BLM

U.S. Department of the Interior
Bureau of Land Management

Environmental Assessment
DOI-BLM-ID-B010-2014-0036-EA

Little Willow Creek
Protective Oil and Gas Leasing

December 15, 2014

U.S. Department of the Interior
Bureau of Land Management
Four Rivers Field Office
3948 Development Avenue
Boise, ID 83705

NATIONAL SYSTEM OF PUBLIC LANDS

Environmental Assessment # DOI-BLM-ID-B010-2014-0036-EA
Little Willow Creek Protective Oil and Gas Leasing

Table of Contents

1.0 Introduction 7
1.1 Need for and Purpose of Action 9
1.2 Decision to Be Made 9
1.3 Summary of Proposed Action 9
1.4 Location and Setting 9
1.5 Conformance with Applicable Land Use Plan 10
1.6 Relationship to Statutes, Regulations, and Other Requirements 10
1.7 Scoping and Development of Issues 12
2.0 Description of the Alternatives 13
2.1 Alternative A - No Federal Mineral Estate Leasing/Continue Present Management 13
2.2 Alternative B – Leasing Federal Mineral Estate with No Surface or Subsurface Occupancy Stipulations 14
2.3 Alternative C - Leasing Federal Mineral Estate with Cascade RMP Stipulations and Additional Lease Notices 15
2.4 Additional Considerations for Alternatives B-C 18
3.0 Affected Environment and Environmental Consequences 21
3.1 Introduction 21
3.1.1 General Discussion of Impacts 21
3.1.2 Reasonably Foreseeable Development Scenario Summary and Assumptions 22
3.2 Soils 23
3.2.1 Affected Environment – Soils 23
3.2.2 Environmental Consequences – Soils 24
3.2.2.1 General Discussion of Impacts 24
3.2.2.2 Alternative A 25
3.2.2.3 Alternative B 25
3.2.2.4 Alternative C 26
3.2.3 Mitigation 26
3.2.4 Cumulative Impacts – Soils 26
3.2.4.1 Scope of Analysis 26
3.2.4.2 Current Conditions, Effects of Past and Present Actions, and Reasonably Foreseeable Future Actions 26
3.2.4.3 Alternative A – Cumulative Impacts 27
3.2.4.4 Alternatives B and C– Cumulative Impacts 28
3.3 Vegetation 28
3.3.1 Affected Environment – Vegetation 28
3.3.2 Environmental Consequences – Vegetation 31
3.3.2.1 General Discussion of Impacts 31
3.3.2.2 Alternative A 32
3.3.2.3 Alternative B 33
3.3.2.4 Alternative C 33
3.3.3 Mitigation 34
3.3.4 Cumulative Impacts – Vegetation 35

3.3.4.1 Scope of Analysis ... 35
3.3.4.2 Current Conditions, Effects of Past and Present Actions, and Reasonably Foreseeable Future Actions ... 35
3.3.4.3 Alternative A – Cumulative Impacts ... 36
3.3.4.4 Alternatives B and C – Cumulative Impacts ... 36
3.4 Air Resources ... 37
3.4.1 Affected Environment – Air Resources ... 37
3.4.2 Environmental Consequences – Air Resources ... 44
3.4.2.1 General Discussion of Impacts ... 44
3.4.2.2 Alternative A ... 45
3.4.2.3 Alternative B ... 45
3.4.2.4 Alternative C ... 45
3.4.3 Mitigation ... 46
3.4.4 Cumulative Impacts – Air Resources ... 48
3.4.4.1 Scope of Analysis ... 48
3.4.4.2 Current Conditions and Effects of Past and Present Actions ... 48
3.4.4.3 Reasonably Foreseeable Future Actions ... 48
3.4.4.4 Alternative A – Cumulative Impacts ... 48
3.4.4.5 Alternative B– Cumulative Impacts ... 49
3.4.4.6 Alternatives C and D – Cumulative Impacts ... 49
3.5 Water Resources ... 49
3.5.1 Affected Environment – Water Resources ... 49
3.5.2 Environmental Consequences – Water Resources ... 50
3.5.2.1 General Discussion of Impacts ... 50
3.5.2.2 Alternative A ... 53
3.5.2.3 Alternative B ... 53
3.5.2.4 Alternative C ... 53
3.5.3 Mitigation ... 54
3.5.4 Cumulative Impacts – Water Resources ... 55
3.5.4.1 Scope of Analysis ... 55
3.5.4.2 Current Conditions and Effects of Past and Present Actions ... 55
3.5.4.3 Reasonably Foreseeable Future Actions ... 55
3.5.4.4 Alternative A – Cumulative Impacts ... 55
3.5.4.5 Alternatives B and C – Cumulative Impacts ... 56
3.6 Wildlife/Special Status Animals ... 56
3.6.1 Affected Environment – Wildlife/Special Status Animals ... 56
3.6.2 Environmental Consequences – Wildlife/Special Status Animals ... 59
3.6.2.1 General Discussion of Impacts ... 59
3.6.2.2 Alternative A ... 61
3.6.2.3 Alternative B ... 62
3.6.2.4 Alternative C ... 63
3.6.3 Mitigation ... 64
3.6.4 Cumulative Impacts - Wildlife/Special Status Animals ... 64
3.6.4.1 Scope of Analysis ... 65
3.6.4.2 Current Conditions and Effects of Past and Present Actions ... 65

3.6.4.3 Reasonably Foreseeable Future Actions 66
3.6.4.4 Alternative A – Cumulative Impacts 66
3.6.4.5 Alternatives B and C – Cumulative Impacts 67
3.7 Cultural Resources 67
3.7.1 Affected Environment – Cultural Resources 67
3.7.2 Environmental Consequences – Cultural Resources 67
3.7.2.1 General Discussion of Impacts 67
3.7.2.2 Alternative A 68
3.7.2.3 Alternative B 68
3.7.2.4 Alternative C 68
3.7.3 Mitigation 68
3.7.4 Cumulative Impacts – Cultural Resources 68
3.8 Recreation 68
3.8.1 Affected Environment – Recreation 68
3.8.2 Environmental Consequences – Recreation 69
3.8.2.1 General Discussion of Impacts 69
3.8.2.2 Alternative A 69
3.8.2.3 Alternative B 69
3.8.2.4 Alternative C 69
3.8.3 Mitigation 69
3.8.4 Cumulative Impacts - Recreation 69
3.9 Visual Resources Management 69
3.9.1 Affected Environment – Visual Resources Management 69
3.9.2 Environmental Consequences – Visual Resources Management 70
3.9.2.1 General Discussion of Impacts 70
3.9.2.2 Alternative A 70
3.9.2.3 Alternative B 70
3.9.2.4 Alternative C 70
3.9.3 Mitigation 70
3.9.4 Cumulative Impacts – Visual Resources Management 70
3.10 Lands and Realty 71
3.10.1 Affected Environment – Lands and Realty 71
3.10.2 Environmental Consequences – Lands and Realty 71
3.10.2.1 General Discussion of Impacts 71
3.10.2.2 Alternative A 71
3.10.2.3 Alternative B 71
3.10.2.4 Alternative C 71
3.10.3 Mitigation 71
3.10.4 Cumulative Impacts - Lands and Realty 72
3.11 Livestock Management 72
3.11.1 Affected Environment – Livestock Management 72
3.11.2 Environmental Consequences – Livestock Management 73
3.11.2.1 General Discussion of Impacts 73
3.11.2.2 Alternative A 73
3.11.2.3 Alternative B 73

3.11.2.4 Alternative C ... 74
3.11.3 Mitigation ... 74
3.11.4 Cumulative Impacts - Livestock Management ... 74
3.11.4.1 Scope of Analysis ... 74
3.11.4.2 Current Conditions and Effects of Past and Present Actions ... 74
3.11.4.3 Reasonably Foreseeable Future Actions ... 75
3.11.4.4 Alternative A – Cumulative Impacts ... 75
3.11.4.5 Alternatives B and C– Cumulative Impacts ... 75
3.12 Minerals (Fluid) ... 75
3.12.1 Affected Environment – Minerals (Fluid) ... 76
3.12.2 Environmental Consequences – Minerals (Fluid) ... 76
3.12.2.1 General Discussion of Impacts ... 77
3.12.2.2 Alternative A ... 77
3.12.2.3 Alternative B ... 77
3.12.2.4 Alternative C ... 77
3.12.3 Mitigation ... 78
3.12.4 Cumulative Impacts – Minerals (Fluid) ... 78
3.12.4.1 Scope of Analysis ... 78
3.12.4.2 Current Conditions and Effects of Past and Present Actions ... 78
3.12.4.3 Reasonably Foreseeable Future Actions ... 78
3.12.4.4 Alternative A – Cumulative Impacts ... 78
3.12.4.5 Alternative B– Cumulative Impacts ... 79
3.12.4.6 Alternative C– Cumulative Impacts ... 79
3.13 Social and Economic ... 79
3.13.1 Affected Environment – Social and Economic ... 79
3.13.2 Environmental Consequences – Social and Economic ... 81
3.13.2.1 General Discussion of Impacts ... 81
3.13.2.2 Alternative A ... 82
3.13.2.3 Alternative B ... 83
3.13.2.4 Alternative C ... 84
3.13.3 Mitigation ... 84
3.13.4 Cumulative Impacts – Social and Economic ... 84
3.13.4.1 Scope of Analysis ... 84
3.13.4.2 Current Conditions and Effects of Past and Present Actions ... 84
3.13.4.3 Reasonably Foreseeable Future Actions ... 84
3.13.4.4 Alternative A – Cumulative Impacts ... 85
3.13.4.5 Alternatives B and C – Cumulative Impacts ... 85
4.0 Consultation and Coordination ... 86
4.1 List of Preparers ... 86
4.2 List of Agencies, Organizations, and Individuals Consulted ... 86
4.3 Public Participation ... 88
5.0 Literature Cited ... 89
6.0 Appendices ... 94
6.1 Appendix 1. Reasonably foreseeable development scenario for the proposed Little Willow Creek oil and gas lease area, Payette County, Idaho. ... 94

6.2 Appendix 2. State lease stipulations in the vicinity of the proposed Little Willow Creek lease area, Payette County, Idaho. 102
6.3 Appendix 3. Legal description of lease parcels and applicability of Alternative C stipulations and lease notices. 104
6.4 Appendix 4. Idaho BLM special status animal species known to, or potentially occurring, in the Little Willow Creek lease area, Payette County, Idaho. 106
7.0 Maps 110

Environmental Assessment # DOI-BLM-ID-B010-2014-0036-EA
Little Willow Creek Protective Oil and Gas Lease

1.0 Introduction

Leasing

The Mining and Minerals Policy Act of 1970 declares that it is the continuing policy of the Federal Government to foster and encourage private enterprise in the development of a stable domestic minerals industry and the orderly and economic development of domestic mineral resources. The Mineral Leasing Act of 1920, as amended, authorizes the Secretary of the Interior to lease federal oil and gas. The Bureau of Land Management (BLM) is the Interior agency delegated the authority to manage the United States' mineral resources. The BLM's oil and gas leasing programs are codified under 43 CFR 3100, in accordance with the authority of the Mineral Leasing Act of 1920, as amended, the Federal Land Policy and Management Act (FLPMA) of 1976, and the Energy Policy Act of 2005.

The decision as to which public lands and minerals are open for leasing and what leasing stipulations may be necessary is made during the land use planning process. Surface management/use for mineral extraction on non-BLM administered land overlaying federal minerals will be determined by the BLM in consultation with the appropriate surface management agency or the private surface owner at the time such surface use is proposed by the leaseholder or designated agent. Under the Mineral Lease Act, issuing oil and gas leases is a discretionary authority conveyed to the Secretary of Interior. In carrying out the mineral leasing authority conveyed through the Mineral Leasing Act, the BLM must comply with other applicable federal laws and regulations, including, but not limited to the Endangered Species Act, the National Historic Preservation Act, the Clean Water Act, the Clean Air Act, and the Energy Policy Act.

Offering federal mineral estate parcels for lease and subsequently issuing oil and gas leases are strictly administrative actions, which, in and of themselves, do not cause or directly result in any surface disturbance. Issuance of an oil and gas lease does convey to the lessee the exclusive right to use as much of the leased land as is reasonably necessary to explore for and extract oil and gas resources from the lease area, subject to the terms of the lease, including stipulations (43 CFR 3101.1-2 and 3101.1-3), regulations pertaining to oil and gas leasing, Onshore Orders, and with prior approval of the Authorized Officer. However, depending on lease stipulations, post-leasing activities may or may not result in impacts to surface resources. Only where stipulations or conditions do not preclude disturbance to surface resources is the action considered an irretrievable commitment of resources. The BLM may issue leases to protect the public interest when uncompensated drainage is occurring or may occur, provided the lease does not convey an irreversible or irretrievable commitment of resources.

As part of the lease issuance process, nominated parcels are reviewed against the appropriate land use plan, and stipulations are attached to mitigate any known environmental or resource conflicts that may occur on a given lease parcel. As stated above, on-the-ground impacts would potentially occur when a lessee applies for and receives approval to explore, occupy and/or drill on the lease. The BLM cannot determine at the leasing stage whether or not a lease would actually be explored or developed.

Oil and gas leases are issued for a 10-year period and continue for so long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and/or gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, then ownership of the minerals leased revert back to the federal government and may be offered for lease again. Drilling wells on a lease is not permitted until the lessee or operator secures BLM's approval of a drilling permit and a surface use plan as specified in 43 CFR 3162.3-1 (Drilling applications and plans) and submits a reclamation bond. Subsequent well operations, such as re-drilling, deepening, repairing casing, plugging-back, performing non-routine fracturing jobs, etc. also require the prior approval of the authorized officer (43 CFR 3162.3-2).

Leasing in the Four Rivers Field Office

While parcels totaling over 180,000 acres of federal land in southwest Idaho have been nominated for competitive oil and gas leasing, BLM has to-date deferred leasing any lands until completion of the Four Rivers Resource Management Plan/EIS (FRMP). The FRMP will replace the 1987 Cascade RMP which currently addresses leasing in the western portion of the Four Rivers Field Office. BLM is considering leasing in this isolated circumstance because of the federal mineral reserve drainage that may occur existing wells are put into production in sections with federal minerals in the Willow Field or on private lands in the proposed leasing area.

There are currently 15 wells that have been drilled in and/or near the Willow and Hamilton Fields and are capable of production, and three wells that have been approved but haven't been drilled. Several of the wells are located in sections with federal mineral estate (Map 1). The BLM determined the boundary of the proposed leasing area by including all lands with federal minerals in the industry-designated Willow Field, as well as those lands with federal minerals located in sections that are within one mile of a well that has been drilled or permitted. Only the lands with federal minerals would be leased within the proposed leasing area boundary.

In November 2013, Alta Mesa Services, Inc., a company that is currently developing a newly discovered natural gas field, made application to the Idaho Oil and Gas Conservation Commission (IOGCC) to omit federal lands in T. 8 N., R. 4 W., Section 3, from a drilling unit it proposed in Section 3. If the federal minerals are omitted from the drilling unit and a producing well is drilled on the private lands (with private minerals) in Section 3, drainage of the federal mineral estate could occur. The opportunity to recover the underlying resource would be lost, and the federal government, acting on behalf of the American taxpayer, would be unable to collect royalties on the extracted mineral resources.

Leasing would protect the American taxpayers' correlative rights, and production royalties could be collected. The BLM considers Alta Mesa's application to the IOGCC to be evidence of potential drainage in Section 3. Lands that are otherwise unavailable for leasing may be leased if there is an imminent threat of drainage. Because of this threat and the likelihood of IOGCC receiving more applications to omit the federal mineral estate in sections where wells have been drilled or proposed, BLM is considering leasing the federal mineral estate within this limited area at this time.

1.1 Need for and Purpose of Action

The purpose of this proposal is to protect the federal mineral resource from uncompensated drainage and surface resources from potential damage in and near the Willow Field, Payette County, Idaho. Uncompensated drainage is defined as the migration of oil and gas in a reservoir, due to a pressure reduction caused by production from wells bottomed in the reservoir. In this instance, uncompensated drainage means that federal mineral resources are being produced by wells on adjacent lands without compensation to the United States in the form of royalties that would otherwise be required if the federal mineral estate were leased under the Mineral Leasing Act, as amended. A prime responsibility of the BLM is to protect the United States from the loss of royalty that results from drainage (uncompensated drainage). For unleased lands, the objectives of BLM's drainage protection program may be accomplished by leasing and requiring the lessee to take protective measures.

This action is needed because natural gas wells have been or are proposed to be drilled on private land adjacent to BLM-administered lands and/or adjacent to lands where BLM owns only the subsurface mineral estate (referred to as split estate). The current and proposed wells in and north of the Willow Field constitute a threat, or potential threat, of uncompensated drainage to the federal mineral estate. Drilling has resulted in the discovery of commercial quantities of natural gas and natural gas condensate in the Willow and Hamilton fields, and those areas are being developed for commercial production. According to the current Idaho well spacing order, only one well can be drilled per 640-acre governmental section (IDAPA 20.07.02.330.02; IOGCC 2013a). The Idaho Department of Lands has approved drilling permit applications for several wells on private lands which would drain minerals reserved to the United States within the well spacing unit designated by the State of Idaho (IOGCC 2014).

1.2 Decision to Be Made

The responsible official will decide whether to recommend that the BLM Idaho State Office offer lands in the proposed lease area and which, if any, stipulations and/or notices should be attached to the leases.

1.3 Summary of Proposed Action

The BLM proposes to offer five parcels (totaling 6,349 acres; Map 2) at a spring 2015 competitive oil and gas lease sale. Stipulations and lease notices would apply on BLM-administered surface and subsurface in the lease area. The offering and subsequent issuance of oil and gas leases is strictly an administrative action, which, in and of itself, would not cause or directly result in any surface disturbance.

1.4 Location and Setting

The proposed 15,644-acre Little Willow Creek oil and gas lease area is located 4-12 miles east of Payette, Idaho (Map 1). The topography is characterized by gently rolling hills. Vegetation is dominated by annual and perennial grass with occasional shrub stands. Rural homes and agricultural fields are primarily associated with Little Willow Creek.

In the proposed lease area, only 6% of surface lands are BLM-administered and the remaining are privately owned; however, the BLM administers 41% of the subsurface mineral estate. Two oil and gas fields to the south have been designated by oil and gas developers. The Willow Field overlies a portion of the Little Willow Creek proposed lease area and currently has eight oil and gas wells. Further south, the Hamilton Field has six wells. Most wells in the area are classified as shut in pending a pipeline (IOGCC 2014).

1.5 Conformance with Applicable Land Use Plan

Leasing is in conformance with the 1988 Cascade Resource Management Plan (CRMP) which makes 456,289 acres (94% of area) available for leasable mineral exploration and development (CRMP Record of Decision page 3). The proposed lease parcels are within the area determined available for leasable mineral exploration and development. The CRMP directs the BLM to manage geological, energy, and minerals resources on the public lands so that significant scientific, recreational, ecological and educational values will be maintained or enhanced. Generally, the public lands are available for mineral exploration and development, subject to applicable regulations and Federal and State laws. The CRMP states that: "Approval of an application for lease is subject to an environmental analysis and may include stipulations to protect other resources." Additional NEPA documentation is needed prior to leasing to address new circumstances or information bearing on the environmental consequences of leasing that was not considered within the broad scope analyzed in the CRMP Environmental Impact Statement.

1.6 Relationship to Statutes, Regulations, and Other Requirements

This EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and in compliance with all applicable laws and regulations, including Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), U.S. Department of the Interior (DOI) requirements (Department Manual 516, Environmental Quality), and/or other federal statutes and executive orders.

Other applicable Federal laws to which the lessee must comply include but are not limited to, the following:

<u>Leasable Minerals</u>

It is BLM policy, as derived from various laws, including the Mineral Leasing Act of 1920 (MLA) and the Federal Land Policy and Management Act of 1976 (FLPMA), to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs. Ensuring that the federal mineral estate is protected from uncompensated drainage of fluid mineral resources is a basic BLM function. 43 CFR 3100.2-1 states "Upon a determination by the authorized officer that lands owned by the U.S. are being drained of oil or gas by wells drilled on adjacent lands . . . Such lands may also be offered for lease in accordance with part 3120 of this title." 43 CFR 3120.1-1 states that "All lands available for leasing shall be offered for competitive bidding under this subpart, including but not limited to . . . (d) Lands which are otherwise unavailable for leasing but which are subject to drainage (protective leasing)."

Any purchaser of a federal oil and gas lease is required to comply with all applicable federal, state, and local laws and regulations, including obtaining all necessary permits required prior to the commencement of project activities.

Environmental Quality

Clean Water Act of 1972 (33 U.S.C. §1251 et seq.): Regulates surface water discharges and storm-water runoff. Section 313 requires federal agencies be in compliance with all federal, state, interstate, and local requirements. In Idaho, the Idaho Department of Environmental Quality (IDEQ) implements the Clean Water Act. Additionally, the IDEQ develops total maximum daily loads (TMDLs) for water bodies.

Safe Drinking Water Act of 1974 as amended: Authorizes the U.S. Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. The EPA, IDEQ, and others work together to make sure that the standards are met.

Clean Air Act of 1970 as amended (42 U.S.C. §7401 et seq.): Sets rules for air emissions from engines, gas processing equipment and other sources associated with drilling and production activities.

Special Status Species

Endangered Species Act (ESA) of 1973 as amended (16 USC 1531): Section 7 of the ESA outlines the procedure for federal interagency cooperation to conserve federally listed species and their designated habitats. Section 7(a) (2) of the ESA states that each federal agency shall, in consultation with Secretary, ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of a listed species' habitat within the project area.

Special Status Species Management Manual for the Bureau of Land Management (BLM Manual 6840): National policy directs BLM State Directors to designate sensitive species in cooperation with the state fish and wildlife agency. This manual establishes policy for management of species listed or proposed for listing pursuant to the ESA and Bureau sensitive species that are found on BLM-administered lands; this policy is to conserve and to mitigate adverse impacts to sensitive species and their habitats. Where relevant to the activities associated with this action, effects to special status species are analyzed in this EA.

Migratory Bird Treaty Act, *Executive Order 13186*, and *BLM Memorandum of Understanding WO-230-2010-04* (between BLM and US Fish and Wildlife Service [USFWS]): Federal agencies are required to evaluate the effects of proposed actions on migratory birds (including eagles) pursuant to the *National Environmental Policy Act of 1969* (NEPA) "or other established environmental review process;" and restore and enhance the habitat of migratory birds, as practicable. Federal agencies are also required to identify where unintentional take reasonably attributable to agency actions is having, or is likely to have, a measurable negative effect on migratory bird populations. With respect to those actions so identified, the agency shall develop

and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the Service. Effects to migratory birds are analyzed in this EA.

Bald and Golden Eagle Protection Act of 1940 as amended (16 USC 668-668d): This act provides for the protection of bald and golden eagles by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. Agencies are required to evaluate: 1) whether take is likely to occur from activities associated with the proposed activity and 2) the direct, indirect, and cumulative impacts the proposal may have on the ability to meet the preservation standard of the Act that the USFWS has interpreted to mean "compatible with the goal of stable or increasing breeding populations." Effects to bald and golden eagles are analyzed in this EA.

Cultural Resources

Idaho BLM has the responsibility to manage cultural resources on public lands pursuant to the National Historic Preservation Act of 1966 (as amended), the 2012 Programmatic Agreement Among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers and the State Protocol Agreement Between the Idaho State Director of the BLM and the Idaho State Historic Preservation Officer (1998) and other internal policies.

Social and Economic

Executive Order 12898 (February 1994): Federal agencies are directed to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations," including tribal populations. The accompanying Presidential Memorandum emphasizes the importance of using the NEPA review process to promote environmental justice.

1.7 Scoping and Development of Issues

Scoping

BLM began scoping for the Little Willow Creek lease sale on July 8, 2014 when the Four Rivers Field Manager sent a scoping packet and/or letter to all land owners with property in or adjacent to the Little Willow Creek proposed lease area and to the Four Rivers Field Office's interested public mailing list seeking scoping comments on the lease proposal. BLM also activated a web page on the BLM NEPA Register to make scoping and informational materials available to the public. The webpage can be reviewed at: https://www.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=renderDefaultPlanOrProjectSite&projectId=39064&dctmId=0b0003e8806d22d8.

On Thursday July 17, 2014 the BLM hosted a public meeting at the Payette County Courthouse. BLM answered questions and accepted comments at the meeting and provided an address and website to send in additional scoping comments about the proposed leasing. Approximately 45 people attended the meeting and 12 individuals and organizations provided scoping comments.

Many of the issues were outside the scope of the leasing decision. The public was primarily concerned with drilling which would be analyzed in a subsequent NEPA document if an Application for Permit to Drill (APD) is received by BLM (Appendix 1). The intent of BLMs scoping effort was to identify issues related to the proposed leasing.

Issues Development

Issues may be defined as a point or matter of discussion, debate, or dispute about a proposed action based on the potential environmental effects (BLM Handbook H-1790-1). Issues are concerns directly or indirectly caused by implementing the proposed action; these are used to develop alternatives to the proposed action. Relevant public comments and issues were used in the development of this EA, including those received in response to the Scoping Document mailed July 8, 2014. Comments not considered issues to analyze in this EA are ones that are: 1) outside the scope of the proposed action and thus irrelevant to the decision being made; 2) already decided by law, regulation, RMP, or other higher level decision; 3) conjectural and not supported by scientific or factual evidence; or 4) not necessary for making an informed decision. The following issues were identified from comments and scoping letters received during the scoping effort:

1. Leasing could indirectly impact air quality in the proposed lease area if exploration and development occur.
2. Leasing could indirectly impact water quality in the proposed lease area if exploration and development occur.
3. Leasing could indirectly pollute ground water in the proposed lease area if exploration and development wells require hydraulic fracturing (fracking).
4. Leasing could indirectly impact sensitive plant species in the proposed lease area if exploration and development occur.
5. Leasing could indirectly impact sensitive wildlife species in the proposed lease area if exploration and development occur.

These issues are addressed in Section 3.0. Although development in the Willow and Hamilton fields has not indicated the need for substantial fracking (Johnson et. al. 2013), the issue is addressed primarily in Section 3.5. The IDT also analyzed the indirect effects of leasing on the following resources: soils, vegetation, cultural resources, recreation, visual resources, lands and realty, livestock management, minerals, and social and economics.

2.0 Description of the Alternatives

2.1 Alternative A - No Federal Mineral Estate Leasing/Continue Present Management

The federal mineral estate in a 15,644 acre area in Payette County, including 996.85 (997) acres of BLM-administered lands and 5,352.35 (5,352) acres of split estate, would not be offered for lease. Development of State and private leases could occur in the area; however, the federal mineral estate would not be available at least until the FRMP is completed. State (Appendix 2) or other stipulations developed by the lessor and lessee would apply to other leases.

