation of the Hoback Canyon Scenic Area along U.S. 189/191 would not be affected by the proposed project once installation is completed and vegetation has been re-established in the pipeline corridor.

Cumulative Effects by Alternative

The cumulative impact analysis area for scenic resources is the Project Area.

Alternative A – No Action

The Project Area has been managed for timber treatment, fuel wood gathering, grazing, and recreational activities. This area has become a regional resource for many recreational activities occurring year-round and a destination for tourists. The disturbances caused by human activity in this area have had a visual impact on the experiences of visitors. There is evidence of human activity throughout the Project Area.

Other management activities that have occurred within the viewing area include road construction, vegetation management and fuels treatments, power line and utility corridors (water and gas lines), communication sites, campgrounds, day use facilities, trailheads, bike paths, hiking trails, ski areas, fuel wood gathering, agricultural use, private residences, and commercial developments. Concurrent management activities, which are taking place at the present time, are a continuation of existing uses, including a variety of year-round recreational activities and fuel wood gathering.

Anticipated management activities that have projected effects on the scenic integrity of the Project Area landscape include five FHWA/WYDOT highway reconstruction projects, two fuels management projects,

and several small federal agency projects. Long-term impacts on scenic resources from highway reconstruction and improvements, and from small recreation site or grazing improvement projects would be consistent with existing man-made features of the landscape, and would not change the overall scenic character of the landscape. These activities are summarized below.

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed gas wells in the Upper Hoback area near Bondurant and Hoback Ranches (BTNF)
- Horse Creek Feedground Connector Road, construction of approximately 500 feet of low service road on the Horse Creek Plateau (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project, Hoback Guard Station to Clark Butte Area (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention, vegetation management of 975 acres between 2004-2007 (BLM/BTNF/Private)
- Poison Creek Open Space Land Purchase (BTNF)
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)

The occurrence of forested areas within and adjacent to the Project Area indicates that there is some likelihood of wildland fire impacts that would affect the scenic quality of the landscape. Wildland fire impacts to scenery could range from low to severe, depending on the severity of a potential wildland fire. Implementation of fuels treatment projects in the Project Area would result in visible short-term effects to vegetation, but over the long term would reduce wildland fire hazards, and enhance vegetation diversity. These effects would contribute to the scenic quality of the landscape.

Anticipated economic and population growth would increase recreational uses of public lands in Teton and Sublette counties, including facilities within the Project Area. Residential and commercial construction is anticipated to continue throughout the area on private lands. These actions would increase the evidence of human activity in the Project Area and the surrounding region. Growth would also increase the number of residents and recreationists who have a concern for scenic resources.

Based on the past, concurrent, and anticipated actions discussed above, the cumulative effects of activities in the Project Area would not raise the visual impact to a significant level. Fuels treatments, open space conservation, and campground and other recreation facility reconstruction have some potential to result in the long-term enhancement of the scenic quality of the landscape.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects. Alternative B may cause a slight increase in cumulative effects on scenic resources, when considered with all other past, present, and reasonably foreseeable future activities in the Project Area.

The following effects would be added to the cumulative effects for Alternative A. Short-term effects on scenic resources would result during the construction of the pipeline and reclamation of the pipeline corridor over a period of six months for construction activities and two years for reclamation activities. These effects would include temporary reductions in visual quality, along the pipeline corridor on residents and wilderness, highway, campground and river users. The cumulative effects of specific current and foreseeable projects that may affect scenic resources, listed above under Alternative A, would not vary based on the inclusion of the effects of the proposed pipeline project.

Forest Plan Consistency

All alternatives are in compliance with the guidance contained in the Forest Plan and are consistent with existing regulatory requirements.

Irreversible and Irrecoverable Commitments

Given time, all actions included within the proposed alternative are reversible. Removal of vegetation within the pipeline corridor is not an irreversible or irretrievable commitment of resources. Because vegetation grows back over time, vegetation removal would not cause irreversible impacts. Until the affected areas recover following pipeline installation, the reduction in visual quality immediately following installation would be an irretrievable loss.

4.4.7 Social and Economic Resources

Indicators

- Effects on employment, wages, housing, and community infrastructure in the Jackson Human Resource Unit (HRU), including the community of Bondurant
- Effects on employment, wages, housing, and community infrastructure in the Big Piney HRU
- Effects on employment, wages, housing, and community infrastructure in the Pinedale HRU
- Socioeconomic effects of liquefied natural gas (LNG) delivery by truck
- Socioeconomic effects on communities and tourism from changes in recreation, hunting, or wildlife viewing opportunities, or changes in scenery

Environmental Effects

Direct and Indirect Effects by Alternative

Alternative A – No Action

There would be no direct consequences on the economies of Teton and Sublette counties from the implementation of the No Action alternative. Residents and businesses in the Jackson area would continue to use a combination of sources to supply their energy needs. Energy supplies are anticipated to be adequate and costs are not anticipated to have a noticeable or measurable effect on the local economy. Customers in the Jackson area are accustomed to not having natural gas available and have adapted to the use of other fuels, such as LNG, fuel oil, electricity, solar, or wood.