2.2 Alternative B – Leasing Federal Mineral Estate with No Surface or Subsurface Occupancy Stipulations

The federal mineral estate in a 15,644 acre area in Payette County, including 997 acres of BLM-administered lands and 5,352 acres of split estate, would be offered for lease in up to five parcels[A] (Table 1, Map 2, Appendix 3).

Table 1. Mineral estate acreages by parcel, surface, and subsurface ownership, proposed Little Willow Creek oil and gas leasing area, Payette County, Idaho.

Parcel	Federal Mineral Estate[1]			Other Mineral Estate[2]		Total
	Federal/Federal	Private/Federal	Total	Private/Private	Private/State	
A	212	1,536	1,748	3,811	0	5,549
B	237	312	549	1,353	0	1,903
C	235	1,140	1,374	1,142	0	2,516
D	274	1,311	1,585	1,186	394	3,165
E	39	1,052	1,091	1,313	98	2,502
Total	997	5,352	6,349	8,799	492	15,644

[1]Acreages presented in this table and throughout the document are rounded to the nearest acre. More accurate figures would be developed if a lease is offered.
[2] The BLM has no control over these resources. The values are provided strictly for informational purposes.

The following stipulations would apply to the federal mineral estate:

No Surface Occupancy (NSO) –1: Surface occupancy and use on BLM-administered and split estate lands would be prohibited until the Four Rivers Resource Management Plan (FRMP) is finalized.

No Sub-surface Occupancy (NSSO) –1: Subsurface occupancy and use on federal mineral estate lands would be prohibited until the FRMP is finalized.

Upon finalization of the FRMP, the leases would be modified by replacing NSO-1 and NSSO-1 with stipulations consistent with the FRMP. Development of State and private leases would be as described in Section 2.1; however, drainage of the federal mineral estate would be allowed and typical royalties would be applied.

[A] Because an oil and gas lease cannot be larger than 2,560 acres (43 CFR 3120.2-3), the 6,352-acre federal mineral estate was divided into smaller parcels. BLM has the discretion to parcel the lands in any configuration. During public scoping, at least one split estate land owner expressed a desire to bid on parcels to which he/she owns the surface estate. BLM has addressed the land owner's concern by making the leases smaller, and by dividing the federal mineral estate in a manner that minimizes the number of split estate landowners on a single lease (the only exception to this is Parcel A, which has multiple split estate landowners, but lies entirely within the industry-designated Willow Field).

2.3 Alternative C - Leasing Federal Mineral Estate with Cascade RMP Stipulations and Additional Lease Notices

The federal mineral estate in a 15,644 acre area in Payette County, including 997 of BLM-administered lands and 5,352 acres of split estate, would be offered for lease in up to five parcels (Table 1, Map 2, Appendix 3). The leases would be subject to standard lease terms and the following stipulations associated with listed species (S-1) and cultural resources (S-2), applicable CRMP stipulations, and lease notices. Lease notices were developed for sensitive resources that were not addressed in the CRMP. Development of State and other leases would be as described in Section 2.1. The following stipulations and lease notices would apply where appropriate (Appendix 3):

Freshwater Aquatic Habitat

Controlled Surface Use (CSU) -1: Surface occupancy and use would be prohibited within 500 feet from the edge of reservoirs, ponds, streams, wetlands, and riparian habitat. Introduction of chemical toxicants or sediments to riparian areas as a result of exploration or production would not be allowed.

CSU-2: A minimum 100 foot riparian buffer zone would be provided from the edge of any riparian habitat to protect riparian vegetation, fisheries, and water quality. The following activities would be generally excluded: new road construction that parallels streams. Best management practices would be used when construction cannot be avoided.

Special Status Plant Species

CSU -3: Occupancy and use, including surface and subsurface rights-of-way, would be prohibited in Type 1-4 special status plant element occurrences.

Big Game Range[B]

CSU-4: No surface use would be allowed in crucial winter range from December 1 to March 31 or crucial antelope fawning range between May 1 and June 30.

Sensitive Wildlife Species

CSU-5: No surface use would be allowed within a 0.75 mile radius of ferruginous hawk or Swainson's hawk nests from March 15 to June 30.

CSU-6: No surface use would be allowed within a 0.75 mile radius of an osprey nest from April 15 to August 31.

CSU-7: No surface use would be allowed within a 0.25 mile radius of a burrowing owl nest from March 15 to June 30.

[B] Those areas where big game animals have demonstrated a definite pattern of use each year or an area where animals tend to concentrate in significant numbers (from Interagency Guidelines for Big Game Range Investigation-Idaho Department of Fish & Game, Bureau of Land Management, U.S. Forest Service).

Wildlife Species of Concern

CSU-8: No surface use would be allowed within a 0.75 mile radius of a golden eagle nest from February 1 to June 30.

CSU-9: No surface use would be allowed within a 0.75 mile radius of a prairie falcon nest from March 15 to June 30.

CSU-10: No surface occupancy would be allowed within a 0.5 mile radius of a heron rookery.

Fragile Soils

Lease Notice (LN) -1: The lessee is hereby notified that special location, design and construction mitigation measures may be required to minimize, to the extent possible, the potential long-term and short-term adverse impacts of oil and gas operations within fragile soils, and to avoid them wherever there is a practicable alternative.

Fragile soil areas, in which the performance objective would be enforced, are defined as follows:

1) Areas rated as highly or severely erodible by wind or water, as described by the National Cooperative Soil Survey for Payette County or as described by on-site inspection.
2) Areas with slopes ≥30%, if they also have one of the following soil characteristics:
    a. a surface texture that is sand, loamy sand, very fine sandy loam, fine sandy loam, silty clay or clay;
    b. a depth to bedrock <20 inches;
    c. an erosion condition that is rated as poor; or
    d. a K-factor >0.32.

Floodplain Management

LN-2: The lessee is hereby notified that special location, design and construction mitigation measures may be required to minimize, to the extent possible, the potential long-term and short-term adverse impacts of oil and gas operations within the 100-year floodplain associated with occupancy and modification of the floodplain, and to avoid direct and indirect floodplain development wherever there is a practicable alternative. Under Executive Order 11988: Floodplain Management; the BLM is required to restore and preserve the natural and beneficial values served by floodplains for actions related to federal activities and programs affecting land use.

Endangered Species (Mandatory)

Stipulation (S) –1: The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable

requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.

Special Status Mammals

LN-3: The lease may, in part or in total, contain important southern Idaho ground squirrel (SIDGS), a candidate species, and pygmy rabbit habitats as identified by the BLM, either currently or prospectively. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on SIDGS populations and habitat quality. Such measures shall be developed during the application for permit to drill on-site and environmental review process and will be consistent with the lease rights granted. Measures may include (in order of priority):

1. Avoid areas occupied by SIDGS and pygmy rabbits.
2. When oil and gas facilities are deemed necessary within unoccupied SIDGS or pygmy rabbit habitat, minimize pad size, road width, and the size of other disturbed areas.
3. New construction of roads, pipelines, and rights-of-way would be planned to minimize the effects of fragmenting wildlife habitat.
4. Restore unneeded areas to native or other appropriate vegetation (shrubs, perennial grasses, and forbs as identified by the SIDGS Working Group) immediately upon vacancy of temporary use sites or permanent closure of well sites to provide forage for nearby SIDGS.
5. Construct power transmission lines outside of SIDGS occupied habitat (including a 0.25-mile buffer) whenever possible. If transmission lines are deemed necessary through or within 0.25 miles of SIDGS colonies, locate poles outside of active burrow systems and consider 1) burying transmission lines, or 2) installing raptor anti-perching devices on transmission lines.

Migratory Birds and Raptors

LN-4: The Operator is responsible for compliance with provisions of the Migratory Bird Treaty Act by implementing one of the following measures: a) avoidance by timing - ground disturbing activities would not occur from April 15 to July 15; b) habitat manipulation - render proposed project footprints unsuitable for nesting prior to the arrival of migratory birds (blading or pre-clearing vegetation must occur prior to April 15 within the year and area scheduled for activities between April 15 and July 15 of that year to deter nesting; or c) survey-buffer-monitor - surveys would be conducted by a BLM approved biologist within the area of the proposed action and a 300 foot buffer from the proposed project footprint between April 15 to July 15 if activities are proposed within this timeframe. If nesting birds are found, activities would not be allowed within 0.1 miles of nests until after the birds have fledged. If active nests are not found, construction activities must occur within 7 days of the survey. If this does not occur, new surveys must be conducted. Survey reports would be submitted to the appropriate BLM Office.

CSU-11: No surface occupancy would be allowed within 1 mile of an active bald eagle or peregrine falcon nest. No surface use would be allowed from December 1 and March 31 where wintering bald eagles or peregrine falcons occur.

Water Quality

LN-5: The operator may be required to implement specific measures to reduce impacts of oil and gas operations on water quality and quantity. Such measures shall be developed during the application for permit to drill on-site and environmental review process and will be consistent with the lease rights granted.

Cultural Resources (Mandatory)
S-2: This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM would not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHP A and other authorities. These obligations may include a requirement that you provide a cultural resources survey conducted by a professional archaeologist approved by the State Historic Preservation Office (SHPO). If currently unknown burial sites are discovered during development activities associated with this lease, these activities must cease immediately, applicable law on unknown burials will be followed and, if necessary, consultation with the appropriate tribe/group of federally recognized Native Americans will take place. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

LN-6: The Surface Management Agency is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures.

Lands and Realty
LN-7: Land Use Authorizations incorporate specific surface land uses allowed on BLM-administered lands by authorized officers and those surface uses acquired by BLM on lands administered by other entities. These BLM authorizations include rights-of-way, leases, permits, conservation easements, and recreation and public purpose leases and patents.

2.4 Additional Considerations for Alternatives B-C

For split estate portions of the lease area, the BLM provided courtesy notification to private landowners that their lands are considered in this NEPA analysis and would be considered for inclusion in an upcoming lease sale. If any activity were to occur on such split estate parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as formulating and reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation (Onshore Oil and Gas Order No. 1). Standard lease terms, stipulations, conditions, and operating procedures would apply to these parcels (43 CFR 3101 and 3160 and 3162).

Standard operating procedures, best management practices, conditions of approval (COA), and lease stipulations could change over time to meet overall RMP and BLM policy objectives. The COA's would be attached to permits for oil and gas lease operations to address site-specific concerns or new information not previously identified in this environmental assessment process.

In some cases new lease stipulations may need to be developed, and these types of changes may require an RMP amendment. For example, if climate change results in hotter and drier conditions, RMP objectives would be unreachable under current management. In this situation, management practices might need to be modified to continue meeting overall RMP management objectives. An example of a climate related modification is the imposition of additional conditions of approval to reduce surface disturbance and implement more aggressive dust treatment measures. Both actions reduce fugitive dust, which would otherwise be exacerbated by the increasingly arid conditions that could be associated with climate change.

Oil and gas leases would be issued for a 10-year period and would continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, ownership of the minerals leased would revert back to the federal government, and the lease could be resold.

Well drilling on a lease would not be permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan specified at 43 CFR 3162.

Drainage

LN-A: Parts of this lease may potentially be subject to drainage by wells located on adjacent private lands. The lessee shall, within 6 months of the drilling and completion of any productive well on the adjacent private lands, submit for approval by the authorized officer:

1. Plans for protecting the lease from drainage (43 CFR § 3162.2-3). The plan must include either (a) a completed Application for Permit to Drill for each of the necessary protective wells, or (b) a proposal for inclusion in a unitization or communitization agreement for the affected portion of the lease. Any agreement should provide for an appropriate share of the production from the offending well to be allocated to the lease; or
2. Engineering, geologic and economic data to demonstrate to the authorized officer's satisfaction that no drainage has occurred or is occurring and/or that a new protective well(s) would have little or no chance of production sufficient to yield a reasonable rate of return in excess of the costs of drilling, completing and operating the well.

If no plan, agreement, or data is submitted and drainage is determined to be occurring, compensatory royalty will be assessed. Compensatory royalty will be assessed on the first day following expiration of the 6-month period, and shall continue until a protective well has been drilled and placed into production status, or until the offending well ceases production, whichever occurs first. The lessee shall be obligated to pay compensatory royalty to the Office of Natural Resources Revenue (ONRR) at a rate to be determined by the BLM authorized officer.

Split Estate

LN-B: Portions of the surface estate of this lease are privately owned (i.e. split estate lands). While the Federal mineral lessee has the right to enter the property for necessary purposes related to lease development, the lessee is responsible for making arrangements, formalized in a

Surface Use Agreement, with the surface owner prior to entry upon the lands. Lessee is hereby informed that the United States will not participate as a third party in negotiations between the lessee and the surface owner. Any agreement reached between the lessee and the surface owner(s) will not be binding on the United States.

Prior to submitting an Application for Permit to Drill (APD) for BLM's approval, lessee is required to submit the name, address, and phone number of the surface owner, if known, in its APD. The lessee must also make a good faith effort to provide a copy of their Surface Use Plan of Operations to the surface owner. After the APD is approved, the operator must make a good faith effort to provide a copy of the Conditions of Approval to the surface owner.

The lessee will be required to certify to the BLM in writing that: (1) It made a good faith effort to notify the surface owner before entry; and (2) That a Surface Use Agreement with the surface owner has been reached, or that a good faith effort to reach an agreement failed. If no agreement can be reached with the surface owner, the lessee must submit an adequate bond (minimum of $1,000) to the BLM, for the benefit of the surface owner, sufficient to pay for loss or damages. The surface owner has the right to appeal the sufficiency of the bond.

Once a parcel is leased, the lessee has the right to explore for and develop oil and gas resources, subject to standard lease terms and special stipulations pertaining to the conduct of operations. The conduct of operations by the lessee on all parcels would be subject to the following terms from the back of the standard lease form, which state:

"Conduct of Operations (SF-3100-11, Section 6)

> Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological and other resources, and to uses or users. Lessee shall take reasonable measures deemed necessary by the lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in leased lands, including the approval of easements or right-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.
>
> Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in destruction of such species or objects."

3.0 Affected Environment and Environmental Consequences

3.1 Introduction

Direct and indirect impacts of the proposed actions will be discussed for BLM-administered and split estate lands. Cumulative impacts for other activities will be discussed for all ownerships in the cumulative impacts analysis area. Analyses will be based on the RFDS created for this document (Table 2, Section 3.1.2, and Appendix 1)

Impact Descriptors
Effects can be temporary (short-term) or long lasting/permanent (long-term). These terms may vary somewhat depending on the resource; therefore, each will be quantified by resource where applicable. Generally speaking:

- **Short-term**: 0-3 years (effects are changes to the environment during and following ground-disturbing activities that revert to pre-disturbance conditions, or nearly so, immediately to within a few years following the disturbance).
- **Long-term**: >3 years (effects are those that would remain beyond short-term ground disturbing activities).

The magnitude of potential effects is described as being major, moderate, minor, negligible, or no effect and is interpreted as follows:

- **Major** effects have the potential to cause substantial change or stress to an environmental resource or resource use. Effects generally would be long-term and/or extend over a wide area.
- **Moderate** effects are apparent and/or would be detectable by casual observers, ranging from insubstantial to substantial. Potential changes to or effects on the resource or resource use would generally be localized and short-term.
- **Minor** effects could be slight but detectable and/or would result in small but measurable changes to an environmental resource or resource use.
- **Negligible** effects have the potential to cause an indiscernible and insignificant change or stress to an environmental resource or use.
- **No effect =** no discernible effect.

3.1.1 General Discussion of Impacts

The act of leasing parcels would not result in any activity that might affect various resources. Even if the proposed parcels are leased, it remains unknown whether development would actually occur, and if so, where specific wells would be drilled and where facilities would be placed. This would not be determined until the BLM receives an application for permit to drill (APD) in which detailed information about proposed wells and facilities would be provided for particular leases. Therefore, this EA discusses potential effects that could occur in the event of development. The amount of development is based on potential well densities and associated activities described in a Reasonably Foreseeable Development Scenario (RFDS) developed for the proposed lease area (Section 3.1.2). As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts are identified by resource below.

Upon receipt of an APD, the BLM would initiate a site-specific NEPA analysis to more fully analyze and disclose site-specific effects of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of best management practices (BMP) documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify APD Conditions of Approval (COA), based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

3.1.2 Reasonably Foreseeable Development Scenario Summary and Assumptions

If the proposed area is leased, the RFDS describes four phases of exploration and development that could occur: exploration, drilling, field development and production, and abandonment (Appendix 1). The RFDS and EA use the following assumptions.

1. One well would be drilled per government section of approximately 640 acres (based on State well spacing order).
2. Federal lease wells would require an APD and subsequent site-specific NEPA analysis. Additional site-specific requirements, termed Conditions of Approval (COA), may be attached to the approved APD.
3. The total surface disturbance, including well pad, pipeline, and road construction, is assumed to be approximately 5 acres per well. After the well is drilled, the pad size and road widths would be minimized and unneeded acreage would be reclaimed.
4. The lessee would seek approval for a drilling permit from IDL for fee land wells.
5. Wells would be drilled using conventional drilling techniques (i.e., vertical holes that would not require hydraulic fracturing - based on recent drilling in the adjacent Willow and Hamilton fields and on the geologic characteristics of the reservoir).
6. Producing wells would be incorporated into the Willow Field unit development. Dry wells would be plugged and abandoned in accordance with State and federal requirements, and the site would be reclaimed.
7. Oil and gas leases would be issued for an initial term of 10 years, subject to extension if there is drilling occurring or if there is a producing well on the lease.
8. Where gas is present at more than one layer, dual completion would be identified, targeted, and permitted resulting in 1 well/640 acres.

The level of drilling and associated activities would depend on available lease parcels and the effect of stipulations. Between 2 and 25 wells could be drilled in the proposed lease area resulting in 7 to 87.5 acres of surface disturbance (Table 2). The Lessee on adjacent State and private leases is currently bonded for 11-30 wells and they have drilled eight. A total of 17 wells have been permitted and drilled, three within the proposed lease area (Map 1). Within the boundaries of the Hamilton and Willow (exclusive of the proposed lease area) fields, up to 53 new wells could be developed at 1 well/640 acres (Table 2).

Table 2. Acres of surface disturbance for new wells and associated infrastructure, Little Willow Creek lease area (Alternatives A-C) and potential wells in the Hamilton and Willow fields, Payette County, Idaho.

Activity	**Alternative**			**Field[1]**	
	A	**B**	**C**	**Hamilton**	**Willow**
New Wells (#)	2	22	25	47	6
Well Pad Disturbance (2.5 acres/pad)	5	55	62.5	117.5	15
New Roads (0.25 miles/well)	0.5	5.5	6.25	11.75	1.5
Road Disturbance (4 acres/mile)	2	22	25	47	6
Total Surface Disturbance (acres)	7	77	87.5	164.5	21

[1] Based on 1 well/640 acres for sections that do not currently have a well.

3.2 Soils

3.2.1 Affected Environment – Soils

Detailed soil surveys for Idaho have been published by the Natural Resources Conservation Service (NRCS). The proposed lease area is characterized by sloping lava plateaus with gently to moderately sloping alluvial fans (cone-shaped deposits of sediment crossed and built up by streams), terraces, and bottom lands. Soils in the lease area are mainly coarse sandy loams, sandy loams, and silt loams (USDA NRCS 2014). Soil erosion susceptibility indices (K-factors) are categorized into the following ranges: low ($K \leq 0.15$), moderate ($K = 0.16 - 0.40$), and high ($K \geq 0.41$). Erosion potential of these soils ranges from moderate (coarse sandy loams) to high (silt loams). K-factors range from 0.20 to 0.64.

The majority of soils are moderately susceptible to erosion (Table 3, Map 3). Approximately 79% of soils (784 acres) are moderately susceptible and 21% (213 acres) are highly susceptible to erosion in the BLM/BLM category; 65% of soils (3,495 acres) are moderately susceptible and 35% (1,899 acres) are highly susceptible in the Private/BLM category and in the Private/Private category 49% of soils are moderately susceptible to erosion and 51% are highly susceptible to erosion (Table 3).

Table 3. Acres of Ownership Categories (Surface/Subsurface Management) in Each K-factor Range.

K-factor Range	**Management or Ownership Surface/Subsurface)[1]**			**Total**
	BLM/BLM	**Private/BLM**	**Private/Private**	
Moderate (K = 0.16-0.40)	784 (79%)	3,495 (65%)	4,495 (49%)	8,774 (56%)
High ($K \geq 0.41$)	213 (21%)	1,899 (35%)	4,758 (51%)	6,870 (44%)
Total Acres	997	5,394	9,253	15,644
K-factor ≤ 0.32	682 (68%)	3,031 (56%)	3,891 (42%)	7,604 (49%)
K-factor > 0.32	314 (32%)	2,364 (44%)	9,253 (58%)	8,040 (51%)
Total Acres	997	5,394	9,253	15,644

[1]BLM/BLM = BLM manages land surface and subsurface minerals; Private/BLM = BLM manages subsurface minerals (federal mineral estate); Private/Private = land surface and subsurface minerals privately owned.

Alternative C stipulations (Section 2.3) specific to Fragile Soils provide a lease notice (LN-1) indicating mitigation would be required in certain situations. In particular, soils with K-factors greater than 0.32 on slopes greater than 30% would require mitigation to limit erosion. Approximately 51% of the proposed lease area contains soils with K-factors above this threshold (Table 3, Figure 1).

3.2.2 Environmental Consequences – Soils

Impacts to soils are based on the RFDS created for this document (Table 2, Appendix 1).

3.2.2.1 General Discussion of Impacts

Soils are investigated to determine erosion hazard and reclamation suitability by evaluating slope and soil properties such as texture, organic matter content, structure, permeability, depth, available water capacity, and salt concentration. Site specific mitigation would limit but not eliminate impacts to soils in the proposed lease area. The extent of impacts to soils would depend on the amount and type of disturbance associated with particular activity, as well as the erosion risk of a given area. As slopes become steeper, the risk of soil instability increases. Actions that alter soil characteristics such as plant cover and composition (amount and species), soil structure, permeability, and compaction may increase erosion potential.

Figure 1. Typical topography, slope, and soil conditions of BLM land in the proposed lease area.

Direct impacts from exploration and development include mixing and breaking down soil components, compaction, and removal of soils in the short term (0-3 years) and long term (>3 years). Compaction alters soil structure (e.g., reduced porosity, increased bulk density) and, therefore, its functionality (e.g., its ability to support healthy vegetation communities and to properly cycle water and nutrients) over the long term (USDA and USFS 2006). Indirect impacts to soils would include removal of ground cover (e.g., vegetation, microbiotic crusts, and litter) in the short term, thus exposing soil surface to wind and water erosion and colonization by

weedy, invasive, disturbance related vegetation (e.g., cheatgrass) and or noxious weeds (e.g., rush skeletonweed) over the long term. Reclamation would be required once wells and infrastructure are no longer in use; therefore, soil structure and function would improve from disturbance related levels over the long term.

Oil and gas exploration and development could increase the potential for fire ignitions due to sparks from heavy equipment and/or vehicles, particularly when soils and vegetation are dry. If a fire burns hot enough, it may impact soil directly by altering its physical properties. Physical properties of soils that are dependent on organic matter (e.g., soil structure, pore space, aggregation) could be affected by heating during a fire (USFS RMRS 2014). Fire could also impact soil hydrology (i.e., infiltration) by increasing water repellency (USFS RMRS 2014). However, fires generally move quickly through shrub and grass communities like those in the proposed lease area. Therefore, it is more likely that soils would be indirectly impacted by the loss of vegetative cover leaving them exposed to erosion, as well as alterations in vegetation which, in turn, could alter soil chemistry and overall productivity over the long term.

3.2.2.2 Alternative A

No BLM managed surface or subsurface/federal mineral estate parcels would be leased, so soils would not be directly impacted in these parcels. Oil and gas activities (wells, well pads, and road construction) on private surface/subsurface could disturb up to 7 acres of soils and remove up to 7 acres of vegetation per the RFDS. Moderate to major, direct and indirect, adverse impacts to soils (compaction, soil loss, loss of structure and function, and colonization by weedy plants) would occur over the short and long term on the 7 acres (<0.1% of the proposed lease area). Soils in the high range for erosion susceptibility would incur greater impacts than soils in the moderate range if disturbed (Table 3). Risk of fire starts would be low because there would be little oil and gas development (two wells plus infrastructure); therefore, fire related soil impacts would be minor. Overall impacts to soils would be negligible due to the very small disturbance footprint possible under this scenario.

3.2.2.3 Alternative B

The BLM would issue leases on 997 BLM surface acres and 5,352 acres of federal mineral estate; however, the NSO and NSSO stipulations would preclude any direct disturbance to soils in these parcels until the FRMP is completed. Impacts to soils, including potential fire related impacts, would be identical to Alternative A (i.e., up to 7 acres of moderate to major disturbance) until implementation of the FRMP.

The RFDS for this alternative indicates up to 22 wells and associated infrastructure would cause direct soil impacts on up to 77 acres (0.5% of the proposed lease area) including BLM surface and federal mineral estate, and private surface/subsurface lands. These soils could sustain moderate to major, adverse, direct impacts, such as compaction and removal, and indirect impacts, such as reduction in productivity, over the short and long term associated with well and well pad development and road building. Minor (e.g., limited vegetation disturbance and wildfires) to major (e.g., roads and activities increase disturbances and wildfires) indirect impacts could occur where vegetation shifts to exotic annual dominated communities (e.g., associated with roads or wildfires) occur and soil protection is reduced or eliminated. These

areas would be more susceptible wind and water erosion over the long term. However, the extent (magnitude and scale) of impacts would depend on land use designations and stipulations set forth in the FRMP.

3.2.2.4 Alternative C

Impacts would be similar to those described in Alternative B (Section 3.2.2.3); however, per the RFDS, direct impacts on up to 88 acres (0.6% of the proposed lease area) could occur on BLM surface, federal mineral estate, and private lands. Indirect impacts would be more likely to affect federal mineral estate lands in this scenario because of the increased amount of disturbance and closer proximity of disturbances. Direct and indirect impacts associated with well and road construction could be reduced where fragile soils are avoided (LN-1, Section 2.3).

3.2.3 Mitigation

Prior to authorization, proposed actions (APDs) would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Where residual impacts are expected based on future site specific APD analyses, measures would be taken to reduce, avoid, or minimize potential impacts to soil resources from exploration and development activities. Examples of mitigation include avoiding excessively steep slopes and areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, re-vegetation, weed control, slope stabilization, surface roughening, and protective fencing.

3.2.4 Cumulative Impacts – Soils

Cumulative impacts to soils are based on the RFDS created for this document (Appendix 1), the Willow Field RFDS, and the actions identified below.

3.2.4.1 Scope of Analysis

The cumulative impact analysis area (CIAA) includes the proposed lease area and the Willow Field southwest of the lease area plus a 0.5-mile buffer totaling approximately 32,460 acres (50 square miles) (Map 3). The CIAA contains private, State, and BLM surface and federal mineral estate lands. This area was selected because the lands it encompasses have similar topographic, geologic, and soil attributes; soil condition (due to land use and wildfire) and susceptibility to erosion (K-factors) are also similar.

3.2.4.2 Current Conditions, Effects of Past and Present Actions, and Reasonably Foreseeable Future Actions

Soil conditions in the CIAA are nearly identical to those in the proposed leased area; the proposed lease area makes up the majority of the CIAA and the Willow Field has undergone similar disturbances. The levels and intensities of anthropogenic activities across all land jurisdictions in the CIAA has perpetuated increases of early successional, highly disturbed landscapes (Leu and Hanser 2011) that are at higher risk for cumulative soil impacts. Past, ongoing, and future land uses contributing to soil conditions include livestock grazing, agricultural development, rights-of-way, and oil and gas development. Wildfire, though not a land use, has also influenced soil conditions.

Livestock Grazing - Both BLM and private lands within CIAA, the proposed lease area in particular, encompass portions of the Sand Hollow, Rock Quarry Gulch, Dahnke, Hashegan, and Kaufman grazing allotments. Livestock grazing can damage soils via compaction, disruption of the soil profile, and remove vegetative cover exposing soils to erosion, particularly where livestock tend to congregate. Historic and recent grazing management in these allotments have contributed to overall soil condition. Livestock grazing would continue at current levels into the foreseeable future.

Agricultural Development - Conversion from shrub and grass communities to cultivated croplands on private land has altered soils on approximately 28% (8,962 acres) of the CIAA. Future agricultural development is unlikely (or would be negligible) because water necessary for crop production is limited.

Rights-of-way (power lines, roads) - Three short power line segments totaling approximately one mile are present in the CIAA. Power lines typically have two-track roads associated with them which disturb and impact soils. Approximately 9 miles of developed roads including the Little Willow Road (7.8 miles) and Big Willow Road (1.2 miles) run through the CIAA. These features combined have a disturbance footprint of approximately 40 acres; which, to a small degree, have contributed to present soil conditions across the CIAA. Future roads would be constructed in association with development of wells, well pads, and other infrastructure or facilities necessary to maintain oil and gas production. Road construction and maintenance would continue to affect soil erosion and displacement within maintained buffers. These effects are spatially restricted and occur over a continuous temporal scale.

Oil and Gas Development - Currently there are 11 wells and 1 well surface site in the CIAA. An estimated 30-41 acres (depending on infrastructure) of soils have been disturbed in the CIAA to date due to oil and gas exploration and development. An additional 6 wells could be drilled in the Willow Field portion of the CIAA in the future disturbing 21 acres of soils.

Wildfire - Approximately 16,655 acres (51 %) of the CIAA has burned at least one time. Multiple fires have burned within the CIAA, mainly in the 1980s, with some overlap. These fires have perpetuated increases of disturbance related plants, which are indicative of decreased soil productivity.

3.2.4.3 Alternative A – Cumulative Impacts

Disturbance from two wells and related infrastructure (7-acre footprint) would produce negligible short and long term impacts to soils when combined with ongoing and future land uses and disturbance. An additional 6 wells in the Willow Field portion of the CIAA would disturb soils on approximately 21 acres (<0.1% of the CIAA). Livestock grazing, rights-of-way construction and maintenance, and Willow Field oil and gas development combined would produce overall minor to moderate soil impacts over the short and long term. No or negligible additional impacts would occur from development of agriculture due limited water availability necessary for these actions. Wildfires could produce minor to major direct and indirect impacts to soils depending on their size and frequency.

3.2.4.4 Alternatives B and C– Cumulative Impacts

Development of 22 to 25 wells (77-87.5-acre footprint) and related infrastructure would produce minor short and long term impacts to soils in the CIAA when combined with ongoing and future land uses and disturbance. Cumulative impacts to soils from ongoing and future actions including livestock grazing, agricultural development, roads and ROWs, oil and gas development, and wildfire would be identical to those described for Alternative A.

3.3 Vegetation

3.3.1 Affected Environment – Vegetation

General Vegetation

Two ecological sites comprise the majority of the proposed lease area. South Slope Granitic 8-12 is associated with coarse sandy loams and is the primary ecological site occurring on steeper slopes and upper portions of gentle slopes. Loamy 8-12 is associated with sandy loams and silt loams which are present in the bottoms, on toe slopes, and lower portions of steeper slopes.

Basin big sagebrush and bluebunch wheatgrass vegetation communities are characteristic of South Slope Granitic 8-12 sites, and Wyoming big sagebrush and bluebunch wheatgrass with Thurber's needlegrass are characteristic of Loamy 8-12 sites. However, based on 2014 site visits, current plant communities on BLM-administered lands are largely dominated by cheatgrass, an invasive annual grass, and introduced annual forbs (e.g., tall tumblemustard, tansymustard, and clasping pepperweed); which is a result of frequent wildfires in the 1980s and recurring spring livestock grazing (Map 4). Between 1980 and 1986, approximately 49% of the area burned once, 15% burned twice, and 3% burned three times. Perennial plant species occasionally present include Sandberg bluegrass, crested wheatgrass, rabbitbrush, and small pockets of remnant bitterbrush, stiff sagebrush, and Wyoming big sagebrush. In general, north-facing slopes are wetter and contain slightly more perennial vegetation than south-facing, drier slopes; therefore, northerly slopes tend to be more resistant to disturbance and support more resilient plant communities.

General vegetation cover types mapped for the proposed lease area are consistent with observations made during site visits (Table 4). Exotic Annuals (i.e., cheatgrass and introduced annual mustards) is the dominant cover type for all ownership configurations (Figure 2). Big Sagebrush (mainly Wyoming big sagebrush and/or basin big sagebrush with cheatgrass and Sandberg bluegrass) is the second most common cover type followed by Bunchgrass (mainly Sandberg bluegrass with cheatgrass and occasionally shrubs) and Stiff Sagebrush (mainly stiff sagebrush with cheatgrass, Sandberg bluegrass, and introduced forbs) on BLM/BLM and Private/BLM. On Private/Private, agriculture is the second most common cover type followed by Big Sagebrush. All remaining cover types comprise 4% each or less for all ownership configurations.

Table 4. Acres of general vegetation cover types[1] and percent composition by mineral ownership, Little Willow Creek proposed lease area, Payette County, Idaho.

General Cover Type	Ownership (Surface/Subsurface)[2]			Total Acres
	BLM/BLM	Private/BLM	Private/Private	

Agriculture	3.3 (<1%)	145.6 (3%)	3,004.6 (33%)	3,153.5 (20%)
Big Sagebrush[3]	258.4 (26%)	1,216.3 (23%)	1,478.6 (16%)	2,953.3 (19%)
Bitterbrush	6.6 (<1%)	15.6 (<1%)	15.8 (<1%)	38.0 (<1%)
Bunchgrass	112.5 (11%)	434.2 (8%)	336.2 (4%)	883.0 (6%)
Exotic Annuals	460.4 (46%)	3,125.0 (59%)	3,756.8 (41%)	7,342.2 (47%)
Greasewood	29.8 (3%)	63.1 (1%)	95.6 (1%)	188.5 (1%)
Salt Desert Shrub	28.2 (3%)	155.3 (3%)	112.9 (1%)	296.4 (2%)
Stiff Sagebrush	91.4 (9%)	162.0 (3%)	346.5 (4%)	599.9 (4%)
Wet Meadow	1.1 (<1%)	3.5 (<1%)	29.0 (<1%)	34.0 (<1%)
Other[4]	3.1 (<1%)	13.9 (<1%)	30.1 (<1%)	47.1 (<1%)
Total Acres[5]	995	5,335	9,206	15,536

[1] Pacific Northwest National Laboratory vegetation mapping data (2002).
[2] BLM/BLM = BLM manages land surface and subsurface minerals; Private/BLM = BLM manages subsurface minerals (federal mineral estate); Private/Private = land surface and subsurface minerals privately owned.
[3] Big Sagebrush Mix and Big Sagebrush were combined because the two have nearly identical components.
[4] Other includes Mountain Big Sagebrush, Mountain Shrubs, Rabbitbrush, Sparse Vegetation, Urban, and Water; which were combined because they represent a small portion (<15 acres in each ownership category) of the proposed lease area.
[5] Total acres are slightly less than 15,644 due to GIS processing of PNNL data set (raster data vs. vector data).

Figure 2. Typical vegetation on BLM surface and mineral estate land in the proposed lease area. Note tall tumble mustard, cheatgrass, and Sandberg bluegrass in the foreground and a patch of green rabbitbrush in the background.

Riparian Vegetation

There 39 acres (<1% of the total lease acres) in the Wet Meadow cover type, which is indicative of riparian vegetation (e.g., cottonwoods, willows, rushes, and sedges) (Table 4). The vast majority of the Wet Meadow cover type (35 acres) is on private lands with private subsurface; only 1.1 acres are on BLM surface managed lands (BLM/BLM) and 3.5 acres are on federal mineral estate (Private/BLM). These areas are mainly associated with Little Willow Creek and the McIntyre Canal and are primarily on private land with private subsurface (Map 5). Additionally, National Wetland Inventory mapping shows approximately 56 acres (which overlap the Wet Meadow cover type to a small degree) of water features (e.g., emergent wetlands, ponds, seeps, and reservoirs) (Map 6). These features are typically used as livestock water sources and are generally sparsely vegetated as a result.

Special Status Plants (SSP)

Two sensitive plant species are mapped in the proposed lease area, an element occurrence (EO) of Snake River goldenweed (BLM Type 3 SSP) and an historical EO of calcareous buckwheat (BLM Type 3 SSP). Three additional EOs of Snake River goldenweed and one EO of Aase's onion (BLM Type 2 SSP) are present within 1 mile of the proposed lease area (Map 5). The calcareous buckwheat was last observed in 1933 and may no longer exist; further, the mapping precision for this EO is very low (G precision)[C], so it is possible that the EO is actually outside the proposed lease area. The Snake River goldenweed EO was not given a condition rank, so it is difficult to determine its estimated viability; however, based on the overall degradation of the vegetation communities across the proposed lease area, habitat condition is likely poor.

Noxious Weeds

'Noxious' is a legal designation given by the Director of the Idaho State Department of Agriculture (ISDA) to any plant having the potential to cause injury to public health, crops, livestock, land or other property (Idaho Statute 22-2402). The Boise District BLM has an active weed control program that annually updates the locations of noxious weeds and treats known weed infestations utilizing chemical, mechanical, and biological control techniques. Infestations of noxious weeds are treated contingent upon the BLM annual weed budget, employee availability, and noxious weed priority.

There are no noxious weeds mapped in the proposed lease area according to BLM Boise District noxious weeds database. However, numerous infestations of rush skeletonweed and Scotch thistle have been recorded in the vicinity (within three to five miles). Many of these infestations have been chemically treated at least once since 2001. Although no noxious species have been recorded within the proposed lease area boundary, it is likely that they do occur to some degree based on the degraded state of vegetation communities.

[C] G is the lowest precision and is typically applied by the Idaho Fish and Game's Idaho Natural Heritage program to historic observations and or observations lacking GPS data. A large buffer is created around a centroid, indicating that the location of the EO likely occurs/occurred somewhere within the polygon, but confidence is low as to its precise location. This EO is not depicted on the map provided because the location polygon is so large (77miles^2).

3.3.2 Environmental Consequences – Vegetation

Impacts to vegetation are based on the RFDS created for this document (Table 2, Appendix 1).

3.3.2.1 General Discussion of Impacts

Site specific mitigation and stipulations would limit impacts to sensitive vegetation (SSPs) and sensitive areas (riparian areas). The level of impacts to vegetation would depend on the amount and type of disturbance associated with a given activity.

General Vegetation

Lease development would directly impact vegetation by removing, damaging (i.e., breakage, trampling), or burying plants. When vegetation is removed and soil is exposed, noxious and invasive species may spread degrading overall condition of plant communities. The influx of machinery and vehicle travel associated with development, production, and improved access would increase the risk of fire starts, especially once vegetation has cured (late summer). Fire would damage or remove vegetation and potentially further degrade vegetation community structure and function. Burned areas would be more susceptible to noxious and invasive species colonization/spread and overall habitat degradation. Roads and degraded habitats would increase fragmentation by reducing the size of and increasing the distance between native vegetation stands.

Surface disturbing activities could also indirectly affect vegetation by disrupting seed banks and mixing, eroding, or compacting soils. Soil erosion would reduce the substrate available for plants and soil compaction could limit seed germination. Fugitive dust generated by construction activities and travel along dirt roads could affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Impacts to plants occurring after germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Riparian Vegetation

Direct and indirect impacts to riparian vegetation by surface disturbing activities would be the same as those described for general vegetation. However, mitigation and stipulations would likely prevent direct impacts to riparian vegetation, except on private lands with private mineral estate.

Special Status Plants

Direct impacts by surface disturbing activities would be the same as those described for general vegetation; however, mitigation and stipulations could prevent direct impacts. Networks of oil and gas infrastructure, roads in particular, could create pollinator and seed dispersal barriers. Vegetation removal and displacement by invasive and/or noxious species would also cause indirect impacts to sensitive plants via habitat degradation. Habitat fragmentation could also lead to a decrease in pollinators over time. All of these factors could decrease long-term EO viability.

Noxious Weeds

Both rush skeletonweed and Scotch thistle are capable of invading and dominating disturbed areas (roadsides, areas burned by wildfire, etc.) over a wide range of precipitation regimes and habitats (Sheley and Petroff 1999). Road building and use would create corridors and seed sources for noxious weed establishment and spread. Noxious weed inventories and treatments could offset some impacts.

3.3.2.2 Alternative A

General Vegetation

Development and production on private surface with private subsurface could disturb up to 7 acres (<0.1% of the proposed lease area) of vegetation. Moderate to major, direct (i.e., removal, breakage, and burying of vegetation) and indirect (e.g., influx of noxious and invasive species, disruption of seed bank, and plant community degradation) impacts would occur over the short (0-3 years) and long (>3 years) term in the isolated areas associated with wells and roads. The federal mineral estate (6,349 acres) would not be leased, so vegetation would not be directly affected in these parcels.

Vegetation in the unleased area could receive similar negligible to minor indirect impacts where invasive annuals, noxious weeds, or fires spread from developed areas. The degree of indirect impacts would depend on the condition and components of plant communities prior to disturbance. Those plant communities maintaining shrubs and native perennial grasses could better resist invasive and noxious weed invasions; however, they would be less resistant if affected by fire. New and upgraded roads would cause minor increased fragmentation.

The threat of fire ignitions could increase a minor amount by equipment use and vehicles travelling on existing and new (0.5 miles) access roads. The extent of impacts to vegetation across all jurisdictions would be influenced by fire size and behavior, as well as the pre-fire vegetation community conditions.

Riparian Vegetation

There would be no impacts to riparian vegetation or habitat on BLM-administered land or federal mineral estate. The extent of short- and long- term direct impacts (i.e., removal or damage) and long-term indirect impacts (i.e., habitat degradation) to riparian vegetation on private mineral estate would depend on the proximity of the disturbance. Any impacts would likely come from access roads associated with wells/well pads.

Special Status Plants

The Snake River goldenweed EO, or other currently mapped special status plant EOs, would not be directly impacted (i.e., removed or damaged). Long-term indirect impacts, such as habitat degradation or fragmentation, would be negligible because overall habitat condition is already relatively poor and the 0.5 mile of new access roads would be ≥2.5 miles away.

Noxious Weeds

The 0.5 miles of new roads could serve as minor noxious and invasive species corridors over the long term.

3.3.2.3 Alternative B

General Vegetation

The NSO and NSSO stipulations would apply until the FRMP is finalized and implemented; therefore, until that time, direct impacts to vegetation would be similar to those described for Alternative A (Section 3.3.2.2).

The RFDS for this alternative specifies up to 77 acres (0.5% of the proposed lease area) of vegetation on private surface and subsurface would sustain moderate to major, adverse, direct impacts (i.e., removal, breakage, and burying of vegetation). Minor to major indirect impacts (e.g., influx of noxious and invasive species, disruption of seed bank, and plant community degradation) could occur over the long term. Because wells and roads would occur throughout the proposed lease area, both private and federal mineral estate lands could be adversely affected. Moderate increases in habitat fragmentation could occur, especially where invasive species increase adjacent to roads. Minor (access restricted by private landowners and fire starts remain similar to current levels) to major (access not restricted and fire starts increase substantially) wildfire impacts could degrade vegetation conditions increasing fragmentation over the long term. However, the extent (magnitude and scale) of impacts to vegetation would depend on land use designations and stipulations set forth in the FRMP.

Riparian Vegetation

Direct impacts (i.e., removal or damage) to riparian areas would not occur on federal mineral estate lands. Long-term indirect impacts on BLM surface and federal mineral estate riparian vegetation would be similar to Alternative A (Section 3.3.2.2) and depend on the proximity of the disturbance. The extent of indirect impacts could be greater than Alternative A because more development would require more access roads (0.5 versus 5.5 miles of new access roads).

Special Status Plants

No direct impacts to the Snake River goldenweed EO or other currently mapped special status plant EOs would occur. Long-term indirect impacts to SSPs on BLM surface and federal mineral estate could be minor to moderate, but would depend on the proximity of the disturbance. However, the degree of these impacts could be greater than Alternative A because development could occur within 0.2 miles of the EO. Increased fragmentation and wildfire potential would adversely affect the EO over the long term.

Noxious Weeds

The 5.5 miles of new roads (and upgrades of existing roads) accessing 22 wells would serve as minor to moderate noxious and invasive species corridors over the long term.

3.3.2.4 Alternative C

General Vegetation

The same area would be leased as Alternative B, but Cascade RMP stipulations and other lease notices for development would apply specific to riparian areas and SSPs. According to the RFDS, up to 87.5 acres (0.6% of the proposed lease area) would sustain moderate to major, adverse, direct impacts (i.e., removal, breakage, and burying of vegetation). Vegetation

community degradation, increased invasive species, seed bank disruption, and wildfire impacts would be similar to those described in Alternative B (Section 3.3.2.3); however, federal mineral reserve lands (with minor exceptions associated with avoidance buffers) would be more likely to be affected because direct disturbances would occur on rather than adjacent to these lands.

Riparian Vegetation
Negligible indirect impacts could occur over the short and long term. Stipulations CSU-1 and CSU-2 (Section 2.3) would preclude direct impacts and limit indirect impacts.

Special Status Plants
Impacts (habitat degradation and fragmentation) would be similar to those described for Alternative B (Section 3.3.2.3); however, development could occur closer to EOs producing greater indirect impacts.

Noxious Weeds
The 6.25 miles of new access roads associated with 25 wells would increase the threat of noxious and invasive species spread slightly more than Alternative B (Section 3.3.2.3), but would remain in the minor to moderate range, overall. There are no stipulations or mitigation specific to noxious weeds under this scenario, but the Boise District BLM's annual weed control program could help mitigate noxious weed expansion.

3.3.3 Mitigation

Site specific mitigation would be addressed at the APD stage of exploration and development. If necessary, COAs could be applied including re-vegetation strategies using native and/or desirable non-native plant species, soil enhancement practices, modification of livestock grazing, and fencing of reclaimed areas. Noxious weed inventories and treatments may also be required.

Special Status Plants
Section 7 of the Endangered Species Act (ESA) requires BLM land managers to ensure that any action authorized, funded, or carried out by the BLM is not likely to jeopardize the continued existence of any threatened or endangered species and that it avoids any appreciable reduction in the likelihood of recovery of affected species. Consultation with the U. S. Fish and Wildlife Service (FWS) is required on any action proposed by the BLM or another federal agency that affects a listed species or that jeopardizes or modifies critical habitat.

The BLM's Special Status Species Policy outlined in BLM Manual 6840, Special Status Species Management, is to conserve listed species and the ecosystems on which they depend and to ensure that actions authorized or carried out by BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any of these species. The BLM's policy is intended to ensure the survival of those plants that are rare or uncommon, either because they are restricted to specific uncommon habitat or because they may be in jeopardy due to human or other actions. The policy for federal candidate species and BLM sensitive species is to ensure that no action that requires federal approval should contribute to the need to list a species as threatened or endangered.

Prior to any exploration or development, the BLM would conduct site specific rare and sensitive plant surveys. If rare (threatened, endangered, proposed, or candidate species) or sensitive plants (SSPs) are found, avoidance stipulations (e.g., disturbance buffers) would be applied. If listed species are found, BLM would consult with the FWS during the analysis phase of processing an ADP.

3.3.4 Cumulative Impacts – Vegetation

Cumulative impacts to vegetation are based on the RFDS created for this document (Appendix 1), the Willow Field RFDS, and the actions described below.

3.3.4.1 Scope of Analysis

The CIAA for vegetation, consistent with the soils CIAA, encompasses the proposed lease area and the Willow field totaling plus a 0.5-mile buffer totaling approximately 32,460 acres (50 miles^2) (Map 4). This area was selected because it contains similar ecological sites and plant community components, conditions are similar, and oils and gas leasing and development is occurring (land uses are comparable).

3.3.4.2 Current Conditions, Effects of Past and Present Actions, and Reasonably Foreseeable Future Actions

Conditions across the CIAA are similar to conditions in the proposed lease sale perimeter: vegetation communities have been degraded and are largely dominated by non-native, weedy, annual species with small patches of remnant native shrubs and perennial grasses. There are no additional special status plants or noxious weeds mapped within the CIAA. Past, ongoing, and future land uses contributing to condition of vegetation include livestock grazing, agricultural development, rights-of-way, and oil and gas development. Wildfire has also been instrumental in shaping the vegetation community components and overall condition.

Livestock Grazing - Both BLM and private lands within CIAA, the proposed lease area in particular, encompass portions of the Sand Hollow, Rock Quarry Gulch, Dahnke, Hashegan, and Kaufman grazing allotments. Livestock grazing can damage and remove vegetation, especially where livestock tend to congregate. Historic and recent grazing management in these allotments have contributed to overall plant community condition. Livestock grazing would continue at current levels into the foreseeable future.

Agricultural Development - Conversion from shrub and grass communities to cultivated croplands on private land has occurred on approximately 28% (8,962 acres) of the CIAA. Future agricultural development is unlikely (or would be negligible) because water necessary for crop production is limited.

Roads and Rights-of-way (ROW) - Road or ROW (powerlines and pipelines) construction and subsequent ongoing maintenance (e.g., blading, grading, and/or spraying) along these features will continue to affect vegetation within and adjacent to maintained buffers. Blading and grading disturb soils and vegetation and often create conditions conducive to noxious and invasive species establishment. Spraying of these sites helps to keep weeds and weedy species relatively restricted to the maintained buffers or to a minimum (e.g., around powerline poles,

which are kept relatively free of vegetation to prevent fire). As a result, upland vegetation is often sparse in these locations. Road construction and maintenance would continue to impact vegetation within maintained buffers. These effects are generally spatially restricted and occur over a continuous temporal scale.

Three short power line segments totaling approximately one mile are present in the CIAA. Power lines typically have two-track roads associated with them which disturb and impact vegetation. Approximately 9 miles of developed roads including the Little Willow Road (7.8 miles) and Big Willow Road (1.2 miles) run through the CIAA. Combined, these features have a disturbance footprint of approximately 40 acres; which has contributed to present plant community conditions. Additional roads are anticipated to access wells, well pads, and other infrastructure or facilities necessary to maintain oil and gas production.

Oil and Gas Development - Currently there are 11 wells and 1 well surface site in the CIAA. Vegetation on approximately 30-41 acres (depending on infrastructure) has been removed or disturbed to date due to oil and gas exploration and development. An additional 6 wells could be drilled in the Willow Field portion of the CIAA which would disturb approximately 21 acres of vegetation.

Wildfire - Several fires have burned across the CIAA, mainly in the 1980s. Approximately 51 % (16,655 acres) of the CIAA has burned at least one time. These fires have perpetuated increases of disturbance related plants, degrading overall vegetation community conditions. Disturbance related vegetation often equates to fine fuels which burn readily creating a negative feedback loop.

3.3.4.3 Alternative A – Cumulative Impacts

Disturbance from two wells and related infrastructure would produce negligible additive short- and long-term impacts to vegetation. In the Willow Field portion of the CIAA, an additional 6 wells would disturb vegetation on approximately 21 acres (<0.1% of the CIAA) combined with the 30-41 acres of existing disturbance would produce minor impacts over the short and long term. Ongoing livestock use in areas grazed each spring (before seed set) could perpetuate disturbance related plants. Sensitive plants could also be impacted directly via trampling by livestock. Rights-of-way construction and maintenance would produce overall minor impacts to vegetation including habitat degradation and fragmentation over the short and long term. Wildfires could produce minor to major direct and indirect impacts to vegetation depending on fire size and frequency. Further agricultural development is improbable, so no additional impacts to vegetation would take place.

3.3.4.4 Alternatives B and C – Cumulative Impacts

Development of 22 to 25 wells and related infrastructure totaling 77 to 87.5 acres of disturbance would produce minor short and long term additive impacts to vegetation in the CIAA. Cumulative impacts to vegetation from ongoing and future actions identified in section 3.3.3.2 (livestock grazing, agricultural development, roads and ROWs, oil and gas development, and wildfires) would be identical to those described for Alternative A.

3.4 Air Resources

Air resources include air quality, air quality related values (AQRVs), and climate change. As part of the planning and decision making process, the BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on pollutant emissions and on air resources.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO2), ozone, particulate matter with a diameter less than or equal to 10 microns (PM10), particulate matter with a diameter less than or equal to 2.5 microns (PM2.5), and sulfur dioxide (SO2). Two additional pollutants, nitrogen oxides (NOx) and volatile organic compounds (VOCs) are regulated because they form ozone in the atmosphere. Air quality regulation is also delegated to the IDEQ. Air quality is determined by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

3.4.1 Affected Environment – Air Resources

Air Quality

Based on data from monitors located in Baker County Oregon (west and generally upwind of the lease area) and Ada and Canyon counties (southeast and generally downwind of the lease area), air quality in Payette County is believed to be much better than required by the NAAQS. The EPA air quality index (AQI) is an index used for reporting daily air quality (http://www.epa.gov/airdata/) to the public. The index tells how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates the AQI for five criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established NAAQS to protect public health. An AQI value of 100 generally corresponds to the primary NAAQS for the pollutant. The following terms help interpret the AQI information:

- **Good** – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate** – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups** – When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease

are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.

- **Unhealthy** – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- **Very Unhealthy** – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 5). Based on available aggregate data for Baker, Ada, and Canyon counties (the nearest counties with monitoring data) for years 2011–2013, more than 84% of the days were rated "good" and the three-year median daily AQI was 19 to 32. Moderate or lower air quality days were typically associated with winter inversions or summer wildfire activity.