However, ongoing population growth and the resulting increases in community services and energy needs of the Jackson area would require an increase in the number of tanker trucks carrying LNG on U.S. 189/191. Additional tanker truck traffic would result in increased air emissions and risk of accidents involving tanker trucks, as the number of trucks on the highway is projected to grow by more than 35 percent by 2010. An increase in air pollution over time would have a negative effect on the quality of life

in the affected area, however, there would be no noticeable or measurable effect on the local economy or social structure. An increased risk of tanker truck accidents would potentially increase the need for fire and emergency services. Providing fire and emergency services would require expenditures for specialized training and equipment, based on the specialized needs for dealing with LNG (National Association of State Fire Marshals 2005). A serious accident involving a tanker truck could have an effect on the local economy and social structure that would be measured in the millions of dollars.

Alternative B – Proposed Action

Demographics

The skills and services required for the proposed project would be provided by current LVE personnel and by local or regional contractors. There would no change in the population from implementation of the proposed project. The transport of LNG through the pipeline would not stimulate any additional population or economic growth.

Current and projected trends in the demographic characteristics of the population in the Project Area are described for the affected environment, and are expected to continue for the foreseeable future. As indicated in the Teton County Comprehensive Plan, existing infrastructure is not sufficient to meet the needs of the projected population growth in Teton County. The proposed pipeline would benefit the ongoing growth of the local economy and the permanent population, as it would provide for more efficient delivery of natural gas to Jackson to meet the energy needs of the local area.

Employment and Income

It is anticipated that the current LVE workforce and local contractors would be used for all phases of pipeline construction, operation, maintenance, and monitoring. The proposed project could create very modest opportunities for short-term construction service contracts that may be operated by local companies. No new permanent positions would be created for pipeline operations and maintenance.

The reduced need for tanker trucks over the long term (a reduction of 2 to 3 tanker truck round trips per day under Alternative B) would likely be offset by increasing needs for truck transport associated with the ongoing growth in Teton and Sublette Counties. No job or transportation contract loss associated with a reduction in tanker truck round trips would be anticipated.

Employment and income from tourism activity has grown rapidly over the last decade and is significant in Teton County. Recreation-based activity is also growing in significance in Sublette County. There would be no permanent displacement of any recreational activity and any resulting economic effect would be short-term, as discussed in the recreation section. Also, for any short-term displacement of an activity, there would be several substitute sites and opportunities on nearby NFS lands. A substitute site may not be available for all short-term displacement of authorized commercial uses of the NFS lands.

The proposed pipeline providing gas to LVE's customers in the Jackson area would not affect or facilitate oil and gas development in northwestern Wyoming due to the limited capacity of the proposed six-inch pipe with an outside diameter of 6.625 inches and no larger, and its design to provide processed and odorized gas to LVE's customers. The anticipated operational pressure of the proposed pipeline would range between 60 and 300 pounds per square inch (psi), with an average system pressure of around 200 psi. However, the pipeline would be capable of operating under considerable pressures, with the maximum allowable operating pressure (MAOP) of the pipeline at 1,440 pound-force per square inch gauge (psig), a unit of measure to indicate the pressure on a surface. The design of pipeline materials to meet higher standards was selected for public safety. The use of pipeline materials of higher standards than would be required for the anticipated conditions provides a higher safety factor for a pipeline that will be installed near a highway.

Housing

There would be no direct effect on local housing resources over the long term. Existing employees residing in the surrounding area and within commuting distance of the project would perform the long term operations and maintenance duties. In the event that additional temporary workforce from outside the region is required for construction activities (150 to 200 workers would be needed to install the pipeline), there would be a relatively small demand for temporary housing over a period of six months. This temporary workforce would be unlikely to relocate permanently to Teton or Sublette Counties as a result of the proposed project, which would require 6 months for completion.

The continued growth of Teton County's recreation and tourism industry over the last decade has fueled population growth and high housing prices. The rental market has not kept pace with population growth, which has increased the challenge of finding temporary housing in the Jackson area. Although temporary housing is tight and in high demand, the 150 to 200 workers associated with the proposed project would likely be accommodated by motels, short-term rentals, or RVs during any time period that construction activities would be based in Teton County. The temporary workforce associated with the proposed project would contribute to the difficulty in finding temporary housing in Jackson during construction activities, however, the effects would not likely be measurable.