Table 5. Air Quality Index Report – Analysis Area Summary (2011-2013), Baker County Oregon and Ada Canyon Counties Idaho.

County[1]	# Days in Period	Median AQI	# Days rated Good	Percent of Days Rated Good	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Baker	1,084	28	915	84	167	2	0	0
Ada	1,088	32	917	84	157	11	2	1
Canyon	1,019	19	925	91	87	4	3	0

Source: EPA 2013a.

Emissions in Payette County are low, due to a small populations and little industrial activity. Based on 2011 emission inventory data available from the EPA National Emission Inventory, oxides of nitrogen, carbon monoxide, $\leq$10 micron particulate matter (PM_{10}), volatile organic compounds, and carbon dioxide were the most common non-biogenic emissions in Payette County (EPA 2014a). As described above, these emissions occur in an area with good air quality.

Table 6. Annual emissions (tons/year) of typical pollutants, typical annual emissions for a well (Upper Green River, Wyoming), and emissions for the reasonably foreseeable development scenario wells (Payette County) and cumulative impacts analysis area (Baker, Ada, Canyon, and Payette counties), Idaho and Oregon.

Pollutant	**Payette County**	**Cumulative Impacts Analysis Area**	**Per Well[1]**	**Alternative (%increase over Payette County values)**			**Hamilton and Willow Fields**
				A	**B**	**C**	
NOx (Oxides of Nitrogen)	1,445.4	24,851.4	14.6	29.2 (2%)	321.2 (22.2%)	365 (25.3%)	774 (3.1%)
CO (Carbon Monoxide)	6,308.3	149,894.3	3.9	7.8 (0.1%)	85.8 (1.4%)	97.5 (1.6%)	207 (0.1%)
SO_2 (Sulfur Dioxide)	39.1	2,800.2	0.0004	0.0008 (<0.01%)	0.0088 (0.02%)	0.01 (0.03%)	0.02 (0.001%)
PM_{10} (Particulates	6,195.6	61,101.9	6.7	13.4	147.4	167.5	355.1

Pollutant	Payette County	Cumulative Impacts Analysis Area	Per Well[1]	Alternative (%increase over Payette County values)			Hamilton and Willow Fields
				A	B	C	
with diameters ≤10 microns or ≤10 x 10^{-6} meters)				(0.2%)	(2.4%)	(2.7%)	(0.7%)
$PM_{2.5}$ (Particulates with diameters ≤ 2.5 microns or ≤2.5 x 10^{-6} meters)	828.4	12,815.4	0.8	1.6 (0.2%)	17.6 (2.1%)	20.0 (2.4%)	42.4 (0.3%)
VOCs (Volatile Organic Compounds)	1,123.1	28,539.1	5.2	10.4 (0.9%)	114.4 (10.2%)	130.0 (11.6%)	275.6 (1.0%)
HAPs (Hazardous Air Pollutants)							
Benzene	18.2	583.2	0.12	0.2 (1.3%)	2.6 (14.5%)	3.0 (16.5%)	6.4 (1.2%)
Toulene	67.4	1,509.5	0.22	0.4 (0.7%)	4.8 (7.2%)	5.5 (8.2%)	11.7 (0.8%)
Ethylbenezene	9.7	190.3	0.00003	0.00006 (<0.01%)	0.0007 (0.01%)	0.0008 (0.01%)	0.002 (0.001%)
Xylene	39	801.5	0.17	0.3 (0.9%)	3.7 (9.5%)	4.3 (10.9%)	9.0 (1.1%)
n-Hexane	23	615.1	0.20	0.4 (1.7%)	4.4 (19.1%)	5.0 (21.7%)	10.6 (1.7%)
Total HAPs	157.3	3,654.6	0.72	1.4 (0.9%)	15.8 (10.2%)	18.0 (11.4%)	38.2 (1.0%)
GHGs (Greenhouse Gases)							
CO_2 (Carbon Dioxide)	240,158	4,029,296	2,582.1	5,164.2 (2.2%)	56,806.2 (23.7%)	64,552.5 (26.9%)	136,851.3 (3.4%)
CH_4 (Methane)	28.6	1,478.8	14.1	28.2 (98.6%)	310.2 (1,085%)	352.5 (1,233%)	747.3 (50.5%)
N_xO (Nitrogen Oxides)	1,445	24,851	0.05	0.1 (1.2%)	1.1 (13.1%)	1.3 (14.9%)	2.7 (0.01%)
CO_2 eq (Global Warming Potential)	243,362	11,764,161	2,893.7	5,787.4 (2.4%)	63,661.4 (26.2%)	72,342.5 (29.7%)	153,366.1 (1.3%)

[1] Source: Kleinfelder (2014)
[2] GWP (Global Warming Potential/Carbon Dioxide Equivalent [CO_2eq]) for CO_2 =1, CH_4 = 21, and N_2O = 310.

Air resources also include visibility, which can be degraded by regional haze caused in part by sulfur, nitrogen, and particulate emissions. Based on trends identified during 2000-2009, visibility has improved slightly near the analysis area on the haziest and clearest days. Blue-shaded circles in Figure 3 indicate negative deciview (dv) changes, which mean that people can see more clearly at greater distances.

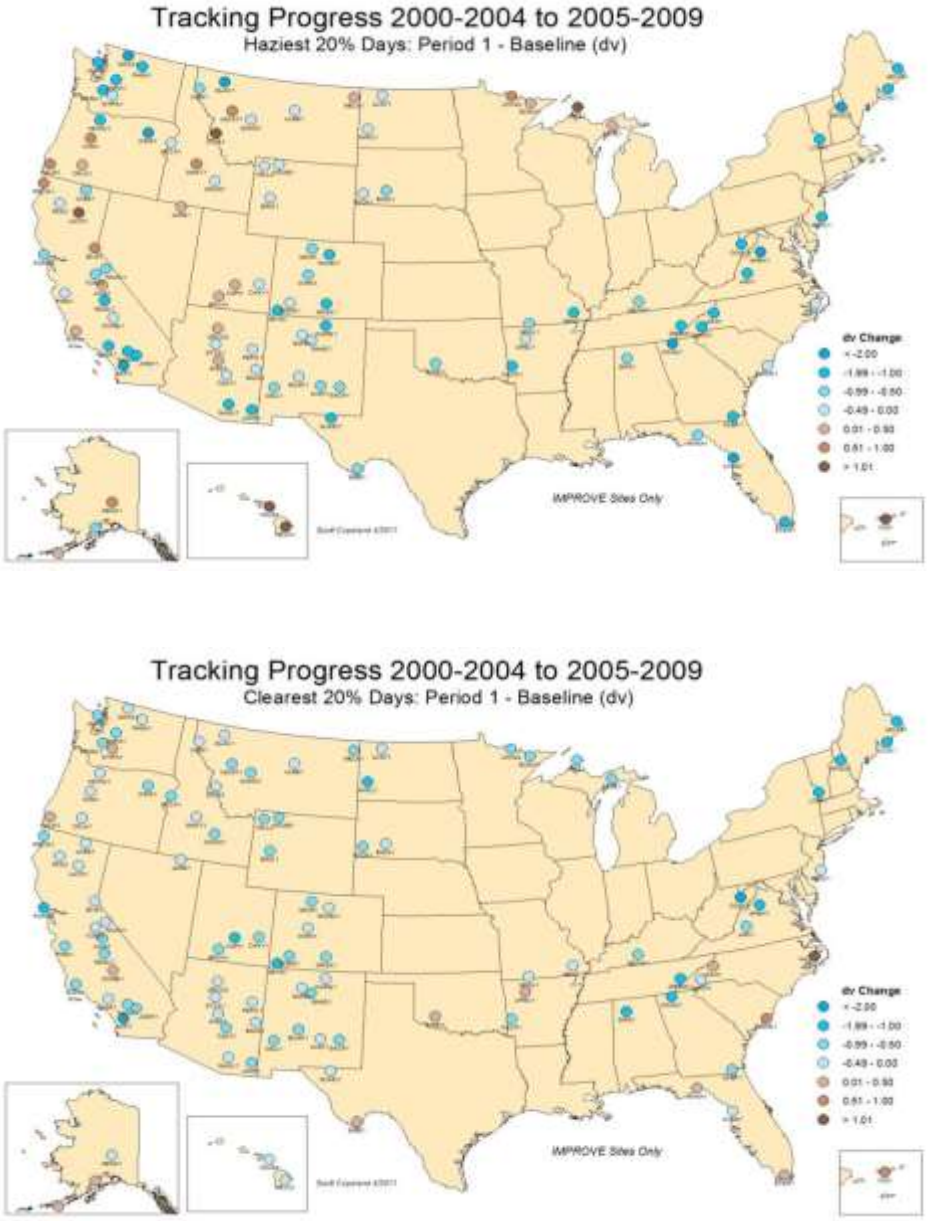


Figure 3. Visibility trends on haziest and clearest days, 2000-2009 (IMPROVE 2011).

Climate Change/Greenhouse Gasses

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC 2007).

The Intergovernmental Panel on Climate Change (Climate Change SIR[D] 2010) states, "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." Global average temperature has increased approximately 1.4°F since the early 20th century (Climate Change SIR 2010). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by the IPCC (Climate Change SIR 2010) include:

- Rates of surface warming increased in the mid-1970s and the global land surface has been warming at about double the rate of ocean surface warming since then;
- Eleven of the last 12 years rank among the 12 warmest years on record since 1850;
- Lower-tropospheric temperatures have slightly greater warming rates than the earth's surface from 1958-2005.

As discussed and summarized in the Climate Change SIR, earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO_2, methane, and N_2O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere (Climate Change SIR 2010). Increased GHG emissions of CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution have substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo) due to soot deposition and other surface changes. It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO_2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR, 2010).

With regard to statewide GHG emissions, Idaho ranks in the lowest decile when compared to all states. The estimate of Idaho's 2011 GHG emissions of 28.5 million metric tons (MMt) of

[D] Although the Climate Change SIR was developed for oil and gas leasing activities in Montana, North Dakota, and South Dakota, conclusions from broader scale analyses/findings are applicable in Idaho.

carbon dioxide equivalent (CO_2e) accounted for approximately 0.43% of the U.S. GHG emissions (WRI 2014).

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the Climate Change SIR describes impacts of climate change in detail at various scales, including the state scale when appropriate. The following summary characterizes potential changes identified by the EPA (EPA 2014a) that are expected to occur at the regional scale, where the Proposed Action and its alternatives could occur. The EPA identifies Idaho as part of the Northwest region (EPA 2014a):

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalists, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR. Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue. Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to two weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increases insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

More specific to Idaho, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (2010) include:

- Temperature increases are predicted to be between 3 to 5°F at the mid-21st century.

- Precipitation may increase in winter by up to 25%, remain stable during the spring and fall, and decrease by up to 25% during the summer.
- Predicted annual runoff for 2041–2060 compared to 1901–1970 is expected to remain stable.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in southern Idaho based on a 1°C global average temperature increase to be 111%.

While long-range regional changes might occur within this analysis area, it is impossible to predict precisely when they could occur. The following example summarizing climate data for the Idaho Southwestern Valleys illustrates this point at a regional scale. A potential regional effect of climate change is earlier snowmelt and associated runoff. This is directly related to spring-time temperatures. Over a 119-year record, temperatures increased 0.08 degrees per decade (Figure 4). This would suggest that runoff may be occurring earlier than in the past. However, data from 1994-2014 indicates a 0.5 degree per decade cooling trend (Figure 5). This example is not an anomaly, as several other 20-year windows can be selected to show either warming or cooling trends. Some of these year-to-year fluctuations in temperature are due to natural processes, such as the effects of El Niños, La Niñas, and the eruption of large volcanoes. This information illustrates the difficulty of predicting actual short-term regional or site-specific changes or conditions which may be due to climate change during any specific time frame.

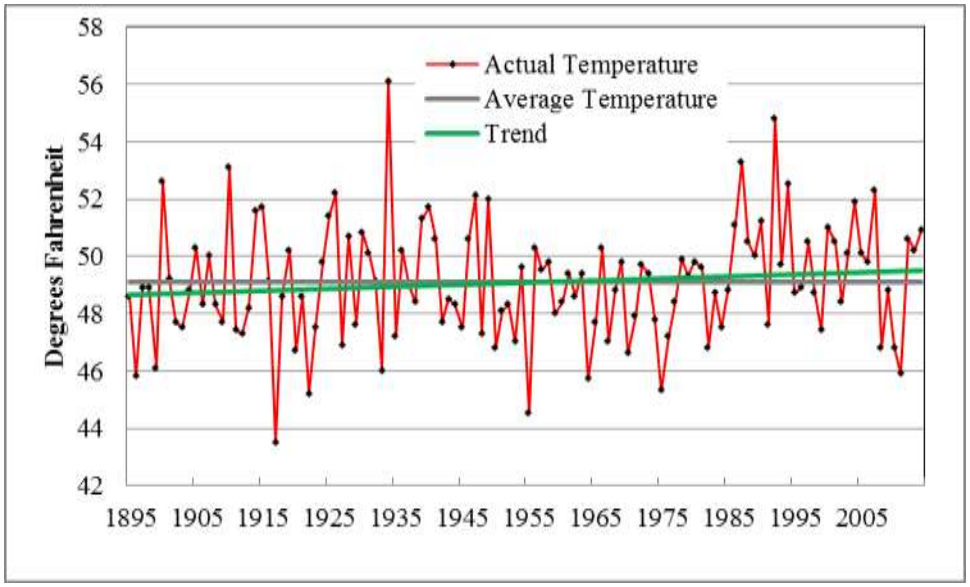


Figure 4. Regional climate summary of spring temperatures (March-May) for Idaho Southwestern Valleys, from 1895-2014. (Source: NOAA website http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html)

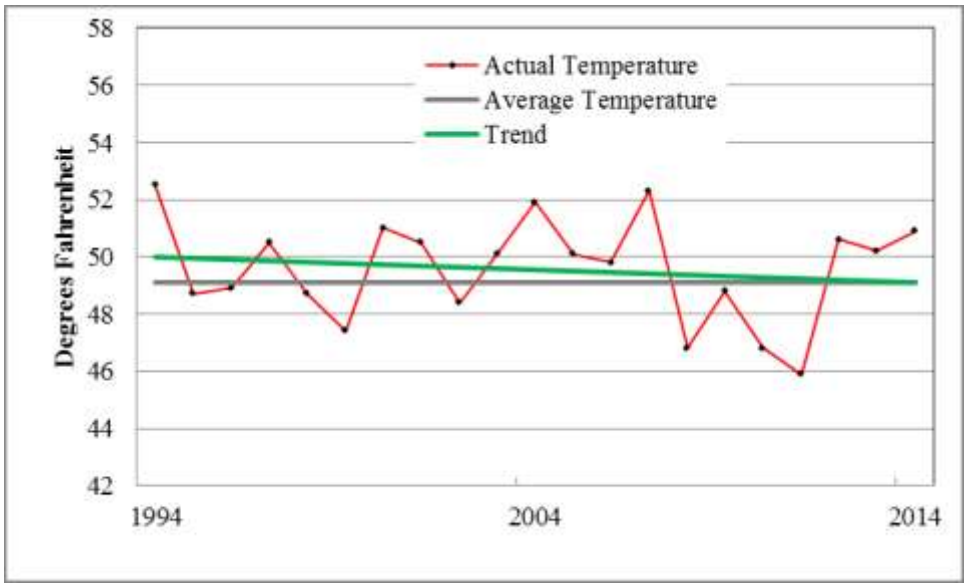


Figure 5. Regional climate summary of spring temperatures (March-May) for Idaho Southwestern Valleys, from 1994-2014. (Source: NOAA website http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html)

3.4.2 Environmental Consequences – Air Resources

Impacts to air resources are based on the RFDS created for this document (Table 2, Appendix 1).

3.4.2.1 General Discussion of Impacts

Air Quality

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads; exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities; as well as potential releases of GHGs and VOCs during drilling or production activities. The amount of increased emissions cannot be precisely quantified at this time since it is not known for certain how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g., compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact would also vary according to the characteristics of the geologic formations from which production occurs, as well as the scope of specific activities proposed in an APD. Oxides of nitrogen, carbon monoxide, volatile organic compounds, carbon dioxide, and methane are the most common emissions from a typical well (Green River, Wyoming; Table 6).

Climate Change/Greenhouse Gases

Sources of GHGs associated with development of lease parcels include construction activities, operations, and facility maintenance in the course of oil and gas exploration, development, and production. Estimated GHG emissions are discussed for these specific aspects of oil and gas activity because the BLM has direct involvement in these steps. Anticipated GHG emissions are based on emissions calculators developed by air quality specialists at the BLM National

Operations Center in Denver, Colorado, based on a typical well in Green River Wyoming (Table 6).

3.4.2.2 Alternative A

Air Quality

Two new State lease wells and associated infrastructure would have minor adverse impacts on air quality over the long term. Small increases in nitrogen oxides (2%), carbon monoxide (0.1%), sulfur dioxide (<0.01%), and particulate matter (0.4%) would occur annually (Table 6). Good AQI values would likely predominate; however, well emissions could slightly increase the number of moderate AQI days especially during inversions. There would be negligible decreases in visibility, primarily within 1-2 miles of the wells.

Climate Change/Greenhouse Gases

Emissions from two new wells on State leases would increase Payette County's annual carbon dioxide equivalent production by 2.4% (Table 6).

3.4.2.3 Alternative B

Air Quality

Twenty-two new BLM lease wells and associated infrastructure would have moderate adverse impacts on air quality over the long term. Increases in nitrogen oxides (22%), carbon monoxide (1.4%), sulfur dioxide (0.02%), and particulate matter (4.5%) would occur annually (Table 6). The percent of days rated good AQI could decrease, especially during inversions. There would be minor decreases in visibility, primarily within 1-2 miles of the wells.

Climate Change/Greenhouse Gases

Twenty-two new wells on BLM leases would increase Payette County's annual carbon dioxide equivalent production by 26.2% (Table 6).

3.4.2.4 Alternative C

Air Quality

Twenty-five new BLM lease wells and associated infrastructure would have moderate adverse impacts on air quality over the long term. Controlled surface use stipulations could reduce some pollutants when or where they are in effect (e.g., the winter use restriction CSU-4 would reduce or eliminate some pollutants [e.g., PM_{10}] between December 1 and March 31; minimizing disturbance of fragile soils could reduce dust over the long term). Increases in nitrogen oxides (25%), carbon monoxide (1.6%), sulfur dioxide (0.03%), and particulate matter (5.1%) would occur annually (Table 6). The percent of days rated good AQI could decrease, especially during inversions. There would be minor decreases in visibility, primarily within 1-2 miles of the wells.

Climate Change/Greenhouse Gases

Twenty-five new wells on BLM leases would increase Payette County's annual carbon dioxide equivalent production by 29.7% (Table 6).

3.4.3 Mitigation

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality and climate change by reducing emissions, surface disturbances, and dust from field production and operations. Measures may also be required as COAs on permits by either the BLM or IDEQ. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Some of the following measures could be imposed at the development stage:

- flare or incinerate hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- install emission control equipment of a minimum 95% efficiency on all condensate storage batteries;
- install emission control equipment of a minimum 95% efficiency on dehydration units, pneumatic pumps, produced water tanks;
- operate vapor recovery systems where petroleum liquids are stored;
- use Tier II or greater, natural gas or electric drill rig engines;
- operate secondary controls on drill rig engines;
- use no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing volatile organic compounds (VOCs));
- operate gas or electric turbines rather than internal combustions engines for compressors;
- use nitrogen oxides (NO_x) emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- perform interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- co-locate wells and production facilities to reduce new surface disturbance;
- use directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- operate gas-fired or electrified pump jack engines;
- install velocity tubing strings;
- use cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- use centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- perform air monitoring for NO_x and ozone (O_3).

Specifically with regard to reducing GHG emissions, Section 6.0 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas production operations. Technologies discussed in the Climate Change SIR and as summarized in Table 7 (reproduced from Table 6-2 in Climate Change SIR), display common methane emission technologies reported under the EPA Natural Gas STAR Program and

associated emission reduction, cost, maintenance, and payback data.

Table 7. Selected methane emission reductions reported under the EPA Natural Gas STAR Program.

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($1,000)	Annual Operating and Maintenance Cost ($1,000)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Wells					
Reduced emission (green) completion	7,000 [2]	$1 – $10	>$1	1 – 3 yr	$3
Plunger lift systems	630	$2.6 – $10	NR	2 – 14 mo	$7
Gas well smart automation system	1,000	$1.2	$0.1 – $1	1 – 3 yr	$3
Gas well foaming	2,520	>$10	$0.1 – $1	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	$35 – $104	$7 – $17	3 – 19 mo	$7
Consolidate crude oil production and water storage tanks	4,200	>$10	<$0.1	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	$5 – $9.8	Negligible	4 – 51 mo	$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	$7
Zero-emission dehydrators	31,400	>$10	>$1	0 – 1 yr	NR
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	$0.2 – $0.3	Negligible	3 – 8 mo	$7
Early replacement	260	$1.9	Negligible	13 mo	$7
Retrofit	230	$0.7	Negligible	6 mo	$7
Maintenance	45 – 260	Negl. to $0.5	Negligible	0 – 4 mo	$7
Convert to instrument air	20,000 (per facility)	$60	Negligible	6 mo	$7
Convert to mechanical control systems	500	<$1	<$0.1	0 – 1 yr	NR
Valves					
Test and repair pressure safety valves	170	NR	$0.1 – $1	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<$1	$0.1 – $1	0 – 1 yr	NR
Compressors					
Install electric compressors	40 – 16,000	>$10	>$1	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	$324	Negligible	10 mo	$7
Flare Installation	2,000	>$10	>$1	None	NR

Source: Multiple EPA Natural Gas STAR Program documents. Individual documents are referenced in Climate Change SIR (2010).

[1] Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc).
[2] Emission reduction (Mcf = thousand cubic feet of methane) is per completion, rather than per year.
NR = not reported

3.4.4 Cumulative Impacts – Air Resources

Cumulative impacts to air resources are based on the RFDS created for this document (Appendix 1), RFDS for Hamilton and Willow fields, and the actions discussed below.

3.4.4.1 Scope of Analysis

The CIAA includes the airshed associated with Ada, Baker, Canyon, and Payette counties. Because of prevailing wind patterns, changes in Baker County air quality would affect Payette County and impacts from Payette County air quality would dissipate at the eastern side of Ada County. The analysis period covers the 10-year lease period; however, pollutants are reported by their annual production levels.

3.4.4.2 Current Conditions and Effects of Past and Present Actions

Because of a large population base (615,335 people in 2013), Ada and Canyon counties contribute substantial amounts of nitrogen oxides (79%), PM_{10} (83%), volatile organic compounds (75%), hazardous air pollutants (87%), and GHG (80%) to the four-county total pollution (Table 6). Baker County, with a relatively small population (16,018 people in 2013) and large area (3,068 mi^2 compared with 2,047 mi^2 for the other three counties combined), accounts for 71% of methane production, while other pollutant contributions vary from 7-24% of totals. The majority of growth during the 10-year period is expected to occur in Ada and Canyon counties; therefore, pollutant contributions from growth-related activities (e.g., construction, vehicle emissions, dust, and manufacturing) in these counties would be expected remain similar or increase proportionately more than Baker and Payette counties.

3.4.4.3 Reasonably Foreseeable Future Actions

An estimated 53 wells could come into production in the Hamilton (33,400 acres) and Willow (7,000 acres outside the proposed lease area) fields (Map 1). These wells would contribute from<0.01-3.4% of most pollutants; however, they would cause a 51% increase in methane production annually. AM Idaho (Alta Mesa's Idaho subsidiary) is constructing a hydrocarbon liquid treatment (dehydrator) facility (4 miles south of New Plymouth, Idaho), an ancillary processing facility (1 mile east of New Plymouth), and associated pipelines from wells to the facilities. AM Idaho has applied for an IDEQ air quality permit for the facilities. Typical pollutants include NO_x, CO, particulate matter, HAP, and VOCs; however, the levels are unknown.

3.4.4.4 Alternative A – Cumulative Impacts

Two additional wells in the proposed lease area would have negligible additive impacts to air quality and GHG pollutants over the long term. Wells in the Hamilton and Willow fields and gas processing facilities would have minor (e.g., 1.3% CO2 eq increase in CIAA) to major (51% methane increase in CIAA) additive impacts (Table 6), whereas, with the exception of methane gas, growth-related activities would account for the majority of pollutant increases.

3.4.4.5 Alternative B– Cumulative Impacts

Twenty-two wells in the proposed lease area would have negligible additive impacts to air quality and most GHG pollutants over the long term; however, they would account for a 13% increase in methane over current levels (Table 6). Pollutants from other sources would be as described in Alternative A (Section 3.4.4.4).

3.4.4.6 Alternatives C and D – Cumulative Impacts

Twenty-five wells in the proposed lease area would have negligible additive impacts to air quality and most GHG pollutants over the long term; however, they would account for a 15% increase in methane over current levels (Table 6). Pollutants from other sources would be as described in Alternative A (Section 3.4.4.4).

3.5 Water Resources

3.5.1 Affected Environment – Water Resources

Surface Hydrology and Water Quality

Surface water quality in the planning area is variable due to the highly erratic discharge and moderately to highly erosive nature of the geologic parent material and soils. Perennial streams retain water year-round and have variable flow regimes. Big Willow (0.8 miles) and Little Willow (5 miles) creeks, perennial streams in the proposed lease area, are not a directly associated with proposed lease parcels. Intermittent streams flow during the part of the year when they receive sufficient water from springs, ground water, or surface sources such as snowmelt or storm events. Ephemeral streams flow only in direct response to precipitation and snowmelt. Ephemeral and intermittent streams (approximately 22 miles) occur in the proposed lease area with 8.2 miles directly associated with federal mineral estate. The Bolton and Patton irrigation canals parallel the north side of Little Willow Creek and the McIntyre and Nelson canals parallel on the south side.

The National Wetland Inventory mapping identifies approximately 56 acres of wetland and riparian areas that are associated with perennial streams, canals, and ponds (Map 5). There are two springs and one seep associated with federal mineral estate. There are three ponds associated with federal mineral estate and seven other ponds in the proposed lease area. The ponds are fed by intermittent/ephemeral streams or irrigation runoff and are typically used as livestock water sources.

Big Willow Creek has an EPA approved temperature total maximum daily level (TMDL) that is not being met (IDEQ 2014). Little Willow Creek below Paddock Valley Reservoir was rated as Unassessed Waters (IDEQ 2014). In 2007, Little Willow Creek suspended sediment levels ranged from 10-165 mg/L. High levels (>30 mg/L) were associated with the irrigation season (May 1 – September 30) and IDEQ recommended a target of 22 mg/L during that period to support cold water aquatic beneficial uses.

There are 352 acres of 100-year floodplain associated with Little Willow and Big Willow creeks and an ephemeral drainage; however, only acre is associated with federal mineral estate.

The lease parcels are located within four hydrologic unit code (HUC) 6 watershed subbasins: Little Willow Creek (HUC 1705012208), Big Willow Creek (HUC 1705012207), Payette River-Snake River (HUC 1705012209), and Jacobsen Gulch – Snake River (HUC 1705011502) (Table 8). The acreage federal mineral reserve comprises between 0.06% (Payette River – Snake River) and 6.2% (Little Willow Creek) of each watershed.

Table 8. Acres and percentage of Level 6 HUC watersheds associated with federal mineral estate and Little Willow Creek lease area, Payette County, Idaho.

Watershed		**Federal Mineral Reserve**		**Total Lease Area**	
Name	**Acres**	**Acres**	**% Watershed**	**Acres**	**% Watershed**
Little Willow Creek	98,464	6,094	6.2	14,182	14.4
Big Willow Creek	98,919	84	0.08	694	0.7
Payette River – Snake River	177,466	106	0.06	629	0.4
Jacobsen Gulch – Snake River	91,054	67	0.07	139	0.2

Ground Water

The quality and availability of ground water varies greatly across Idaho. Residents in Payette County commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials, typically sand and gravel deposits. Alluvial aquifers occur in terrace deposits and within the floodplains, and along the channels of larger streams, tributaries, and rivers, and are important sources of ground water. Based on 41 wells in the lease area authorized by IDWR, typical domestic supply wells in the area are between 37-405 feet deep with standing water occurring at 5-330 feet and production occurring between 7-533 feet. Well water is typically used for domestic, livestock, and irrigation purposes.

Nitrate is present in shallow ground water beneath the Payette Valley at concentrations that occasionally exceed the drinking water standard of 10 milligrams per liter (mg/L; IDEQ 2012). Arsenic has been detected in exceedance of the drinking water standard of 0.010 mg/L. Fluoride has been detected occasionally at concentrations that exceed the drinking water standard of 4 mg/L, and dissolved iron and manganese have exceeded the secondary standards of 0.3 mg/L and 0.05 mg/L, respectively.

3.5.2 Environmental Consequences – Water Resources

Impacts to water resources are based on the RFDS created for this document (Table 2, Appendix 1).

3.5.2.1 General Discussion of Impacts

Surface Hydrology and Water Quality

The magnitude of the impacts to water resources would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. Surface disturbance effects typically are localized, short-term, and occur from implementation through

vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on water resources.

Oil and gas exploration and development could cause the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed, 100-year floodplains of non-major streams, and non-riparian, ephemeral waterbodies. The potential effects from these activities could be accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential can be further increased in the long term by soil compaction and low permeability surfacing (e.g. roads and well pads) which increases the energy and amount of overland flow and decreases infiltration, which in turn changes flow characteristics, reduces ground water recharge, and increases sedimentation and erosion.

Water withdrawals for drilling operations would lead to reduced aquifer water levels, reduced streamflow, and impacts to some water quality parameters associated with stream flow. These impacts to water quality may include increased water temperature, decreased concentrations of dissolved oxygen, and increases in other parameters such as salinity levels, sodium adsorption ratio, and introduction of drilling pollutants (e.g., organic acids, alkalis, diesel oil, crankcase oils, hydrochloric and hydrofluoric acids, chloride, sodium, calcium, magnesium, potassium, polycyclic aromatic hydrocarbons, lead, arsenic, barium, antimony, sulfur, zinc, and naturally occurring radioactive materials) (TEEIC 2014). Ground water removal would result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. Typically produced water from conventional oil and gas wells is from a depth below useable aquifers.

Ground Water

Spills, drilling fluids, fracking fluids, or produced fluids could potentially impact surface and ground water resources over the long term. Drilling in the proposed lease area would most likely pass through useable ground water. Potential impacts to ground water resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, failed cement, surface spills, and/or the loss of drilling, completion, and hydraulic fracturing fluids into groundwater. It is possible for chemical additives used in drilling activities to be introduced into ground water producing formations without proper casing and cementing of the well bore. Concentrations of these additives also vary considerably and are not always known because different mixtures can be used for different purposes in gas development and even in the same well bore. Changes in porosity or other properties of the rock being drilled can result in the loss of drilling fluids. When this occurs, drilling fluids can be introduced into ground water in the absence of proper cementing and casing. Site specific conditions and drilling practices determine the probability of this occurrence and determine the ground water resources that could be impacted. Some or all of the produced water from these leases is likely to be injected in wells for disposal. Improper construction and management of reserve and evaporation pits could degrade ground water quality through leakage and leaching.

The potential for adverse ground water impacts caused from hydraulic fracturing are currently

being investigated by the EPA. Currently, water use to drill one well ranges between 1 and 6 million gallons. In fracturing a well, companies have estimated that generally they use a ratio of 0.5% hydraulic chemical fluid mix to 1.5 million gallons of water. That translates to a minimum of 5,000 gallons of chemicals into one well for every 1.5 million gallons of water used to fracture a well. In addition to changing the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore; hydraulic fracturing can also introduce chemical additives into the producing formations. Production zones generally do not contain fresh water. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. These additives are not always used in these drilling activities and some are likely to be benign such as bentonite clay and sand. Concentrations of these additives also vary considerably because different mixtures can be used for different purposes in oil and gas development and even in the same well bore. If contamination of aquifers from any source occurs, changes in ground water quality could impact springs and residential wells that are sourced from the affected aquifers.

If contamination of freshwater aquifers from oil and gas development occurs, changes in ground water quality could impact springs and residential wells if these springs and residential wells are sourced from the same aquifers that have been affected. Direct impacts to surface water would likely be greatest shortly after the start of construction activities and would likely decrease in time due to natural stabilization, and reclamation efforts. Ground water impacts would be less evident and occur on a longer time scale. Construction activities would occur over a relatively short period (commonly less than a month); however, natural stabilization of the soil can sometimes takes years to establish to the degree that would adequately prevent accelerated erosion caused by compaction and removal of vegetation. Spills or produced fluids (e.g., saltwater, oil, fracking chemicals, and/or condensate in the event of a breech, overflow, or spill from storage tanks) could result in contamination of the soil onsite, or offsite, and may potentially impact surface and ground water resources in the long term.

Not all wells resulting from an APD would employ fracturing, and water consumption would be temporary. Oil and gas wells are cased and cemented at a depth below all usable water zones; consequently impacts to water quality at springs and residential wells are not expected. However, faulty cementing or well casing could result in methane migration to upper zones. Should hydrocarbon or associated chemicals for oil and gas development in excess of EPA/IDEQ standards for minimum concentration levels migrate into culinary water supply wells, springs, or systems, it could result in these water sources becoming non-potable.

For federal mineral estate wells, Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones. For State-regulated wells, IDAPA 20.07.02 provides similar requirements from initial drilling to plugging. Authorization of exploration and production activities would require full compliance with local, state, and federal directives and stipulations that relate to surface and ground water protection.

3.5.2.2 Alternative A

Surface Hydrology and Water Quality

Not leasing 6,349 acres would limit surface disturbance in those areas. Vegetation and soil conditions would be maintained over the long term minimizing sediment input to waterbodies from 6% of the Little Willow Creek watershed and negligible (0.2%) portions of other watersheds (Table 8). Development of two wells and associated infrastructure (7 acres of disturbance) would have negligible (~0.001% of Little Willow Creek watershed) direct impacts to surface hydrology. Negligible (>0.25 miles from stream) to moderate (<200 feet from stream) short-term sediment inputs could occur to Little Willow Creek until vegetation reestablishment occurs. Produced water and pollutants carried by natural events would cause adverse water quality impacts where pollutants reach Little Willow Creek. The longevity and severity of the impacts would depend on the type of pollutant. Ground water depletion could adversely affect Little Willow Creek.

Ground Water

Direct development and production ground water impacts would not occur on 6,349 acres. Development of two wells could have negligible (well casings are effectively implemented) to major (persistent, toxic pollutants are introduced) adverse effects to ground water quality in the Little Willow Creek drainage. Up to 15 domestic and agricultural wells in the immediate vicinity and downstream could be affected.

3.5.2.3 Alternative B

Surface Hydrology and Water Quality

Leasing 6,349 acres with NSO and NSSO stipulations would limit surface disturbance in those areas. Vegetation and soil conditions would be maintained over the long term minimizing sediment input to waterbodies from 6% of the Little Willow Creek watershed and negligible (0.2%) portions of other watersheds (Table 8). Development of 22 wells and associated infrastructure (77 acres of disturbance) would have negligible to minor direct impacts to surface hydrology, primarily where roads collect and convey water rather than allowing infiltration. Impacts from sediment inputs would be similar to Alternative A (Section 3.5.2.2); however, four additional wells could be drilled near Little Willow and Big Willow creeks. Produced water and pollutant impacts could affect Little Willow and Big Willow creeks. Four additional wells would increase the probability of adverse water quality and ground water depletion impacts.

Ground Water

Direct development and production ground water impacts would not occur on 6,349 acres. Development of 22 wells could have negligible (well casings are effectively implemented) to major (persistent, toxic pollutants are introduced) adverse effects to ground water quality in the Little Willow and Big Willow drainages; however, the number of wells could increase the probability of a pollution event. Up to 54 domestic and agricultural wells in the immediate vicinity and downstream could be affected.

3.5.2.4 Alternative C

Surface Hydrology and Water Quality

Leasing 6,349 acres with CSU stipulations would limit surface disturbance in those areas. Vegetation and soil conditions would be maintained over the long term minimizing sediment input to waterbodies from 6% of the Little Willow Creek watershed and negligible (0.2%) portions of other watersheds (Table 8). Development of 25 wells and associated infrastructure (88 acres of disturbance) would have similar hydrology and sediment impacts to Alternative B (Section 3.5.2.3); however, 500 foot CSU buffers from waterbodies would help limit sediment inputs (Map 5). Fewer surface occupancy restrictions would allow wells to be placed further from streams relative to Alternative B. Produced water and pollutant impacts could affect Little Willow and Big Willow creeks; however, CSU buffers would reduce the probability of pollutants reaching waterbodies.

Ground Water

Direct development and production ground water impacts could occur on <6,162 acres. Development of 25 wells could have similar impacts to those described in Alternative B (Section 3.5.2.3); however, the probability of a pollution event could be slightly greater.

3.5.3 Mitigation

Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, and expedite rapid reclamation (including interim reclamation) would maintain surface hydrology processes and water quality. Methods to reduce erosion and sedimentation could include: reducing surface disturbance acres; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around waterbodies and floodplains could reduce sedimentation and maintain water quality. Lining ponds would minimize seepage of potentially toxic chemicals into ground water. Closing and rehabilitating ponds promptly, when no longer functional or needed, would exposure to toxic substances. Appropriate well completion, the use of Spill Prevention Plans, and Underground Injection Control (UIC) regulations would mitigate ground water impacts. Site-specific mitigation and reclamation measures would be described in the COAs.

Known water bearing zones in the lease area are protected by drilling requirements and, with proper practices, contamination of ground water resources would be unlikely (IOGCC 2013b; IDAPA 20.07.02). Casing along with cement would be extended well beyond fresh-water zones to insure that drilling fluids remain within the well bore and do not enter ground water. Potential impacts to ground water at site specific locations are analyzed through the NEPA review process at the development stage when the APD is submitted. This process includes geologic and engineering reviews and onsite oversight to ensure that cementing and casing programs are adequate to protect all downhole resources. All water used would have to comply with State water rights regulations and a source of water would need to be secured by industry that would not harm senior water rights holders.

3.5.4 Cumulative Impacts – Water Resources

Cumulative impacts to water resources are based on the RFDS created for this document (Appendix 1), RFDS for Hamilton and Willow fields, and the actions discussed below.

3.5.4.1 Scope of Analysis

The 65,700-acre CIAA includes portions of the Little Willow Creek, Big Willow Creek, and Payette River-Snake River (north of the Farmers Canal) Level 6 HUC watersheds downstream of the eastern boundary of the proposed lease area and the majority of the Payette Valley Flow System (Map 5). This represents an area that could potentially be affected by surface runoff and ground water pollutants. The analysis period covers the 10-year lease period; however, pollutants would be expected to travel at different rates in different systems. Surface pollutants could reach the downstream portion of the CIAA relatively quickly once they enter flowing waters. Conversely, ground water pollutants would likely take considerably longer to travel beyond the source.

3.5.4.2 Current Conditions and Effects of Past and Present Actions

Sagebrush and other shrubs (11,067 acres; 17% of CIAA), exotic annuals (13,716 acres; 21%), agriculture (35,404 acres; 54%), urban (2,271 acres; 3%), and perennial bunchgrass (2,452 acres; 4%) comprise the majority of cover types. Roads, ploughed fields and exotic annual cover provide the lowest degree of watershed protection. Watershed stability is at greatest risk where these cover types occur in moderate or highly erosive soils. Most agricultural lands are irrigated with surface (from canals) or ground water.

There are approximately 56.5 miles of perennial streams (Payette River, Little Willow and Big Willow creeks) and all are influenced by irrigation outtake and return flows. There are approximately 2,000 acres of wetland, riparian, and pond habitat. Stream and riparian conditions are similar to those described in Section 3.6.1. The 9,760 acres of floodway are primarily associated with the Payette River. There are 1,305 water wells, most occur south of the Payette River or northwest of the confluence of Little Willow Creek and the Payette River.

Potential pollutant sources include pesticides from agricultural and urban areas, chemicals from industrial and retail businesses, runoff from roadways, and 15 existing oil and gas wells. The amount of pollutants from these sources is unknown.

3.5.4.3 Reasonably Foreseeable Future Actions

At least 37 additional oil and gas wells could be drilled (1 well/640 acres in the portions of the Willow and Hamilton fields in the CIAA). Pollutants from development and production would be as described in Section 0. Wildfires, as described in other sections, would be expected to cause short-term increases in sediment inputs and watershed instability until vegetation cover is reestablished.

3.5.4.4 Alternative A – Cumulative Impacts

<u>Surface Hydrology and Water Quality</u>

Not leasing 6,349 acres (10% of the CIAA) would have negligible to minor additive benefits to surface hydrology and water quality. Wildfires, exotic annuals, and ploughed fields would potentially affect much larger areas. Rain events in these areas could result in minor to major sediment inputs to floodways and streams. Burned riparian areas would recover within five years, but upland areas would likely become dominated by exotic annuals and remain susceptible to erosion events. The extent of ground water withdrawal for irrigation is unknown. Irrigation water removal and return water pollutants (both agricultural and urban) would annually have moderate to major adverse water quality impacts to perennial streams. Development and production at up to 37 oil and gas wells would have negligible surface hydrology impacts, but could have negligible (no spills occur, spills are largely contained on site, or spills are non-pollutant materials) to major (spills affect domestic water supplies with toxic pollutants) adverse water quality impacts.

Ground Water

Not leasing 6,349 acres would have negligible additive ground water benefits. Agricultural activities (e.g., ground water pumping, pollution input from leaking wells) would have minor (seasonal reductions in water availability, pollution stays in immediate vicinity of well) to major (increased use of ground water during extended drought periods, pollutants migrate from well to domestic water supplies) adverse impacts to ground water availability and quality over the short and long term. Pollutants from industrial and urban sources could have minor to major short or long term adverse impact to ground water quality. Development and production at up to 37 oil and gas wells would have negligible (well casings are effectively implemented, ground water is not used to produce gas) to major (persistent, toxic pollutants are introduced; ground water is used to produce gas) adverse effects to ground water availability and quality.

3.5.4.5 Alternatives B and C – Cumulative Impacts

Surface Hydrology and Water Quality

Leasing 6,349 acres with some surface stipulations and development of 22-25 wells and associated infrastructure would have negligible to minor additive impacts to surface hydrology and increased sediment input. Minor to moderate additive water quality impacts from produced water and pollutants could occur. Impacts from other activities would be as described in Alternative A (Section 3.5.4.4).

Ground Water

Development and production at 22-25 wells would have negligible (well casings are effectively implemented) to major (persistent, toxic pollutants are introduced) adverse additive effects to ground water availability and quality. Impacts from other activities would be as described in Alternative A (Section 3.5.4.4).

3.6 Wildlife/Special Status Animals

3.6.1 Affected Environment – Wildlife/Special Status Animals

Habitats support a variety of special status wildlife including southern Idaho ground squirrel (SIDGS), a candidate species under the ESA, 14 other mammal species, 17 bird species, three amphibian species, and three reptile species (Appendix 4). Habitat conditions are described for

representative groups of animals (migratory birds, southern Idaho ground squirrels, big game, and amphibians/fish).

Vegetation composition has been shaped by physical site characteristics such as aspect, soils, precipitation, and disturbances (primarily wildland fire, livestock grazing, and agricultural development). Fires and long-term spring grazing have reduced the diversity and abundance of native perennial forbs and grasses, favoring exotic annuals. The resulting conditions (Section 3.2.1) generally provide poor quality habitat for most species. Shrub-dominated communities comprise 32% of cover, annual and perennial grasslands and agriculture characterize the remainder. Although these disturbances have occurred on all aspects, native vegetation is less resilient on the hotter, drier southerly aspects than the cooler, moister northerly aspects; therefore, southerly aspects are dominated by exotic grasses and northerly aspects are dominated by native vegetation. This has resulted in major habitat fragmentation. The proposed lease area has approximately 36.6 miles of roads and trails (1.5 miles/mi^2). Access to many roads is restricted by private landowners; therefore, the majority of roads have minor fragmentation and disturbance impacts.

Migratory Birds and Raptors

The analysis area encompasses over 15,000 acres; therefore, bird habitat will be analyzed at a landscape scale, where birds are typically affected on a population level (Paige and Ritter 1999). Because the area lacks contiguous sagebrush habitat and suitable cover of native perennial bunchgrasses and forbs, it does not support stable populations of sagebrush-obligate species such as greater sage-grouse. These sagebrush obligates require a large mosaic of big sagebrush cover types, inter-mixed with native bunchgrasses and forbs. Other sagebrush obligates including Brewer's sparrow, sage sparrow, and sage thrasher could be present during the spring and summer; however, these species are also sensitive to fragmented sagebrush habitats and they occur in low numbers.

Grassland associated species such as long-billed curlew, western meadowlark, vesper sparrow, and horned lark utilize short grassland habitat for nesting, breeding, and brood-rearing. Long-billed curlew populations have declined in nearby areas (i.e., Long-billed Curlew Habitat Area of Critical Environmental Concern 8-20 miles southeast of the lease area) primarily due to recreational activities and development. Between 1966 and 2012, vesper sparrow, western meadowlark, and horned lark populations in Idaho have also declined. Northern harrier, red-tailed hawk, ferruginous hawk, golden eagle, American kestrel, and turkey vulture are common birds of prey that hunt for insects, small mammals, birds, and carrion throughout the area, year-round or during annual migrations.

Riparian associated species including warblers, flycatchers, and sparrows utilize shrub and tree dominated habitat along Little Willow and Big Willow creeks for nesting, brood rearing, and foraging. Little Willow Creek provides marginal quality habitat that is substantially influenced by agricultural activities and is primarily characterized by herbaceous-dominated vegetation with scattered stands of cottonwood, willow, and Russian olive. Big Willow Creek provides good quality habitat that is characterized by a fairly contiguous cottonwood overstory with interspersed willow and herbaceous communities or understories.

Resident (e.g., golden eagle, red-tailed hawk, Cooper's hawk) and migratory (e.g., burrowing owl, short-eared owl, prairie falcon) birds use the area for nesting, brood rearing, foraging, and migration. Surveys for raptor nests have not occurred in or adjacent to the lease parcels. Although fires have degraded much of the habitat, it does provide suitable habitat for a variety of prey species including small mammals, song birds, reptiles, and insects.

Burrowing Mammals

Southern Idaho Ground Squirrel - Southern Idaho ground squirrels inhabit drainage bottoms and adjacent gradual slopes in small scattered populations, below approximately 3,200 feet elevation. Historically, SIDGS primarily occupied sandier soils that supported big sagebrush/bunchgrass/forb communities with antelope bitterbrush (Yensen 1991). In the absence of a reliable and nutritious diet provided by native grasses and forbs, SIDGS are subject to the highly variable productivity and nutritional value of exotic annuals. When annual precipitation is relatively low, poor productivity of exotic annuals may not provide enough nutritional sustenance to enable squirrels to store enough fat to survive their long over-wintering period (torpor). The availability of forbs plays a crucial role in the torpor persistence of juvenile male ground squirrels (Barrett 2005). Torpor begins in late June or early July when vegetation begins to dehydrate and desiccate, and lasts until late January or early February when squirrels emerge from their burrows.

Currently, SIDGS habitat is dominated by exotic annuals and provides limited sagebrush cover with perennial herbaceous understories needed to support a stable squirrel population; medusahead is common throughout the area, especially on south aspects, and is indigestible for SIDGS due to its high silica content. The majority of known SIDGS colonies occur on adjacent private lands (IDFG 2013). There is a paucity of SIDGS monitoring data for the area, but it is likely that SIDGS utilize habitat on the northerly aspects of public land to some degree, as these areas tend to support more native vegetation.

Pygmy Rabbit - The pygmy rabbit is the smallest North American rabbit species (USFWS 2010). On September 30, 2010, the USFWS concluded that the pygmy rabbit does not currently warrant listing under the ESA (USFWS 2010). This species is typically found in areas of tall, dense sagebrush cover and are considered a sagebrush-obligate species because they are highly dependent on sagebrush to provide both food and shelter throughout the year (Green and Flinders 1980; Katzner and Parker 1997). Pygmy rabbits have been found from 2,900 feet to over 6,000 feet in elevation in southwestern Idaho. Although low sagebrush density and prevalence of cheatgrass provides marginal habitat, pygmy rabbits have been observed in the proposed lease area.

Big Game

The area provides limited winter habitat for antelope and mule deer as south slopes are typically dominated by annual grasses and do not support adequate shrub cover. Mule deer inhabiting the area are part of the Weiser-McCall Population Management Unit (IDFG 2010b). Deer winter range has been adversely impacted by wildfire, as fire has reduced the abundance of important shrub species such as bitterbrush and sagebrush that deer depend on for food and thermal cover during the winter. The spread of noxious weeds also poses a threat to mule deer winter range.

The area may provide marginally better elk winter range because of their grass species dietary preferences even during winter. Elk inhabiting the area are part of the Weiser River Zone delineated by the Idaho Department of Fish and Game (IDFG). Threats to elk winter range habitat include noxious weed invasion such as yellow starthistle and whitetop (IDFG 2010a). Big game may avoid the area during late summer, fall, and winter due to lack of shrub cover on southerly slopes, reduced abundance of perennial grasses and forbs, and off-highway vehicle (OHV) activity. The proposed lease area occurs on the western edge of identified winter range and is characterized by regular human disturbance associated with low density rural residences and associated agricultural activities. Approximately 77% of the proposed lease area and 94% of lands associated with federal mineral reserves are considered big game winter range (Map 6).

Aquatic Species

Perennial and intermittent water sources provide breeding and brood-rearing habitat for a variety of amphibian, reptile, and fish species. Degraded water quality (e.g., increased temperature levels, sediment loads, and agricultural pollutants) and irrigation dewatering, especially in Little Willow Creek, may limit the suitability or productivity for some species. Adjacent uplands provide important foraging areas for amphibians and reptiles. Some species (e.g., western toad) may move up to 3.9 miles (1.2 miles on average) from breeding areas and occupy areas away from water sources (Bull 2006).

Bats

Up to 11 special status bat species could occur in the area. The species rely on natural (e.g., tress, cliffs, and caves) or manmade (e.g., buildings) structures for roosting and hibernating. They are typically nocturnal insect foragers in a variety of habitats including forest, shrub, grass, or agriculture dominated areas. Little brown bats typically forage up to 0.6 miles from a roost area; however, ranges diminish to predominantly 0.1 miles in July when females are lactating and insect densities are high (Henry et. al. 2002).

3.6.2 Environmental Consequences – Wildlife/Special Status Animals

Impacts to wildlife are based on the RFDS created for this document (Table 2, Appendix 1).

3.6.2.1 General Discussion of Impacts

The use of standard lease terms and stipulations could minimize, but not preclude impacts to wildlife. Oil and gas development which results in surface disturbance could directly and indirectly impact aquatic and terrestrial wildlife species. The scale, location, and pace of development, combined with implementation of mitigation measures and the specific tolerance of the species to human disturbance all influence the severity of impacts to wildlife species and habitats.

Direct impacts would include disturbance or interruption of activities, vehicle collisions, powerline collisions and electrocutions, nest abandonment, habitat avoidance, displacement of wildlife species resulting from human presence and increased predation. Disturbances (e.g., natural gas development activities, OHV use) can adversely affect songbird habitat use (Ingelfinger 2001; Barton and Holmes 2007). The impacts were greatest within 330 feet of high

traffic volume roads where ≤60% population reductions occurred even when traffic volumes were less than 12 vehicles/day. Noise and human activities can disrupt key activities such as breeding displays, brooding, and foraging. Road mortality can be influenced by travel speed, species abundance, species susceptibility, coincidence of vehicle and animal activity, and proximity to key habitats. Hawks and owls are more susceptible to electrocution especially where wingspans are wider than the line spacing, whereas quail, pheasants, ducks, and songbirds are more susceptible to collision hazards (Bevanger 1998).

Indirect impacts would include loss or reduction in suitability of habitat, improved habitat for undesirable (non-native) competitors, species or community shift to species or communities more tolerant of disturbances, barriers to species migration and dispersal, and habitat fragmentation. Increases in invasive and noxious weed species that displace native plant species would adversely affect habitat structure and quality, reducing habitat suitability for most species while favoring species that tolerate poor habitat quality.

Migratory Birds and Raptors

Construction and development activities can effect migratory bird's nesting season from as early as February 15; however, activity from March 15th through August 15th poses the greatest impact to migratory birds by disrupting breeding behavior and breeding success. Nest occupancy for some species (e.g., golden eagle and ferruginous hawk) may not be affected during the production phase (Wallace 2014). Response to disturbances during winter, when birds are stressed by environmental conditions could adversely affect survivability. During the winter, 97% of raptors flushed when humans on foot were within 385 feet and 38% flushed when vehicles were within 245 feet (Holmes et. al. 1993). Take of bald and golden eagles or any other migratory species would not be anticipated; however, take may occur indirectly as a result of vehicle collisions and other related actions associated with development.

Burrowing Mammals

Construction of well pads and roads could directly eliminate habitat. Vehicle traffic and increased raptor perch sites associated with powerlines and other infrastructure would increase mortality. Reduced habitat quality (e.g., increases in invasive annuals and noxious weeds) and increased fragmentation would adversely affect SIDGS annual body condition, survival rates, and population viability (Barrett 2005) and pygmy rabbit diet quality and cover (Larrucea and Brussard 2008).