The addition of a temporary workforce consisting of 150 to 200 workers for a period of up to six months would add to the several thousand individuals who already live in Sublette County on a temporary or rotational basis, but maintain a permanent residence in another area, and several hundred workers who commute daily to the area from places such as Rock Springs. These energy development workers reside in motels, man camps, housing rentals, and RVs located throughout the county (Jacquet 2007). During the first week of December 2006, about 250 RV's, at least 350 man-camp beds, and about 400 motel rooms were filled with natural gas workers (Jacquet 2007). Although temporary housing is tight and in high demand, the 200 or so workers associated with the proposed project would be accommodated by a combination of resources, including short-term housing rentals, motels, RVs, and the potential establishment of a temporary man camp located on private lands. The temporary workforce associate with the proposed project would not contribute to the severe shortage of affordable permanent housing in Sublette County (Jacquet 2007).

Community Infrastructure

It is likely that all of the existing fire protection resources that serve the Project Area would be involved in the suppression of any fire or other emergency event. Interagency fire crews would be dispatched from other areas as needed.

The St. Johns Hospital provides emergency care for residents in the vicinity of the Project Area. The hospital is currently undergoing expansion, so that facilities should be sufficient to provide care in the event of a pipeline-related incident.

The proposed project would not measurably increase the need for fire or emergency services, as an incident associated with the proposed pipeline would, statistically, be unlikely to occur. Preparedness to provide fire and emergency services for potential incidents involving the rupture of the pressurized natural gas pipeline would require expenditures for specialized training and equipment. A serious incident involving a pipeline rupture could have an effect on the local economy and social structure that would be measured in millions of dollars. Providing fire and emergency services for a greatly reduced number of LNG tanker trucks would require expenditures for specialized training and equipment, based on the specialized needs for dealing with LNG (National Association of State Fire Marshals 2005).

Environmental Justice

No potentially adverse effects that disproportionately affect Native American tribes or minority or low-income groups have been identified. The Project Area does not contain tribal lands or Indian communities, and no treaty rights or Indian trust resources are known to exist for this area. No communities within the Project Area would be likely to be physically affected by development of the pipeline. The effects from Alternative B would not be disproportionate to those experienced by the general population. The proposed environmental and socioeconomic effects are spread across all races, ages, and income levels.

Cumulative Effects by Alternative

The cumulative impact analysis area for social and economic resources encompasses Teton and Sublette counties.

Alternative A – No Action

The cumulative effects of past, ongoing, and reasonably foreseeable development activities in and near communities to the social and economic structure of Teton and Sublette counties have been substantial and have the potential to continue to be substantial. It appears likely that some social conflict and lifestyle changes are more likely to occur as the long-term residential and commercial developments expand to much of the available private land in the counties.

In comparison, most projects on federal lands, such as vegetation management or recreation activities, individually or collectively, would produce no noticeable or measurable effects on the economic or social structure of Teton or Sublette counties. However, many private properties are located adjacent to or near federal lands, so that future activities on federal lands will be increasingly likely to affect the local social structure even if they are too small to affect the economy. Conversely, increased population and economic growth in the counties are likely to result in an increased number of projects on federal lands, including vegetation treatments, recreation and non-recreation special uses, utility corridors and infrastructure, road improvements, travel management plans, rangeland management and grazing, and additional recreation/tourism facilities.

Current and projected developments within or near to the Project Area include highway reconstruction and improvement projects, oil and gas development, fuels treatment activities, and various grazing or recreation projects. These projects would each be implemented over relatively short time periods, and labor force for most of these projects would be hired through local contractors, so that there would be no increase in population. The incremental, cumulative effect of these projects would not affect community services or infrastructure. Past, ongoing, or reasonably foreseeable activities on federal lands in Teton and Sublette counties that would not have a noticeable or measurable cumulative effect on social and economic resources include the following:

- Highway Reconstruction and Improvements: Dell Creek and Pfisterer near Bondurant; Alpine to Hoback Junction; Hoback Junction; Hoback North; and Hoback SE (FHWA/WYDOT)
- Proposed exploratory gas wells in the Upper Hoback area near Bondurant and the Hoback Ranches subdivision (BTNF)
- Moose-Gypsum area projects (BTNF)
- Horse Creek Feedground Connector Road (WGFD)
- South Park River Access Site/Plan (BLM)
- Monument Ridge Fuel Treatment Project (BTNF)
- Hoback Ranches Fuels Reduction/Fire Prevention (BLM/BTNF/Private)
- Fisherman Creek Aspen Treatment Project, conifer removal, mechanical treatment of aspen stands and some broadcast burning on 213 acres (BTNF)