Big Game

Well pad and road construction would reduce available habitat. Roads and associated disturbances would reduce suitability of adjacent habitat. Mule deer avoided areas when development was initiated and did not become acclimated to activities as time passed; instead, avoidance distances increased as development progressed (Sawyer et. al. 2006). The distance animals were displaced increased from 1.7 to 2.3 miles away from well pads during the first three years of development. Mule deer densities decreased 46% in the developed area over a four year period. Animals forced to winter at higher elevations with increased snow levels would have reduced survival rates. Habitat loss and fragmentation were better predictors of antelope winter habitat use than distance to well pads and roads (Beckman et. al. 2008).

Aquatic Species
Noise and lights from development activities could disrupt breeding behavior annually. Road mortality would affect species that spend part of their life cycle in terrestrial habitats (Carr 2002). Pollutants discharged into aquatic systems could cause behavioral changes, mutations, or mortality at all life stages (Lefcort et. al. 1998).

Bats
Lights and noise associated with human activities could cause short-term disruptions in foraging behavior and success. Persistent disturbances near roost sites could cause avoidance or abandonment. Bat responses to disturbances vary by species, and some species (e.g., big brown bat) may be more tolerant than others (Duchamp et. al. 2004). Infrastructure (e.g., powerlines) could cause increased collision mortality. Actions that reduce insect productivity (e.g., reduced habitat quality, pollutants) would reduce available prey.

3.6.2.2 Alternative A

Migratory Birds and Raptors
Development of two wells and associated infrastructure would have minor adverse short- and long-term disturbance, mortality, and habitat quality reduction impacts. An additional 0.5 miles of roads would cause a negligible increase in fragmentation and disturbance. Low levels of localized disturbance would occur throughout the year over the long term. Up to 7 acres of habitat would be directly eliminated and use would be reduced on 70 acres because of disturbance.

Burrowing Mammals
Development of two wells and associated infrastructure would have minor adverse short- and long-term mortality and habitat quality reduction impacts. An additional 0.5 miles of roads and powerlines would cause a minor increase in SIDGS mortality. Up to 7 acres of habitat would be directly eliminated. Depending on the location of roads and well pads, impacts to pygmy rabbits could be negligible (development >0.35 miles from sagebrush) to major (development in an occupied sagebrush stand).

Big Game
Depending on their location and animal responses, development of two wells and associated infrastructure would have minor (wells adjacent to existing disturbances that animals have become habituated to) to major (at least one well on the east side of the lease area that effectively keeps animals from using the remainder of the lease area) disturbance impacts. Changes in habitat fragmentation (beyond the disturbance component) and habitat quality would have minor adverse long-term impacts.

Aquatic Species
Depending on their location, development of two wells and associated infrastructure would have negligible (>0.5 miles from wetland/riparian habitat with no possibility of pollution input) to moderate (<0.1 miles from wetland/riparian habitat with potential pollution input) disturbance and pollutant impacts.

Bats
Development of two wells and associated infrastructure would have negligible (located >0.75 miles from roost sites) to minor (located <0.5 miles from roost sites) adverse short- and long-term disturbance, mortality, and prey reduction impacts.

3.6.2.3 Alternative B

No direct habitat loss (77 acres of well pads and roads) would occur on the 6,349 acre federal mineral estate until the FRMP was implemented; however, loss could occur in adjacent areas that are developed prior to FRMP implementation. Stipulations derived from the FRMP could help mitigate impacts described below.

Migratory Birds and Raptors
Development of 22 wells and associated infrastructure would have moderate to major adverse short- and long-term disturbance, mortality, and habitat quality reduction impacts. An additional 5.5 miles of roads would cause a major increase in fragmentation and disturbance because regular activity would occur in most of the proposed lease area. Moderate levels of disturbance would occur throughout the year and lease area over the long term. Up to 77 acres of habitat would be directly eliminated and use would be reduced on 770 acres because of disturbance.

Burrowing Mammals
Development of 22 wells and associated infrastructure would have moderate to major adverse short- and long-term mortality and habitat quality reduction impacts. An additional 5.5 miles of roads and powerlines would cause minor to moderate increases in SIDGS mortality. Up to 77 acres of habitat could be directly eliminated. Habitat quality changes would adversely affect both species; however, impacts to pygmy rabbits would be greater because of their year-round activity patterns. Depending on the location of roads and well pads, impacts to pygmy rabbits could be negligible (development >0.35 miles from sagebrush) to major (development in an occupied sagebrush stand).

Big Game
Development of 22 wells and associated infrastructure would have moderate to major adverse short- and long-term disturbance, habitat fragmentation, and habitat quality reduction impacts. Road densities would increase to 1.7 miles/mi^2, but vehicle traffic throughout the area would increase substantially, especially during the development phase. Existing unmaintained roads would be upgraded and become potentially more accessible throughout the year and to a greater number of users, increasing disturbance and fragmentation. Access restrictions by private landowner could limit disturbances to development and production activities. The activities would make the area unsuitable winter range for animals that do not become habituated to higher disturbance levels. Increases in invasive and noxious weed species would further degrade habitat; however, improved access that helps fire suppression efforts could reduce fire size and associated habitat loss.

Aquatic Species

Development of 22 wells and associated roads would have minor to moderate adverse short- and long-term disturbance, mortality, and pollutant impacts. Ponds and streams downslope from well pads would be most susceptible to surface-flow pollutant impacts. Contaminated ground water that connects to streams could have negligible (short-term, non-toxic pollutants) to major (persistent toxicant introduced) adverse impacts on up to 5.8 miles of perennial streams in the proposed lease area and potentially downstream areas.

Bats

Development of 22 wells and associated infrastructure would have minor (disturbance located >0.75 miles from roost sites) to moderate (located <0.5 miles from roost sites) adverse short- and long-term disturbance, mortality, and prey reduction impacts. Disturbance tolerant species would be less affected than intolerant species. Reduced insect production associated with decreased habitat quality would adversely affect all species over the long term.

3.6.2.4 Alternative C

Migratory Birds and Raptors

Development of 25 wells and associated infrastructure would have similar disturbance, mortality, and habitat quality reduction impacts as described in Alternative B (Section 3.6.2.3). An additional 6.8 miles of roads would cause a major increase in fragmentation because roads would occur throughout the lease area. Up to 88 acres of habitat would be directly eliminated and use would be reduced on 875 acres because of disturbance. Winter and spring surface use restrictions would reduce or eliminate lessee-related disturbance and mortality impacts during critical periods; however, increased access by non-lessee users could offset those benefits. No surface occupancy within 0.5 miles of heron rookeries would minimize lessee-related disturbances and habitat impacts.

Burrowing Mammals

Development of 25 wells and associated infrastructure would have moderate adverse short- and long-term mortality and habitat quality reduction impacts. An additional 6.8 miles of roads and powerlines would cause minor to moderate increases in SIDGS mortality. Avoidance of burrow sites would eliminate direct impacts to those important areas, but up to 88 acres of foraging habitat could be eliminated and infrastructure that increases disturbance and raptor perch sites could adversely affect adjacent burrow sites. Habitat quality change impacts would be as described in Alternative B (Section 3.6.2.3). Controlled surface use restrictions would benefit burrowing mammals that occur in restricted areas by reducing (winter and spring restrictions that coincide with critical periods of pygmy rabbits) or eliminating (spring restrictions that coincide with SIDGS active periods) lessee-related disturbances.

Big Game

Development of 25 wells and associated infrastructure would have moderate to major adverse short- and long-term disturbance, habitat fragmentation, and habitat quality reduction impacts. Road densities would increase to 1.8 miles/mi^2, but controlled surface use restrictions would reduce or eliminate lessee-related disturbances during the winter. Other road-related and habitat quality impacts would be as described in Alternative B (Section 3.6.2.3). Overall winter range

suitability could be similar to Alternative B or slightly improved depending on how animals respond to infrastructure and wells despite surface use restrictions.

Aquatic Species

Surface occupancy and pollutant restrictions would minimize or eliminate development and production related disturbance, mortality, and pollutant impacts to key aquatic habitat. Development of 25 wells and associated roads would have minor to moderate adverse short- and long-term disturbance and mortality impacts to species that utilize areas >500 feet from riparian habitats.

Bats

Development of 25 wells and associated infrastructure would have similar disturbance, mortality, and prey reduction impacts described in Alternative B (Section 3.6.2.3). Spring controlled surface use restrictions and riparian habitat buffers would benefit bats by reducing or eliminating activities in important foraging and roosting areas.

3.6.3 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to terrestrial and aquatic species from exploration and development activities. Lease stipulations to mitigate impacts on wildlife would be placed on leases for crucial winter range (timing limitation), migratory birds and raptors (controlled surface use), burrowing mammals (lease notice), Endangered Species Act (Section 7 Consultation), and fragile soils (lease notice) stipulations which would protect additional habitat. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project could be subject to additional mitigative COAs. Mitigation could include rapid revegetation, project relocation (<660 feet), or pre-disturbance wildlife species surveying. If oil and gas development is proposed in suitable habitat for threatened or endangered species, consultation with the USFWS would occur to determine if additional terms and conditions would need to be applied. Adherence to Avian Powerline Interaction Committee (APLIC) guidelines could help reduce or eliminate electrocution mortality.

The following operational measures would help reduce wildlife impacts. If drilling operations require evaporation ponds, cover ponds with nets to exclude migratory birds. Ponds should be checked frequently (daily) for trapped wildlife. Report trapped wildlife (live and dead) to BLM, FWS, and IDFG no later than 24 hours of initial discovery. Lighting at sites should be directed specifically to where needed to minimize potential impacts to wildlife and turned off when not in use. To minimize predators or nuisance wildlife at work sites, place an appropriately sized dumpster with lid at each site during construction activities and check/dump as needed. Prohibit workers from bringing dogs to well sites during drilling and site maintenance actions to avoid predation/harassment of wildlife. Enforce speed limits of 25 MPH on spur roads and well pads to reduce wildlife collision risk.

3.6.4 Cumulative Impacts - Wildlife/Special Status Animals

Cumulative impacts to wildlife are based on the RFDS created for this document (Appendix 1) and the actions discussed below.

3.6.4.1 Scope of Analysis

The 81,518-acre CIAA (13% BLM, 4% State, and 83% private) includes a 3-mile buffer around the proposed lease area and north of the Payette River (Map 6). This area was selected because it corresponds to typical foraging or dispersal movements or disturbance response distances for a variety of species. The lease period of 10 years will be used for the temporal analysis limit because most disturbance impacts are associated with lease activities and site reclamation would address some longer term impacts such as habitat quality and fragmentation.

3.6.4.2 Current Conditions and Effects of Past and Present Actions

The CIAA supports the same species described above. Migratory birds and raptors are common throughout the area. Pygmy rabbits are uncommon and SIDGS are present throughout most of the area. About 60% of the area, primarily in the north and east, is considered big game winter range. Approximately 36 miles of perennial streams and river provide marginal to suitable habitat for aquatic species.

Vegetative Cover and Habitat Conditions – Sagebrush and other shrubs (26,809 acres; 33% of CIAA), exotic annuals (29,807 acres; 37%), agriculture/urban (16,531 acres; 20%), and perennial bunchgrass (7,936 acres; 10%) comprise the majority of cover types. Sagebrush understory conditions vary by slope and aspect, with steeper and north facing slopes generally having a more intact native understory than gentler and south facing slopes. Approximately 79% of the area has burned one or more times, with most of the fires occurring during the 1980s. Where shrubs have become re-established in areas burned prior to 1990, exotic annuals are dominant or co-dominant in the understory. Conditions on the Little Willow (14 miles) and Big Willow (11.8 miles) creeks are similar to those described above. The Payette River (9.8 miles) is characterized by cottonwood and willow overstories with shrub and herbaceous understories.

Disturbance – The CIAA is characterized by low density rural development. Disturbance factors include agricultural activities, OHV use, hunting, and other recreational uses. Nonresident access is restricted in much of the CIAA by private landowners. Recreational use is greatest during the spring and fall.

Roads – There are approximately 197 miles of roads (1.5 miles/mi^2) including 9.3 miles of highway, 45 miles of maintained roads, and 142.7 miles of unmaintained roads. The majority of maintained roads are associated with developed areas on Little Willow and Big Willow creeks or the Payette River. There are 9 miles of designated trails east of the Big Willow and Stone Quarry roads junction. Within big game winter range, approximately 1,172 acres are designated as closed to motorized vehicles, 127 acres are designated as open, and the remainder are designated limited to existing roads.

Powerlines - The CIAA includes two transmission lines (26.5 miles) and numerous distribution lines (74.7 miles). Transmission lines are built to APLIC standards; however, most distribution lines are not. Therefore, both types represent collision hazards, but only the distribution lines represent electrocution hazards. The majority of distribution lines are within 0.3 miles of Little Willow and Big Willow creeks or the Payette River.

Livestock Grazing – The CIAA includes all or portions of 10 BLM-administered livestock grazing allotments (32,550 acres; 40% of CIAA). The allotments are used primarily during the spring, with some season long (e.g., Kauffman) or winter (e.g., Sand Hollow) use occurring. Undeveloped private lands outside BLM allotments and agricultural fields (fall-winter) are also used for grazing.

3.6.4.3 Reasonably Foreseeable Future Actions

Oil and Gas Lease Development and Production – There are 11 existing or planned wells (Map 1, IOGCC 2014). There are approximately 4,960 acres of State-managed mineral resources, some of which have been leased, but drilling has not been initiated. Exploration is currently being conducted in the eastern two-thirds of the CIAA. Approximately 15 wells could be drilled in the Willow Field between the Payette River and the proposed lease area.

Agricultural/Residential Development – Development causes a direct loss of wildlife habitat and activities associated with the developed areas can cause disturbance over the long term. Limited residential development would occur on the western boundary of the CIAA. Negligible increases in agricultural development would be expected because of limited water resources. If water resources decline, some fields could go fallow, creating marginal wildlife habitat. New development would require additional powerlines and other infrastructure.

Recreation Uses – Off-highway vehicle use would be expected to remain static (e.g., increased access restrictions imposed by private landowners) or increase (e.g., in response to increasing populations) over time. Approximately 384 acres along the Payette River are managed by the IDFG in the Payette River Wildlife Management Area to benefit wildlife and sportsmen.

Wildfire – Although not planned events, wildfires would be expected to periodically occur and may increase in size and frequency in response to climate change. Loss of shrubs and increased dominance of exotic annuals in burned areas would reduce habitat structure and quality over the short term. Adverse effects would persist over the long term where native perennials don't re-establish.

3.6.4.4 Alternative A – Cumulative Impacts

Two additional wells and associated infrastructure would have negligible additive disturbance, mortality, habitat quality reduction, and fragmentation impacts over the short and long term. Ongoing activities and existing roads and powerlines would cause minor (away from developed areas) to moderate (adjacent to developed areas along Little Willow and Big Willow creeks) disturbance and mortality impacts throughout the CIAA. Livestock grazing, especially in consistent spring use areas, would favor exotic annuals and early seral native and non-native species throughout undeveloped portions of the CIAA. Development and production activities of at least 26 wells would have moderate disturbance, mortality, and fragmentation impacts over the short and long term on approximately 20% of the CIAA. The majority of wells would be within 0.5 miles of perennial streams, but only nine wells would be within 1.5 miles of big game winter range. Additional agricultural and residential development would have minor disturbance, habitat loss, and fragmentation impacts over the long term. Depending on size,

wildfires would have minor to major long-term adverse impacts on habitat quality and fragmentation.

3.6.4.5 Alternatives B and C – Cumulative Impacts

Development and production activities at 22 to 25 wells in the proposed lease area would have moderate additive disturbance, mortality, habitat quality reduction, and fragmentation impacts over the short and long term. Timing and other restrictions in Alternative C wells would help reduce spatial and temporal overlap with other disturbances (e.g., other oil and gas development, recreation use) and habitat quality and fragmentation impacts. Impacts from ongoing and foreseeable future actions would be as described in Alternative A (Section 3.6.4.4).

3.7 Cultural Resources

3.7.1 Affected Environment – Cultural Resources

The BLM is responsible for identifying, protecting, managing, and enhancing cultural resources which are located on public lands, or that may be affected by BLM undertakings on non-Federal lands, in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. The procedures for compliance with the NHPA are outlined in regulation under 36 CFR 800. Cultural resources include archaeological, historic, and architectural properties, as well as traditional life-way values and/or traditional cultural properties important to Native American groups.

Common prehistoric archaeological site types in Payette County include rock art, artifact scatters, burials, and tool manufacture. Common historic archaeological sites are the remains of farmsteads, homesteads, depressions, artifact scatters, foundations, cabins, sheepherder camps, and historic inscriptions.

A literature search (Level I or Class I) of Idaho State Historic Preservation Office records and a 2001 Class III survey (498 acres associated with Idaho Power right-of-way) identified 11 sites within a one-mile search radius. Records were reviewed to determine what types and numbers of known cultural resources are present within or adjacent to the lease area. Seven sites are prehistoric, three sites are historic, and one site includes prehistoric and historic artifacts. None of the sites were considered eligible for listing on the National Register of Historic Places (NRHP).

3.7.2 Environmental Consequences – Cultural Resources

Impacts to cultural resources are based on the RFDS created for this document (Table 2, Appendix 1).

3.7.2.1 General Discussion of Impacts

Ground disturbing activities could alter the characteristics of an eligible property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Other effects to cultural resources from surface disturbance activities include the destruction, damage, or alteration to all or part of the cultural resource and diminishing the

property's significant historic features as a result of the introduction of visual, atmospheric, or audible elements. Activities that adversely affect adjacent vegetation conditions and soil stability could increase erosion that would degrade or destroy site context.

3.7.2.2 Alternative A

Development of two wells and associated infrastructure could adversely affect cultural resources on private lands.

3.7.2.3 Alternative B

Leasing with a NSO stipulation would preclude ground disturbing impacts to cultural resources on 6,349 acres. Changes in vegetation condition and erosion could have negligible long-term impacts for eligible properties adjacent to ground disturbing activities.

3.7.2.4 Alternative C

Compliance with Cultural Resources S-2 would ensure that no sites would be disturbed or destroyed before they are inventoried and evaluated for eligibility for listing in the NRHP. Historic and archeological sites that are eligible for listing in the National Register of Historic Places or potentially eligible to be listed would either be avoided or have the information in the sites extracted through archeological data recovery prior to surface disturbance.

3.7.3 Mitigation

Specific mitigation measures including site avoidance, excavation, or data recovery would have to be determined when site-specific development proposals are received. Most surface-disturbing situations for cultural resources would be avoided by project redesign or relocation. Unavoidable, significant properties would be site-specifically mitigated with concurrence with the State Historic Preservation Office prior to implementation of a project.

3.7.4 Cumulative Impacts – Cultural Resources

Because the alternatives would cause none to negligible impacts to cultural resources, cumulative impacts will not be discussed.

3.8 Recreation

3.8.1 Affected Environment – Recreation

BLM only manages recreational opportunities and experiences on BLM-administered surface lands. Recreational activities enjoyed by the public on BLM lands in the proposed lease area include hunting, hiking, and OHV activities. Benefits and experiences enjoyed by recreational users include opportunities for solitude, spending time with families, enhancing leisure time, improving sports skills, enjoying nature, and enjoying physical exercise. The 997 acres of BLM-administered lands proposed for lease have limited legal public access (i.e., no public easements or rights-of-way across private property). The lack of public access limits use of the BLM parcels for recreational use by the general public. None of the BLM-administered lands occur in special recreation management areas (SRMAs) or recreation areas. Motorized use on BLM-administered lands is limited to existing roads and trails.

3.8.2 Environmental Consequences – Recreation

Impacts to recreation are based on the RFDS created for this document (Table 2, Appendix 1).

3.8.2.1 General Discussion of Impacts

Road construction that leads to or across BLM-administered lands would create or improve public access to those lands. However, access across private lands between public rights-of-way and public lands would still be at the discretion of the landowner. Noise and traffic associated with development and production could detract from the rural physical and social setting or disrupt some activities (e.g., hunting).

3.8.2.2 Alternative A

Infrastructure development associated with two wells would create none to negligible increases in BLM-administered land access. Public lands would be beyond the potential well sites; therefore, no new roads would be constructed to BLM-administered lands. Development and production activities would cause negligible adverse changes in user experiences.

3.8.2.3 Alternative B

Infrastructure associated with 22 wells would not occur on 6,349 acres of BLM-administered and split estate lands; therefore, there would be none to negligible increases in BLM-administered land access. Development and production activities would cause minor to moderate (e.g., activities adversely affect game species) adverse changes in user experiences.

3.8.2.4 Alternative C

Infrastructure development associated with 25 wells would create minor improvements in BLM-administered land access. Most BLM parcels have existing road access; therefore, upgrading those roads could allow better year-round access by a wider range of users. Development and production activities could cause minor to moderate (e.g., activities adversely affect game species) adverse changes in user experiences.

3.8.3 Mitigation

Because of the isolated nature of public lands in the area, no mitigation would be required.

3.8.4 Cumulative Impacts - Recreation

Because the alternatives would cause primarily none to minor impacts to recreation activities and experiences and public land access is at the discretion of private landowners, cumulative impacts will not be discussed.

3.9 Visual Resources Management

3.9.1 Affected Environment – Visual Resources Management

Visual Resource Management (VRM) is the system used to designate and manage the visual resources on public land. In the lease area, the CRMP designated 112 acres as Class III and 885 acres as Class IV (Map 7). A Class III VRM area classification means the level of change to the

character of the landscape should be moderate. Changes caused by management activities should not dominate the view of the casual observer and should not detract from the existing landscape features. Any changes made should repeat the basic elements found in the natural landscape such as form, line, color and texture. A Class IV VRM area classification means that the characteristic landscape can provide for major modification of the landscape. The level of change in the basic landscape elements can be high. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. An existing 230 kV line traverses Class III and IV lands in the northern portion of the proposed lease area. Human influences are relatively unnoticeable on the remainder of BLM-administered lands that are characterized by mixed vegetation communities, fencing, and unimproved two-track roads.

3.9.2 Environmental Consequences – Visual Resources Management

Impacts to visual resources are based on the RFDS created for this document (Table 2, Appendix 1).

3.9.2.1 General Discussion of Impacts

Disturbance of existing vegetation and creation of permanent linear (e.g., roads, powerlines) and point (e.g., well pads and structures) features would alter the form, line, color, and texture of the natural landscape.

3.9.2.2 Alternative A

Development of two wells on private lands would have no impact on VRM characteristics.

3.9.2.3 Alternative B

Development of 22 wells on private lands would have no impact on VRM characteristics.

3.9.2.4 Alternative C

Development of wells and associated infrastructure on BLM-administered lands could have negligible (Class IV) to minor (Class III) adverse impacts on visual resources. It would introduce more noticeable man-made structures to the natural environment.

3.9.3 Mitigation

All oil and gas development would implement, as appropriate for the site, BLM BMPs for VRM, regardless of the VRM class. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance, selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. Wherever practical, no new development would be allowed on ridges. Overall, the goal would be to not reduce the scenic values that currently exist.

3.9.4 Cumulative Impacts – Visual Resources Management

Because the changes associated with the potential development would be in conformance with VRM guidance for Class III and IV lands, cumulative impacts will not be discussed.

3.10 Lands and Realty

3.10.1 Affected Environment – Lands and Realty

Lands and realty actions will only occur on BLM-administered surface lands. The affected environment consists of 997 acres of BLM-administered public lands (or 16% of the total acreage proposed for lease). Rights-of-way currently exist for an Idaho Power 230-kV powerline (IDI-13054; 0.53 miles long by 100 feet wide; 6.4 acres) and associated access roads (1.71 miles of roads 14 feet wide; 2.9 acres) and for the Little Willow Irrigation District's Nelson Canal (IDB-0019666; 0.12 miles) (Map 7).

3.10.2 Environmental Consequences – Lands and Realty

3.10.2.1 General Discussion of Impacts

Standard oil and gas lease terms recognize prior existing rights. Development activities could require rights-of-way that overlay and adversely affect existing rights-of-way. Rights-of-way applications would be analyzed through a NEPA process that would identify potential resource impacts which would likely be similar to impacts described in this document.

3.10.2.2 Alternative A

Development of two wells and associated infrastructure would not affect existing public lands or rights-of-way. The IDI-13054 right-of-way is >2 miles north of the proposed well sites.

3.10.2.3 Alternative B

Development of 22 wells and infrastructure outside BLM-administered mineral rights would not directly affect IDI-13054. Activity could occur within a 0.6-mile segment of the powerline corridor that occurs on private lands.

3.10.2.4 Alternative C

Development of 25 wells and associated infrastructure would have a negligible impact on IDI-13054. Roads associated with the right-of-way could be improved and used for oil and gas infrastructure which would improve access to the powerline. The powerline right-of-way occupies <1% of BLM-administered lands and occurs to the north of where infrastructure would likely occur; therefore, it could be readily avoided.

3.10.3 Mitigation

The split estate lease notice would require the lessee to attempt to work with the surface owner through execution of a Surface Use Agreement. A bond would be required, for the benefit of the surface owner, if no agreement was reached. Measures would be taken to avoid disturbance or impacts to existing rights-of-way, in the event of any oil and gas development activities. Any new "off-lease" or third party rights-of-way required across federal surface for exploration and/or development would be subject to lands and realty stipulations to protect other resources as determined by environmental analyses. In order to protect the existing rights-of-way it is

recommended that LN-7 be applied to lease parcels associated with IDI-13054 and IDB-0019666.

3.10.4 Cumulative Impacts - Lands and Realty

Because the alternatives would cause no or negligible impacts to the existing rights-of-way, cumulative impacts will not be discussed.

3.11 Livestock Management

3.11.1 Affected Environment – Livestock Management

The proposed lease area includes portions of five BLM-administered grazing allotments (Map 8). The allotments are permitted for cattle and use periods are in the spring, spring through fall, or winter (Table 9). Total allotment sizes range from 1,488 acres (Danke Allotment) to 15,643 acres (Sand Hollow Allotment), with federal mineral estate affecting 306 acres (Sand Hollow Allotment) to 1,095 acres (Danke Allotment) (Table 10). The allotments have several range improvements including fences, stock ponds, wells, and roads (Map 8). Livestock grazing is not currently permitted on 184 acres of BLM-administered lands in the proposed lease area.

Table 9. Permit information for five allotments affected by proposed Little Willow Creek lease, Payette County, Idaho.

Allotment		Permittee	Livestock		Season of Use	Permitted AUMs
Name	Number		Kind	#		
Dannke	00084	Larry Dahnke	C	150	4/1 – 5/15	58
Hashagen	00248	Wolfe Ranches	C	112	3/16 – 4/15*	114
Kauffman	00163	Randall Kauffman	C	200	4/1 – 10/10**	25
Rock Quarry Gulch	20131		C	130	4/11-8/10	115
Sand Hollow	00254	Rocky Comfort Cattle Co.	C	1,302	10/26-3/15***	1,509

*Season and numbers are not restricted to those shown above provided overuse and deterioration do not occur to the federal range.
**Livestock numbers will be coordinated between BLM and the Lessee and may vary within the permitted use period, however, AUMs may not be exceeded. Any change to the scheduled use requires prior approval.
***Season and numbers of livestock are not restricted to those shown above provided overuse and deterioration does not occur to the public lands and the use is covered by the OX CRMP.

Table 10. Federal mineral reserve acres by allotment, amount of allotment in lease area, and total allotment size (acres) for five allotments affected by proposed Little Willow Creek lease, Payette County, Idaho.

Allotment	Federal Mineral Reserve		Lease Area		Allotment Total			
	BLM	Private	BLM	Private	BLM	State	Private	Total
Dannke	269	826	269	992	496	0	992	1,488
Hashagen	198	743	198	1,619	511	0	1,901	2,412
Kauffman	57	613	57	1,335	67	0	1,770	1,837
Rock Quarry Gulch	217	824	217	1,620	563	0	1,940	2,503
Sand Hollow	59	247	59	669	4,935	603	10,105	15,643

There are 23.1 miles of allotment boundary and 3.5 miles of pasture fencing in the five allotments. Natural or reservoir water sources occur in the Hashagen and Kaufman allotments.

3.11.2 Environmental Consequences – Livestock Management

Impacts to livestock management are based on the RFDS created for this document (Table 2, Appendix 1).

3.11.2.1 General Discussion of Impacts

Standard oil and gas lease terms recognize prior existing rights. Oil and gas development would result in a loss of vegetation for livestock grazing (e.g., direct removal, introduction of unpalatable plant species), decreased vegetation palatability due to fugitive dust, disrupted livestock management practices, increased vehicle collision injuries and mortalities, altered water quality and availability, and decreased grazing capacity (Fowler and Witte 1985). These impacts would vary from short-term impacts to long-term impacts depending on the development level, reclamation success, and the type of vegetation removed.

Oil and gas development activity would reduce BLM's ability to manage livestock grazing while meeting or progressing towards meeting the Idaho Standards of Rangeland Health (USDI 1997). Development and associated disturbances could reduce available forage or alter livestock distribution which could lead to overgrazing or other localized grazing impacts. Construction of roads, especially in areas of rough topography could improve livestock distribution.

3.11.2.2 Alternative A

Development of two wells and associated infrastructure would occur outside and, therefore, would not directly affect BLM-administered allotments. Negligible impacts from fugitive dust could occur.

3.11.2.3 Alternative B

Development of 22 wells and associated infrastructure on private lands would have negligible (Sand Hollow Allotment) to minor (Hashagen and Rock Quarry Gulch allotments) vegetation loss, palatability, collision, and capacity impacts over the short and long term. Approximately 32% of the development could occur in the allotments (2,982 acres of private lands with no split estate minerals in the allotments/9,292 acres in the proposed lease area); therefore, direct habitat loss would occur on approximately 25 acres (7 wells and 1.75 miles of roads). Changes in palatability and desirable species composition adjacent to roads would depend on the amount of dust generated and the distance it travelled. Roads that cross allotment or pasture boundaries could have moderate to major disruption impacts where animals are able to freely move between use areas. Changes in water availability and quality could occur in the Hashagen and Kaufman allotments. Minor adverse rangeland health impacts could occur on BLM-administered lands, primarily in the Danke, Hashagen, and Rock Quarry Gulch allotments where BLM-administered lands make up 21-25% of the allotment within the proposed lease area.

3.11.2.4 Alternative C

Development of 25 wells and associated infrastructure on private lands would have negligible (Sand Hollow Allotment; e.g., no direct impacts, possible dust and disturbance impacts) to moderate (Danke Allotment; e.g., reduced forage capacity caused by increased weeds) vegetation loss, palatability, collision, and capacity impacts over the short and long term. Based on allotment acreages and well spacing, none (Sand Hollow Allotment) to two wells (Danke, Hashagen, and Rock Quarry Gulch allotments) could be developed. Direct loss of vegetation would be ≤7 acres in a given allotment and 25 acres total in the five allotments. Impacts to livestock operations, water, and rangeland health would be as described in Alternative B (Section 3.11.2.3).

3.11.3 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to livestock grazing from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could potentially include controlling livestock movement by maintaining fence line integrity, fencing facilities, installing cattleguards, re-vegetation of disturbed sites, and fugitive dust control.

3.11.4 Cumulative Impacts - Livestock Management

Cumulative impacts to livestock management are based on the RFDS created for this document (Appendix 1) and the actions identified below.

3.11.4.1 Scope of Analysis

The 23,891-acre CIAA includes all lands associated with the five allotments associated with proposed lease (Table 10). Allotments represent an administrative boundary that addresses most components of an individual's livestock operation. Changes in vegetation conditions outside the allotments that could indirectly affect the allotments are discussed in Soils and Vegetation Cumulative Impacts (Section 3.2.4). The lease period of 10 years will be used for the temporal analysis limit because most impacts are associated with lease activities and site reclamation.

3.11.4.2 Current Conditions and Effects of Past and Present Actions

Vegetation Conditions – Major cover types include shrubs (10,793 acres; 45% of CIAA), exotic annuals (9,511 acres; 40%), and perennial grasses (3,512 acres; 15%). Exotic annuals are the dominant cover type in the Danke, Hashagen, and Rock Quarry Gulch (southern portion allotments. All of the Danke, Hashagen, and Rock Quarry Gulch and significant portions of the Sand Hollow and Kaufman allotments burned in the 1980s. Where shrubs have recovered, exotic annuals are dominant or co-dominant with perennial species in the understory. Species composition is the most important palatability influence, with areas dominated by medusahead providing the least palatable forage except during early spring green-up. Rangeland health assessments have not been conducted on the allotments. Consistent moderate or greater livestock use during the growing period would result in downward perennial grass trends and increased exotic annuals. Perennial grasses would be less affected by dormant season use and could be maintained in the absence of other disturbances (e.g., wildfire).

Disturbance – Disturbance impacts include leaving gates open, harassing livestock, and shooting livestock. There are approximately 46 miles of roads in the allotments, but almost all are unimproved 2-tracks that require access through private lands. Non-livestock related use occurs primarily during the spring and fall by OHV users and hunters. There are existing gas wells on the Hashagen (one well) and Kauffman (two wells) allotments. There are approximately 84 miles of allotment and pasture fences.

3.11.4.3 Reasonably Foreseeable Future Actions

Oil and Gas Lease Development and Production – There are approximately 765 acres of State-managed mineral resources (679 acres in Sand Hollow Allotment, 75 acres in Hashagen Allotment, and 5 acres in Dannke Allotment), some of which may have been leased, but drilling has not been initiated. An unknown amount of private land has also been leased. One additional well could be drilled in the Kaufman Allotment and up to seven wells could be drilled in the Sand Hollow Allotment that would not affect federal mineral estate.

Wildfire – Although not planned events, wildfires would be expected to periodically occur and may increase in size and frequency in response to climate change. Conversion of perennial grass understories to exotic annuals in burned areas would reduce forage quality and availability over the long term. Loss of shrub cover would reduce soil moisture and shorten growing periods. Burned public lands are typically rested one or more growing seasons until recovery objectives are met.

3.11.4.4 Alternative A – Cumulative Impacts

Not leasing federal mineral estate would have no additive impacts. Changes in vegetation conditions caused by livestock grazing and wildfires would have moderate to major adverse impacts to livestock forage where exotic annuals replace perennials and rangeland health standards would not be met over the long term. Larger wildfires would have moderate to major short-term adverse impacts to livestock operations where post-fire rest is implemented. Recreation, OHV, and development/production would cause negligible to moderate short-term disturbance impacts. An additional eight wells and associated infrastructure would cause negligible direct forage loss and decreased forage palatability, but could cause minor to moderate decreases in vegetation conditions where increased access and use increased exotic annuals and noxious weeds.

3.11.4.5 Alternatives B and C– Cumulative Impacts

Development and production activities at 7 to 10 wells in the proposed lease area would have minor to moderate additive vegetation condition and disturbance impacts over the short and long term. Impacts from ongoing and foreseeable future actions would be as described in Alternative A (Section 3.11.4.4).

3.12 Minerals (Fluid)

3.12.1 Affected Environment – Minerals (Fluid)

The proposed lease area occurs in the Payette River Valley, at an elevation of between 2,000 and 3,000 feet. It is on the northern edge of the western Snake River Plain, an approximately 40-mile wide, northwest-trending graben structure, filled with sediments of Plio-Pleistocene Lakes Idaho and Bruneau and intercalated basalts. These sediments are referred to as the Idaho Group (Pliocene) and Payette Formation (Miocene). While there is no type section for the Payette Formation, it is described as a thick body of fresh-water and continental sediments, generally made up of ash, clay, shale, and sandstone, with an occasional lignite bed (Buwalda 1923). The sediments are known to contain organic material, including petrified tree stumps, fresh-water shells and mammalian fossils, such as ancestral horses and camels. Strata seen at Payette extend westward across the Snake River for long distances into Oregon. The Payette Formation has been measured at over 4,000 feet in a deep well at Ontario, Oregon.

The Willow and Hamilton fields have been designated by the oil industry to delineate areas believed to have a natural gas reservoir large enough to sustain commercial development (Map 1). Developers describe the reservoir as being a sequence of fluvial sands, ranging from 500 to 800 feet thick, except where replaced/interrupted by volcanics (IOGCC 2013a). In the ML Investments #1-10 well, located in T. 8 N., R. 4 W., Section 10, the fluvial sand was found at 4,100 feet. Another sand layer is described at the 3,750 foot depth. The fluvial sands are porous and have consistent characteristics across the reservoir. They are overlain by 1,700 – 3,500 feet of lacustrine shale, which provides a regional topseal. Both sands are believed to be adequately drained by a well spacing of one well per 640 acres (IOGCC 2013a). The Western Idaho Basin is characterized primarily by conventional non-associated gas; however, conventional associated (with oil) and tight sand gasses may also be present, but shale-associated gas resources are not thought to be present (Johnson et. al. 2013). Conventional non-associated and associated gases typically can be extracted with smaller scale fracking (well-bore stimulation; Johnson et. al. 2013 pg. 8); however, tight sand and shale-associated gases likely would require fracking to extract.

Although BLM had numerous leases in the 1980's in the area, there are no current federal oil and gas leases in Payette County. In 2014, the Idaho Department of Lands (IDL) leased approximately 4,100 acres of State-owned minerals in Payette County. The remainder of the 20,288 acres of State-owned minerals in Payette County were leased between 2006 and 2013. The State currently has approximately 85,000 acres leased for oil and gas development statewide. There are no wells on federal mineral estates in Payette County; however, there is one producing well and 10 shut-in wells pending pipelines located on private lands (Table 11).

Table 11. Existing development activity on federal and State leases, Payette County, Idaho.

Well Type	Federal Estate	Private and State Leases
Drilling Well(s)	0	4
Producing Gas Well(s)	0	1
Shut-in Well(s) (pending pipeline)	0	10
Permitted, not Drilled Well(s)	0	2
Temporarily Abandoned Well(s)	0	1

3.12.2 Environmental Consequences – Minerals (Fluid)

Impacts to minerals are based on the RFDS created for this document (Table 2, Appendix 1).

3.12.2.1 General Discussion of Impacts

Issuing a lease provides the lessee with the exclusive right to explore for and develop oil and gas. Natural gas produced from federal mineral estate would enter the public markets. The production of oil and gas would result in the irreversible and irretrievable loss of these resources. Royalties and taxes would accrue to the federal and state treasuries from the lease parcel lands. There would be a reduction in the known amount of oil and gas resources. If the federal mineral estate is not leased, but is omitted by the Idaho Oil and Gas Conservation Commission (IOGCC), then they could be drained without compensation.

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use could affect oil and gas exploration and development, both on and off the federal parcel. Leases issued with major constraints (NSO stipulations) may decrease some lease values, increase operating costs, and require relocation of well sites, and modification of field development. Leases issued with moderate constraints (timing limitation and controlled surface use stipulations) may result in similar but reduced impacts, and delays in operations and uncertainty on the part of operators regarding restrictions.

3.12.2.2 Alternative A

The federal mineral estate could remain in place over the short and long terms if they were not leased. The two additional wells would occur in privately-owned mineral estate ≥0.5 miles from federal mineral estate. However, if the federal mineral estate were omitted by the IOGCC, then at least 493 acres of the federal mineral estate within 0.5 miles of existing wells (based on 1 well/640 acre spacing) could be drained.

Because of mineral ownership patterns, not leasing 6,349 acres of federal mineral estate could have moderate to major adverse effects on the ability to develop and produce State- and privately-owned fluid minerals. Lease values and operating costs could be adversely affected. Development of non-federal reserve minerals would not be adversely affected if the IOGCC omits the federal mineral estate.

3.12.2.3 Alternative B

The NSO and NSSO stipulations affecting 6,349 acres would cause minor to moderate decreased lease values and increased operating costs. Developing 22 wells on private lands would allow oil and gas production from the majority of federal mineral estate and State- and privately-owned minerals. Because of well spacing limitations, minerals from up to 1,920 acres of federal mineral estate would not be available because of NSO and NSSO stipulations. However, because of the interspersion of private lands in the proposed lease area, the amount of unavailable federal mineral estate would be expected to be much less.

3.12.2.4 Alternative C

Developing 25 wells would allow oil and gas production from almost all the federal mineral estate and State- and privately-owned minerals. Because of their proximity to federal mineral estate outside the lease area and current well spacing, some minerals at the periphery of the lease area might not be available for production. Applying lease stipulations would cause minor

decreased lease values and minor to moderate increased operating costs, primarily during the development phase. The special status plant species and freshwater aquatic habitat stipulations would affect approximately 190 acres of federal mineral estate (Maps 4 and 5). The big game winter range stipulation would affect 4,800 acres (Map 6). Fragile soils are associated with approximately 2,600 acres of federal mineral estate and floodplains would affect <1 acre (Maps 3 and 5). Impacts from other resource stipulations and lease notices cannot be determined at this time because surveys have not been conducted for the resources; however, migratory birds, raptors, burrowing mammals, and bats likely are associated with most of the federal mineral estate.

3.12.3 Mitigation

Applying the drainage stipulation in Alternative C would ensure that the lessee of a parcel adequately addresses the issue of uncompensated drainage.

3.12.4 Cumulative Impacts – Minerals (Fluid)

Cumulative impacts to fluid minerals are based on the RFDS created for this document (Table 2, Appendix 1) and the actions described below.

3.12.4.1 Scope of Analysis

The CIAA is the 15,644-acre Little Willow Creek proposed oil and gas lease area because only federal minerals in the lease area would be available. Well spacing guidance should prevent uncompensated drainage from the federal mineral estate outside the proposed lease area. The lease period of 10 years will be used for the temporal analysis limit because the federal mineral estate would be available for production during that time period, but not necessarily beyond.

3.12.4.2 Current Conditions and Effects of Past and Present Actions

In addition to the 6,349 acres of federal mineral estate, the CIAA includes 493 acres of State-owned minerals and 8,799 acres of private-owned minerals. The lease status of the State and private minerals is unknown. Six wells (three drilled and pending pipelines and three in the process of being drilled) occur in (three wells) or within 0.5 miles (three wells) of the CIAA. The wells are associated with privately-owned minerals; however, one well is within 0.15 miles of State-owned minerals.

3.12.4.3 Reasonably Foreseeable Future Actions

Two wells on privately-owned minerals could be drilled. Wells associated with State-owned minerals could be subject to stipulations for unstable soils, wildlife, threatened and endangered species, and floodplains (Appendix 2). Private lessors could also incorporate stipulations in their lease agreements; however, their scope is unknown.

3.12.4.4 Alternative A – Cumulative Impacts

Not leasing 6,349 acres of federal mineral estate could have minor (if the federal mineral estate is omitted) to moderate (if not omitted) adverse additive impacts to the value of unleased State- and privately-owned minerals. Stipulations associated with State-owned minerals could have minor adverse impacts on lease values and operating costs.

3.12.4.5 Alternative B– Cumulative Impacts

Leasing 6,349 acres of federal mineral estate with NSO and NSSO stipulations could have minor (if stipulations have a limited effect on accessibility) to moderate (if stipulations affect accessibility) adverse additive impacts to the value of unleased State- and privately-owned minerals. Stipulations associated with State-owned minerals would be as described in Alternative A (Section 3.12.4.4).

3.12.4.6 Alternative C– Cumulative Impacts

Leasing 6,349 acres of federal mineral estate with stipulations and lease notices would have minor adverse additive impacts to the value of unleased State- and privately-owned minerals. Stipulations associated with State-owned minerals would be as described in Alternative A (Section 3.12.4.4).

3.13 Social and Economic

3.13.1 Affected Environment – Social and Economic

Social and Environmental Justice

The 2010 Payette County population was 22,623, an increase of 10% from 2000. In comparison, the state population increased 21% between 2000 and 2010, Ada and Canyon counties increased 30.4% and 43.7% respectively. The 2010 Payette County population density was 55 persons/mi^2, compared to 18.8 for Idaho as a whole and 370 and 313 for Ada and Canyon counties respectively. The areas in the vicinity of the proposed lease area are home to farms, ranches, and dispersed residences.

As defined in Executive Order 12898, minority, low income populations, and disadvantaged groups are present in Payette County. Between 2008 and 2012, 19.2% of Payette County's population lived below the poverty line compared to 15.1% of Idaho's total population (Payette County QuickFacts, USCB 2014). The County is not very ethnically or racially diverse. In 2010, 85% of residents identified themselves as being non-Hispanic or Latino ethnicity and 15% of residents reported having Hispanic ancestry (US Census Bureau 2010). Non-white races including African American, Asian, American Indian, Pacific Islander, and others accounted for 11% of the population. In 2010, American Indians accounted for 1.1% of Payette County's population compared to 1.4% for the state as a whole. Tribes in Idaho and elsewhere have an interest in lands in Payette County; however, BLM is unaware of potential interest involving the proposed lease area.

Economics

In 2011, Payette County supported 9,606 jobs and had a 9.1% unemployment rate (Table 12). Non-services related industries (e.g., farm, construction, and manufacturing) accounted for 2,868 jobs, while service related industries (e.g., wholesale, retail, transportation, finance, real estate, and health care) accounted for 5,330 jobs and government accounted for 1,146 jobs (U.S. Department of Commerce 2011). In 2012, labor earnings of $325 million included $100 million in non-services related, $153 million in services related, and $47 million in government related earnings. The 2011 per capita income was $29,475. Total personal income (TPI) in 2011 was

estimated to be $667 million including a net residential inflow of $105 million (earnings gained from outside the county – earnings leaving the county). Total personal income includes labor and non-labor income, including money earned on investments (interest, dividends, and rents) and transfer payments relating to age (Medicare and Social Security payments) or poverty (Medicaid or welfare assistance). Idaho had 147 people employed in oil and gas extraction activities statewide in 2011 (IPAA 2012).

Table 12. Employment (2011) and personal income (2012) by industry, Payette County, Idaho.

Industry	**Employment (jobs)**	**Personal Income (Thousands of 2012 dollars)**	**Average Income/Job (Thousands of 2012 dollars)**
Farm	974	$28,255	$29
Forestry & Related Activities	na	na	na
Mining (incl. fossil fuels)[1]	na	na	na
Construction[1]	780	$25,285	$32.4
Manufacturing	1,114	$46,321	$41.6
Utilities	95	$10,480	$110.3
Wholesale Trade[1]	278	$9,247	$33.3
Retail Trade[1]	734	$13,380	$18.2
Transportation & Warehousing[1]	341	$13,446	$39.4
Information	111	$6,604	$59.5
Finance & Insurance[1]	381	$9,798	$25.7
Real Estate & Rental & Leasing[1]	426	$3,543	$8.3
Professional & Tech. Services[1]	313	$10,763	$34.4
Management of Companies[1]	90	$8,503	$94.5
Admin. & Waste Services[1]	526	$9,587	$18.2
Educational Services	90	$868	$9.6
Health Care & Social Assistance[1]	844	$35,832	$42.5
Arts, Entertainment, and Rec	94	$545	$5.8
Accommodation & Food Services[1]	294	$3,843	$13.1
Other Services[1]	713	$16,977	$23.8
Government[1]	1,146	$47,312	$41.3
Total	9,606	$325,048	$33.8

[1] Industries that typically add jobs to support oil and gas leasing, exploration, and production activities.

Oil and Gas Leasing and Production

Local economic effects of leasing federal minerals for oil and gas exploration, development, and production are influenced by the number of acres leased, the number of wells drilled, and the estimated levels of production. These activities influence local employment, income, and public revenues (indicators of economic impacts). There are no federal-administered leases in the area; however, in 2014, the IDL leased 4,006 acres of State owned lands and minerals in Payette County.

Leasing - Federal oil and gas leases generate a one-time lease bid as well as annual rents. Parcels containing federal minerals, which have been approved for leasing, are auctioned off periodically to interested parties starting at a minimum bid of $2.00 per acre. Many parcels leased at auction generate bonus bids in excess of the minimum bid. In 2014, bonus bids ranged from $50.24/acre (October) to $79.68/acre (January) for State leases; however, because no leases have been offered, figures for federal minerals are not available. Once federal minerals are leased, leases are subject to annual rent or royalty payments. Rent on leased minerals is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Typically, oil and gas leases expire after 10 years unless drilling activity on these parcels results in one or more producing wells.

Production – Idaho currently has one producing well on private land and none associated with federal mineral estate (IPAA 2012, IDL 2014). Of 18 Payette County gas wells currently permitted by IDL, one is in production, 10 have been drilled and are shut pending a pipeline (Table 11). Once production begins, federally leased minerals are considered to be held by production and lease holders are required to pay royalties on production instead of annual rent. The BLM also considers mineral leases to be held by production if they have been incorporated into fields or units working cooperatively to increase extraction capabilities.

Federal oil and gas production is subject to production taxes or royalties. On public domain lands, these federal oil and gas royalties generally equal 12.5% of the value of production (43 CFR 3103.3.1), of which 50% would be allocated to the State and 50% would be allocated to the U.S. Treasury. In Idaho, 90% of federal mineral royalty revenues that the state receives are distributed to the Public School Income Fund and 10% distributed to the general fund of the counties where the revenue was generated. For State leases, a 12.5% production royalty is distributed to the permanent fund of the appropriate beneficiary, other State agencies, and the General Fund. The 2.5% production tax goes to the producing county (11.2% of tax revenue), cities within the producing county (11.2%), public schools (11.2%), local economic development (6.4%), and an oil and gas conservation fund (60%).

Local Economic Contribution - Oil and gas development has the potential to stimulate economic activity in a number of sectors throughout the region. Exploration, development, and production activities create a multiplier effect in the local economy as money spent in the oil and gas related industries is spent and re-spent in other industries (Table 12).

3.13.2 Environmental Consequences – Social and Economic

Impacts to the social and economic environment are based on the RFDS created for this document (Table 2, Appendix 1).

3.13.2.1 General Discussion of Impacts

<u>Social and Environmental Justice</u>

Development of a lease may generate impacts to people living near or using the area in the vicinity of the lease. Oil and gas exploration, drilling, or production could create an inconvenience to these people due to increased traffic and traffic delays, noise, and visual impacts. This could be especially noticeable in areas where oil and gas development has been

minimal. The amount of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, length of time, and season these activities occurred, etc. Creation of new access roads into an area could allow increased public access and exposure of private property to vandalism. For split estate leases, surface owner agreements, standard lease stipulations, and BMPs could address many of the concerns of private surface owners. Production and development activities could disproportionately affect disadvantaged groups where the activities are specifically targeted to their communities or properties to the benefit or avoidance of non-disadvantaged groups. They could also provide job opportunities for those groups.

Economics

Local and/or out-of-state workers could be hired or contracted to meet the direct and indirect needs of development and production. Individual income for workers typically associated with development and production activities would vary from $8,300 to $94,500 annually (Table 12). Mining-related jobs would likely pay above the median income ($32,400/year). Total new jobs created could be relatively low because some work would be short-term in nature. For each million dollars in gas production, 2.4 jobs could be created in the county of production (Weber 2012). Employees may shift to higher paying energy-related jobs creating a labor shortage for local employers. Sudden influxes of workers could reduce affordable housing availability. An influx of workers and equipment without commensurate financial support could adversely affect public and private sector infrastructure (schools, hospitals, law enforcement, fire protection, and other community needs), especially in rural communities. Tax, royalty, spending, and income revenues associated with leasing, development, and production would benefit local, county, State, and national economies. Stipulations that affect access to mineral resources could reduce economic return for lessors and lessees. Activities that increase access to mineral resources could benefit other mineral rights holders. Activities that adversely affect health, safety, or the environment could cause short- or long-term decreases in personal income and property values.

Disclosure of the direct, indirect, and cumulative effects of GHG emissions provides information on the potential economic effects of climate change including effects that could be termed the "social cost of carbon" (SCC). The EPA and other federal agencies developed a method for estimating the SCC and a range of estimated values (EPA 2014). The SCC estimates damages associated with climate change impacts to net agricultural productivity, human health, property damage, and ecosystems. Using a 3% average discount rate and year 2020 values, the incremental SCC is estimated to be $51 per ton of annual CO_2eq increase.

3.13.2.2 Alternative A

Social and Environmental Justice

Not leasing the federal mineral estate in the project area would limit the development potential of the project area to only two wells, both located on private lands. Developing two wells and associated infrastructure would have minor short-term impacts from increased traffic and noise and long-term visual, public access, and vandalism impacts. Limited increases in access and worker influx would occur. There are disadvantaged groups in Payette County, but they do not appear to be disproportionately associated with the two wells or the proposed lease area.

Economics

By not leasing, federal, state, or local revenues would not be generated from leasing, rents, or royalties from federal mineral estate. If BLM does not lease the federal minerals, it is likely that the IOGCC would allow the federal mineral estate to be omitted from the drilling unit. Moderate (if 493 acres associated with existing wells are omitted) to major (if up to 6,349 acres throughout the lease area are omitted) resource and revenue losses would occur if the IOGCC omitted the federal mineral estate and productive wells are drilled on private lands in the same unit. Development and production of two wells would cause minor employment and income increases. Negligible to minor impacts to labor and housing availability and infrastructure would occur over the short term. Adjacent mineral rights holders would experience minor beneficial (omission allowed) or moderate adverse (omission not granted) financial impacts. Adverse water quality and availability (Section 3.5.2.2), safety, and environmental impacts would primarily affect individual landowners in the immediate vicinity of the wells.