- Poison Creek Open Space Land Purchase (BTNF)
- Cottonwood II Integrated Projects, vegetation management of 975 acres and prescribed burning of 1,000 acres of aspen, and Maki Creek, vegetation management of 214 acres and prescribed burning of 2,000 acres (BTNF)
- High Mountains Heli-Skiing, mid-December to mid-April – Snake River/Wyoming Range (BTNF)
- Wildlife Habitat Management Areas, management of hay pastures and winter feedgrounds (WGFD)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

Only the following ongoing or foreseeable projects on federal lands would have a noticeable or measurable cumulative effect on the economic and social structure of Teton or Sublette counties:

- Oil and gas development and production activity in the Pinedale Anticline area, including Questar Year-Round Drilling Project and Jonah Infill Drilling Project (BLM)
- Special Use, Recreation Use, and Outfitter and Guide Activities in/near the Project Area (BTNF)
- Livestock grazing and grazing improvements, including the reauthorization of the Bondurant Basin grazing allotments (BTNF)

The potential for future oil and gas drilling on federal and private lands is moderate to high in some portions of the Jackson and Pinedale Community Interest Areas (CIAs), which encompass the Project Area. Currently, many drilling projects are proposed for the Pinedale Anticline area and the Jonah Infill Drilling Project. The social and economic impacts from any future drilling activities could be substantial, resulting in increases in population, effects to community services and infrastructure, arrests and crime rates, and economic contributions to the local economies.

Other planned and foreseeable projects with a potential effect to the social and economic structure of Teton and Sublette counties respond to the rapidly growing population and economy of the region. The Teton Village Expansion Planned Unit Development would include free-market and employee housing of over 400 units, recreational facilities, and commercial space.

Community services and infrastructure would likely need to be increased as a result of ongoing residential and commercial development in the region. Some projects on NFS lands and the reconstruction and enhancement projects along U.S. 189/191 have been developed in response to past and current pressure on the existing infrastructure. Additional projects that have been developed in response to increased demand for community services include the remodeling of the St. John’s Medical Center.

Alternative B – Proposed Action

The cumulative effects for Alternative B would not be expected to vary from those described above for Alternative A, except that the proposed project would also contribute to the cumulative effects. Alternative B would not be likely to cause any noticeable or measurable increase in cumulative effects on the economic or social structure of Teton and Sublette counties, when considered with all other past, present, and reasonably foreseeable development activities. The incremental, cumulative effect of these projects, in addition to the proposed LVE project, would not affect community services or infrastructure.

Forest Plan Consistency

All alternatives are in compliance with Forest Plan guidance contained and are consistent with existing regulatory requirements. Alternative B supports Forest Plan direction to help utilities provide services.

Irreversible and Irretrievable Commitments

An irreversible or irretrievable commitment of resources would occur if resources are consumed, committed, or lost as a result of the project. The commitment of resources would be irreversible if the project started a process (chemical, biological, or physical) that could not be stopped. There are no social or economic effects from Alternative B that would be irreversible.

Commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility for the life of the project and possibly beyond. The proposed alternative would not eliminate the use of trails and campgrounds in the Project Area or cause a negative visual impact once the pipeline is installed. There would be no measurable loss of revenues to the local economy if the tourist dollars are spent elsewhere during installation activities at these sites. However, the likelihood of such a result would be small, as the Project Area contains sufficient recreation opportunities to offset the temporary loss of an opportunity. Therefore, no irretrievable commitment of social or economic resources would occur.

4.5 SPECIFICALLY REQUIRED DISCLOSURES

This section contains disclosures of effects that are specifically required by federal law, regulation, or policy.

4.5.1 Wetlands and Floodplains

Wetlands in the Project Area would be impacted by the project. The design criteria in **Appendix D**, describe that wetlands would be delineated prior to implementation and how anticipated effects would be reduced. The effects of construction activities on wetlands would be reduced by following the design criteria in **Appendix D** during project implementation.

This subject is documented in Chapters 3 and 4, in the Streams and Watershed section and Vegetation section of each chapter. Riparian ecosystems within the Project Area are protected and managed in accordance with Forest Plan standards and guidelines.

4.5.2 National Forest Management Act Compliance

The proposed project is consistent with the National Forest Management Act of 1976, as documented in Chapter 4 and the *Project File*.

4.5.3 Threatened and Endangered Species

The direct, indirect, and cumulative effects upon threatened and endangered species are discussed in Chapter 4 in the Wildlife and Fisheries section. They are further documented in the Biological Assessment located in the *Project File*.

4.5.4 Prime Farmland, Rangeland, and Forest Land

The proposed project was designed in accordance with the Secretary of Agriculture Memorandum 1827 for prime farmland, rangeland, and forestland. Regardless of the alternative, NFS lands would be managed with sensitivity to any adjacent private and public lands.

4.5.5 Effects on the Human Environment

The civil rights of any American citizen, including women and minorities, are not differentially affected by implementation of any alternative.