Based on the GHG emission estimate (Table 6), the annual SCC associated with two wells would be $295,137 (in 2011 dollars). Estimated SCC is not directly comparable to economic contributions reported above, which recognize certain economic contributions to the local area and governmental agencies, but do not include all contributions to private entities at the regional and national scale. Direct comparison of SCC to the economic contributions reported above is also not appropriate because costs associated with climate change are borne by many different entities.

3.13.2.3 Alternative B

Social and Environmental Justice

Developing 22 wells and associated infrastructure would have moderate to major short-term increased traffic and noise impacts and long-term visual impacts. Minor (access controlled by private landowners) to major (access not controlled by private landowners) access and vandalism impacts could occur over the long term. A moderate worker influx could adversely affect traditional lifestyles. Disadvantaged groups in Payette County would not be directly affected by the wells, but access to affordable housing and social services in nearby communities could be reduced during the short term.

Economics

Federal, state, or local revenues would be generated from leasing and rents ($9,528 to $12,704 annually) during the 10-year lease period. The NSO and NSSO stipulations could reduce the lease value and bonus bid amounts. Developing and maintaining 22 wells would have minor to moderate short-term and negligible long-term job increases. Royalty income would depend on how productive the wells are and cannot be estimated at this time. Minor to moderate impacts to labor and housing availability and infrastructure would occur over the short term. Adjacent mineral rights holders would experience moderate financial benefits where access to their minerals improved. Adverse water quality and availability (Section 3.5.2.3), safety, and environmental impacts could have negligible (wells remain intact and don’t affect ground water) to major (surface and ground water adversely affected by multiple wells) to the adjacent landowners and downstream communities. Based on the GHG emission estimate (Table 6), the annual SCC associated with 22 wells would be $3,246,711 (in 2011 dollars).

3.13.2.4 Alternative C

Social and Environmental Justice

The impacts of developing 25 wells and associated infrastructure would be as described in Alternative B (Section 3.13.2.3).

Economics

Leasing 6,349 acres and associated development and production would have similar revenue, job, labor and housing availability, infrastructure, and adjacent mineral rights holder impacts as described in Alternative B (Section 3.13.2.3). The impact of CSU stipulations on lease value would be less than Alternative B and royalty income could be greater. Adverse water quality and availability (Section 3.5.2.4), safety, and environmental impacts would be similar to Alternative B; however, the freshwater aquatic habitat CSU stipulation could provide minor to moderate surface water protection. Based on the GHG emission estimate (Table 6), the annual SCC associated with 25 wells would be $3,689,442 (in 2011 dollars).

3.13.3 Mitigation

Measures that limit or control dust, noise, odors and protect visual impacts and water quality resources would help reduce social and economic impacts (Dahl et. al. 2010).

3.13.4 Cumulative Impacts – Social and Economic

Cumulative impacts to the social and economic environment are based on the RFDS created for this document (Table 2, Appendix 1), RFDS for the Willow and Hamilton fields, and the activities identified below.

3.13.4.1 Scope of Analysis

Payette County will serve as the CIAA. Although social and economic costs and benefits could occur at regional, state, national, and international levels, the majority would occur at the county level. The lease period of 10 years will be used for the temporal analysis limit because the federal mineral estate would be available for production during that time period, but not necessarily beyond.

3.13.4.2 Current Conditions and Effects of Past and Present Actions

Current Payette County social and economic conditions are described in Section 3.13.1. All State-owned minerals (Section 3.12.1) and an unknown acreage of privately-owned minerals have been leased in recent years. The State leases will expire between 2016 (14,181 acres) and 2024. The existing 17 oil and gas wells have been developed over several years, although the majority of work occurred since 2011. Exploration work is ongoing in the County. The effect of these activities on social and economic conditions, beyond State lease rental returns, is unknown.

3.13.4.3 Reasonably Foreseeable Future Actions

Oil and Gas Lease Development and Production – Development of wells and associated infrastructure would occur on private and State leases in the Willow and Hamilton (one new well proposed October 2014) fields. Current development is approximately two to four wells annually.

3.13.4.4 Alternative A – Cumulative Impacts

Social and Environmental Justice

Development of two wells and associated infrastructure would have negligible additive traffic, noise, visual, access, vandalism, and worker influx impacts. Development of up to 53 wells in the Hamilton and Willow fields would have minor impacts. The county's population base is large enough that changes associated with oil and gas development would be relatively unnoticeable.

Economics

Not leasing federal mineral estate would have negligible additive adverse revenue impacts. Development of two wells and associated infrastructure would have negligible additive employment, income, labor and housing availability, infrastructure, water quality and availability, and SCC impacts. Development of up to 53 wells in the Hamilton and Willow fields would have minor revenue, employment, income, labor and housing availability, infrastructure, safety, and environmental impacts. Development in the Hamilton and Willow fields could cause minor (water availability affected by increased use) to moderate (water quality adversely affected by persistent pollutants) water quality and availability and SCC ($7,660,302) impacts. The county's economic and employment base is large enough that changes associated with oil and gas development would be relatively unnoticeable.

3.13.4.5 Alternatives B and C – Cumulative Impacts

Social and Environmental Justice

Leasing federal mineral estate and the subsequent development of 22-25 wells and associated infrastructure would have minor additive traffic, noise, visual, access, vandalism, and worker influx impacts. Impacts from other oil and gas development would be as described in Alternative A (Section 3.13.4.4).

Economics

Leasing federal mineral estate and the subsequent development of 22-25 wells and associated infrastructure would have minor additive employment, income, labor and housing availability, and infrastructure impacts and minor to moderate additive water quality and availability and SCC impacts. Impacts from other oil and gas development would be as described in Alternative A (Section 3.13.4.4).

4.0 Consultation and Coordination

4.1 List of Preparers

Name	Position
Jonathan Beck	Planning and Environmental Coordinator, ID State Office and Boise District
Aimee Betts	Associate District Manager, Boise District
M.J. Byrne	Public Affairs, Boise District
Tate Fischer	Field Office Manager, Four Rivers
Sarah Garcia	Rangeland Management Specialist, Four Rivers
Lara Hannon	Natural Resource Specialist/Acting NEPA Specialist, Boise District
Valerie Lenhartzen	Geologist, Four Rivers
Matthew McCoy	Assistant Field Office Manager, Four Rivers
David Murphy	Branch Chief, Realty, ID State Office
Karen Porter	Geologist, ID State Office
Larry Ridenhour	Outdoor Recreation Planner, Four Rivers
Dean Shaw	Archaeologist, Four Rivers
Mark Steiger	Botanist, Four Rivers
Allen Tarter	Natural Resource Specialist (Riparian), Four Rivers

4.2 List of Agencies, Organizations, and Individuals Consulted

Affected Landowners and Permittees (84 individual or companies within 1 mile of proposed lease area)
Allen and Kirmse, Ltd
Alta Mesa Service, Inc., c/o F. David Murrell
Burns Paiute Tribe, Tribal Chairman
Canyon County Commissioners
Confederate Tribes of the Umatilla, Tribal Chairman
Congressman Raul Labrador
Energy West Corp.
Gem County Commissioners
Grazing Board Resource Area Representatives, Phil Soulen
Grazing Board Resource Area Representatives, Stan Boyd
Grazing Board Resource Area Representatives, Weldon Branch
Idaho Citizens Against Resource Extraction
Idaho Conservation League, John Robinson
Idaho Department of Agriculture
Idaho Department of Fish & Game c/o Rick Ward
Idaho Department of Lands c/o Grazing Program Manager
Idaho Governor, CL "Butch" Otter
Idaho Lieutenant Governor Brad Little
Idaho Office of Energy Resources, c/o John Chatburn

Larry Craig
Moffitt Thomas and Associates
Nez Perce Tribes, Tribal Chairman
SBS Associates, LLC
Senator Jim Risch
Senator Mike Crapo
Shoshone-Bannock Tribe, c/o Nathan Small
Shoshone-Paiute Tribe, c/o Ted Howard
Trendwell Energy Corp.
US Fish and Wildlife Service
Washington County Commissioners
Weiser-Brown Oil Co, c/o Richard Brown
Western Watersheds Project
Western Watersheds Project, Katie Fite

Native American Consultation

BLM is required to consult with Native American tribes to "help assure (1) that federally recognized tribal governments and Native American individuals, whose traditional uses of public land might be affected by a proposed action, will have sufficient opportunity to contribute to the decision, and (2) that the decision maker will give tribal concerns proper consideration" (U.S. Department of the Interior, *BLM Manual Handbook H-8120-1*). Tribal coordination and consultation responsibilities are implemented under laws and executive orders that are specific to cultural resources which are referred to as "cultural resource authorities," and under regulations that are not specific which are termed "general authorities." Cultural resource authorities include: the *National Historic Preservation Act of 1966*, as amended (NHPA); the *Archaeological Resources Protection Act of 1979*; and the *Native American Graves Protection and Repatriation Act of 1990, as amended*. General authorities include: the *American Indian Religious Freedom Act of 1979*; the NEPA; the FLPMA; and *Executive Order 13007-Indian Sacred Sites*. The proposed action is in compliance with the aforementioned authorities.

Southwest Idaho is the homeland of two culturally and linguistically related tribes: the Northern Shoshone and the Northern Paiute. In the latter half of the 19th century, a reservation was established at Duck Valley on the Nevada/Idaho border west of the Bruneau River. Today, the Shoshone-Paiute Tribes residing on the Duck Valley Reservation actively practice their culture and retain aboriginal rights and/or interests in this area. The Shoshone-Paiute Tribes assert aboriginal rights to their traditional homelands as their treaties with the United States, the Boise Valley Treaty of 1864 and the Bruneau Valley Treaty of 1866, which would have extinguished aboriginal title to the lands now federally administered, were never ratified.

Other tribes that have ties to southwest Idaho include the Bannock Tribe and the Nez Perce Tribe. Southeast Idaho is the homeland of the Northern Shoshone Tribe and the Bannock Tribe. In 1867 a reservation was established at Fort Hall in southeastern Idaho. The Fort Bridger Treaty of 1868 applies to BLM's relationship with the Shoshone-Bannock Tribes. The northern part of the BLM's Boise District was also inhabited by the Nez Perce Tribe. The Nez Perce signed treaties in 1855, 1863 and 1868. BLM considers off-reservation treaty-reserved fishing,

hunting, gathering, and similar rights of access and resource use on the public lands for all tribes that may be affected by a proposed action.

The BLM initiated consultation with the Shoshone-Paiute Tribes during the June 19, 2014 Wings and Roots Program, Native American Campfire meeting. At that time, the Tribes were provided an information "early alert" with updated information from the June 12, 2014, field trip. The Shoshone-Paiute Tribes did not respond to a July 3, 2014 scoping letter, but will be consulted once again at the December 2014 Wings and Roots Program, Native American Campfire meeting.

4.3 Public Participation

The BLM received public comments from the following individuals and entities:

Alta Mesa Services, Inc.
Idaho Concerned Residents for the Environment (ICARE)
Idaho Office of Energy Resources
Idaho Petroleum Council
Idaho Residents Against Gas Extraction (IRAGE)
Jason Williams
JoAnn Higby
Lyndsey Winters Juel
Marilyn Richardson
Terry Paulus
William Fowkes and Alice Whitford
Western Watersheds Project (WWP)

5.0 Literature Cited

Barrett, J. 2005. Population viability of the southern Idaho ground squirrel (*Spermophilus brunneus endemicus*): effects of an altered landscape. M.S. Thesis, Boise State University, Boise, ID.

Barton, D. C. and A. L. Holmes. 2007. Off-highway vehicle trail impacts on breeding songbirds in northeastern California. J. Wildlife Manage. 71:1617-1620.

Beckman, J. P., K. M. Berger, J. K. Young, and J. Berger. 2008. Wildlife and energy development: pronghorn in the upper Green River Basin – year 3 summary. Wildlife Conservation Society, Bronx, NY. Available for download from http://www.wcs.org/ yellowstone. 86 pp.

Bevanger, K. 1998. Biological and conservation aspects of bird mortality caused by electricity power lines: a review. Biol. Conserv. 86:67-76.

Bull, E. L. 2006. Sexual differences in the ecology and habitat selection of western toads (Bufo boreas) in northeastern Oregon. Herp. Conserv. Biol. 1:27-38.

Buwalda, J. P. 1923. A preliminary reconnaissance of the gas and oil possibilities of southwestern and south-central Idaho: Idaho Bur. Mines and Geology Pamph. 5. 10 pp.

Carr, L. W. and L. Fahrig. 2002. Effect of road density on two amphibian species of differing vagility. Conserv. Biol. 15: 1071-1078.

Climate Change SIR. 2010. Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management. Report on Greenhouse Gas Emissions and Climate Change for Montana, North Dakota, and South Dakota. Technical report prepared for the Montana/Dakotas Bureau of Land Management by URS Corporation. URS Project 22241790.

Dahl, G., C. Price, and D. Kalish. 2010. Oil and gas regulations: a guide for local governments. Colorado Dept of Local Affairs. 85 pp. http://www.springsgov.com/units/boardscomm/OilGas/DOLA%20O&G%20Guide%20for%20Local%20Governments.pdf Accessed November 23, 2014.

Duchamp, J. E., D. W. Sparks, and J. O. Whitaker, Jr. 2004. Foraging-habitat selection by bats at an urban-rural interface: comparison between a successful and a less successful species. Can. J. Zool. 82:1157=1164.

EPA. 2014a. The 2011 National Emissions Inventory [Website]. Version 1. U.S. Environmental Protection Agency. http://www.epa.gov/ttn/chief/net/2011inventory.html Accessed November 10, 2014.

EPA. 2014b. Climate impacts in the northwest. http://www.epa.gov/climatechange/impacts-adaptation/northwest.html. Accessed October 31, 2014.

Fowler, J. M. and J. Witte. 1985. Oil and gas activity on ranch operations and rangelands. Rangelands 7:35-37.

Green, J.S., and J.T. Flinders. 1980. Habitat and dietary relationships of the pygmy rabbit. J. Range Manage. 33:136–142.

Henry, M., D. W. Thomas, R. Vaudry, and M. Carrier. 2002. Foraging distances and home range of pregnant and lactating little brown bats (*Myotis lucifugus*). J. Mammal. 83:767-774.

Holmes, T. L., R. L. Knight, L. Stegall, and G. R. Craig. 1993. Responses of wintering grassland raptors to human disturbance. Wild. Soc. Bull. 21: 461-468.

IDAPA (Idaho Administrative Procedures Act) 20.07.02. 2014. Conservation of crude oil and natural gas in the State of Idaho. http://adminrules.idaho.gov/rules/current/20/0702.pdf. Accessed November 1, 2014.

IDEQ (Idaho Department of Environmental Quality). 2012. Payette County ground water quality improvement and drinking water source protection plan. IDEQ, Boise, Idaho. 77pp.

_____. 2014. Idaho's 2012 integrated report - final. IDEQ, Boise, Idaho. 847 pp. http://deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report.aspx. Accessed November 1, 2014.

IDFG (Idaho Department of Fish Game). 2010a. Elk statewide progress report. Boise, ID.

_____. 2010b. Mule deer statewide progress report. Boise, ID.

_____. 2013. Idaho fish and wildlife information system. Idaho Department of Fish and Game, Boise, ID.

IMPROVE. 2011. Spatial and seasonal patterns and temporal variability of haze and its constituents in the United States, Report V. Interagency Monitoring of Protected Visual Environments (IMPROVE). http://vista.cira.colostate.edu/improve/publications/Reports/2011/PDF/IMPROVE_V_FullReport.pdf. Accessed November 1, 2014.

Ingelfinger, F. 2001. The effects of natural gas development on sagebrush steppe passerines in Sublette County, Wyoming. M.S. Thesis. University of WY, Laramie, Wyoming.

IOGCC (Idaho Oil and Gas Conservation Commission). 2013. Final order in the matter of the petition by AM Idaho, LLC, requesting amendment to the spacing order for the Hamilton and

Willow fields. http://www.idl.idaho.gov/oil-gas/commission/042413-am-idaho-final-spacing-order.pdf. Accessed November 29, 2014.

_____. 2013b. "Fracking" in Idaho and the potential impacts of oil and gas exploration. http://www.idl.idaho.gov/oil-gas/commission/2013-faq-fracking.pdf. Accessed December 6, 2014.

_____. 2014. Oil and gas drill permits. http://www.idl.idaho.gov/oil-gas/commission/well-permits/index.html. Accessed November 1, 2014.

IPAA (Independent Petroleum Association of America). 2012. The Oil and Gas Producing Industry in Your State 2011-2012. IPAA, Washington, DC. 140 pp.

IPCC. 2007. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007. http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html. Accessed November 7, 2014.

Johnson, Z., P. S. Cook, J. O'Lauglin, and K. Bird. 2013. Oil and gas resource exploration and development polixcies in Idaho. Report No. 33. Policy Analysis Group – College of Natural Resources, University of Idaho, Moscow. 77 pp.

Katzner, T. E. and K. L. Parker. 1997. Vegetative characteristics and size of home ranges used by pygmy rabbits (*Brachylagus idahoensis*) during winter. J. Mammal. 78:1063-1072.

Kleinfelder, Inc., and Environ International Corporation. 2014. Air emissions inventory for a representative oil and gas well in the western United States. Developed under contract with the Bureau of Land Management, updated March 21, Littleton, CO.

Larrucea, E. S. and P. F. Brussard. 2008. Habitat selection and current distribution of the pygmy rabbit in Nevada and California, USA. J. Mammal. 89:691-699.

Lefcort, H., R. A. Meguire, L. H. Wilson, and W. F. Ettinger. 1998. Heavy metals alter the survival, growth, metamorphosis, and antipredatory behavior of Columbia spotted frog (*Rana luteiventris*) tadpoles. Arch. Environ. Contamination Toxicology 35:447-456.

Leu, M. and S. E. Hanser. 2011. Influences of the human footprint on sagebrush landscape patterns-Implications for sage-grouse conservation. in Knick, S. T. and J. W. Connelly eds., Greater Sage-Grouse- Ecology and Conservation of a Landscape Species and Its Habitats, Studies in Avian Biology No. 38: Berkeley, CA, University of California Press, pp. 383-405.

Paige, C. and S. A. Ritter. 1999. Birds in a sagebrush ocean: managing sagebrush habitats for bird communities. Partners in Flight Western Working Group, Boise, ID. 52 pp.

Sawyer, H., R. M. Nielson, Lindzey, and L. L. McDonald. 2006. Winter habitat selection of mule deer before and during development of a natural gas field. J. Wildl. Manage. 70:396-403.

Sheley, R. L., Petroff, J. K., eds. 1999. Biology and management of noxious rangeland weeds. Corvallis, OR: Oregon State University Press. Pp. 85, 202, 217, 249, 261, 315, 350, 362, 401, and 408.

TEEIC (Tribal Energy and Environmental Information Clearinghouse). 2014. Oil and gas drilling/development impacts. http://teeic.indianaffairs.gov/er/oilgas/impact/drilldev/index.htm. Accessed November 23, 2014.

USCB (US Census Bureau). 2014. Various sites including Population Finder and QuickFacts. http://www.census.gov/en.html#. Accessed November 2, 2014.

USDA (US Department of Agriculture), Natural Resources Conservation Service (NRCS). 2014. Soil Survey Staff, Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) Database for Soil survey of parts of Ada, Elmore, Owyhee, Boise, Canyon Gem and Payette County areas. http://soildatamart.nrcs.usda.gov. Accessed September 30, 2014.

USDA and USFS. 2006. Wildland Fire in Ecosystems: Effects of Fire on Soil and Water. General Technical Report RMRS-GTR-42-Volume 4. Pages 29-40.

USDI (US Department of the Interior). 1997. Idaho standards for rangeland health and guidelines for livestock grazing management. USDI, Bureau of Land Management, Boise, ID. 20 pp.

USFS (US Forest Service), Rocky Mountain Research Station (RMRS). 2014. SOLO. A Guide to Soil Quality Monitoring for Long Term Ecosystem Sustainability on Northern Regional National Forests. "The Effect of Fire on Soil Properties" report submitted by Leonard F. DeBano. Accessed November 19, 2014. http://forest.moscowfsl.wsu.edu/smp/solo/documents/GTRs/INT_280/DeBano_INT-280.php

USFWS (U. S. Fish and Wildlife Service). 2010. Endangered and threatened wildlife and plants; 12-month finding on a petition to list the pygmy rabbit as endangered or threatened. Federal Register 75:60516-60561.

Wallace, Z. 2014. Effects of oil and natural gas development on territory occupancy of ferruginous hawks and golden eagles in Wyoming, USA. M. S. Thesis, Oregon State University, Corvallis, OR. 137 pp.

Weber, J.G. 2012. The effects of a natural gas boom on employment and income in Colorado, Texas, and Wyoming. Energy Econ. 34:1580-1588.

WRI. 2012. Climate Analysis Indicators Tool (CAIT) 2.0. [Website]. World Resources Institute (WRI). http://cait.wri.org/ . Accessed October 31, 2014.

Yensen, E. 1991. Taxonomy and distribution of the Idaho ground squirrel, *Spermophilus brunneus*. J. Mammalogy 72:583-600.

6.0 Appendices

6.1 Appendix 1. Reasonably foreseeable development scenario for the proposed Little Willow Creek oil and gas lease area, Payette County, Idaho.

REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

FOR

PROTECTIVE OIL AND GAS LEASING

IN PARTS OF
TOWNSHIP 8 NORTH, RANGE 4 WEST
TOWNSHIP 9 NORTH, RANGE 4 WEST, AND
TOWNSHIP 9 NORTH, RANGE 3 WEST
BOISE MERIDIAN

FOUR RIVERS FIELD OFFICE
IDAHO

Prepared by: _____ Date: _____
Karen Porter
BLM Idaho State Office Geologist

SUMMARY

The BLM's Four Rivers Field Office is currently analyzing the environmental effects of offering 6474.62 acres of federal mineral estate for competitive oil and gas leasing. This RFDS is being written in support of that analysis, to inform the public and the preparers of the environmental assessment of the disturbance that could occur as a result of leasing the lands, so that the environmental impacts can be determined and mitigation measures, in the form of lease stipulations, can be developed to minimize those impacts. The BLM plans to offer these lands in a lease sale in early 2015, in order to protect the federal mineral estate from potential drainage caused by the development of a natural gas field that is presently occurring on private lands, referred to by the developer as the Willow Field.

According to an April 16, 2013 order by the Idaho Oil and Gas Conservation Commission, well spacing in the area is one well per government section, or 640 acres. In the northern part of the field, lands with reserved federal mineral estate (also called split estate) are intermingled with some of the private lands, causing conflicts for the developer. Idaho BLM has been deferring leasing in the Four Rivers FO while the current land use plan, the CRMP, is being revised. The CRMP/EIS was completed in 1987, and, while it identified lands closed to leasing and identified some areas as No Surface Occupancy, the analysis does not meet current BLM standards for oil and gas leasing. One major component that is missing is an analysis based on a Reasonably Foreseeable Development Scenario, or RFDS. Therefore, this RFDS describes the likely disturbance that could occur if BLM were to select any of the alternatives being proposed.

This Reasonably Foreseeable Development Scenario (RFDS) indicates that the following impacts could occur, by alternative:

Alternative A (No Action) - If BLM does not lease in the project area, development drilling could occur in only 2 sections- T. 8 N., R. 4 W., section 2, and T. 9 N., R. 4 W., section 36. The lands in these sections are private and do not contain any federal mineral estate. Technically only two wells could be drilled in the project area. This would result in approximately 10 acres of disturbance.

Alternative B (Lease with NSO/NSSO) - offering leases with NSO/NSSO would allow those sections that have lands with federal mineral estate to be drilled, however the drilling could not occur on the federal mineral estate. The only federal action would be to administer the leases and collect royalties. As there is only one section that has 100% federal minerals (T 9 N., R. 4 W., section 26) and there are 25 sections within the project boundary, technically Alt B could result in up to 24 wells. However, in looking at the topography of each section, it is noted that there are several sections where the private land is either inaccessible or is too steep to be suitable as a drill site. Two sections- T. 9 N., R. 4 W., section 13, and T. 9 N., R. 3 W., section 17- do not have favorable private land conditions for drilling. Therefore, if Alt B were selected, it is estimated that 22 wells would be drilled in the project area, resulting in 77 acres of disturbance.

Alts C (Lease with Cascade RMP stipulations and additional lease notices)- generally all

federal minerals would be available for development, resulting in the drilling of 25 wells (one per section), and 88 acres of disturbance.

It is anticipated that one geophysical exploration program would occur and that it would likely be conducted along existing roads or trails or by overland travel, thereby causing minor impacts to surface resources.

INTRODUCTION

This report describes the anticipated level of oil and gas exploration and development activity associated with issuing oil and gas leases in the project area. This projection is necessary so that the impacts to other natural resources can be analyzed in an environmental assessment, and to determine what if any stipulations, in addition to those on the standard lease form and those required by BLM policy, may be necessary to attach to the leases in order to mitigate those impacts.

ASSUMPTIONS AND DISCUSSION

- It is assumed that one well would be drilled per government section of approximately 640 acres. This is based on the state of Idaho's well spacing order.

- If a well is to be located on a federal lease, the lessee will be required to submit a drilling permit (APD) to BLM for approval prior to commencing operations. Site-specific NEPA would then be conducted, and additional site-specific requirements, termed Conditions of Approval, may be attached to the APD. If the well is to be located on fee lands, the lessee would seek approval for a drilling permit from the Idaho Department of Lands.

- If drilling is proposed on split estate lands, the lessee will be required to contact the surface owner and attempt to reach an agreement concerning surface access prior to submitting the APD. In accordance with BLM's Onshore Order Number One, upon submitting an APD, the lessee or its operator must certify to the BLM that: (1) It made a good faith effort to notify the private surface owner before entry; and (2) A Surface Access Agreement with the surface owner has been reached, or that a good faith effort to reach an agreement failed. The Surface Access Agreement may include terms or conditions of use, be a waiver, or an agreement for compensation. BLM is not a party to the surface agreement, however if no agreement is reached with the surface owner, the operator is required to submit an adequate bond (minimum of $1000) to the BLM for the benefit of the surface owner, in an amount sufficient to compensate for any loss of crops or damage to tangible improvements. This is a separate and distinct bond from the reclamation bond required under 43 CFR 3104.

- Based on the recent drilling that has occurred in the Willow Field, it is assumed that any well drilled would be a vertical hole, and that it would not require hydraulic fracturing. It is also assumed that the well would be a natural gas well.

- If the well is productive, it is assumed that it would be incorporated into the Willow Field unit development. If dry, the well would be plugged and abandoned, and the site would be reclaimed.

- Oil and gas leases are issued for an initial term of 10 years, subject to extension if there is drilling occurring or if there is a producing well on the lease.

ANTICIPATED SURFACE DISTURBANCE DUE TO OIL AND GAS ACTIVITIES

The following phases of oil and gas exploration/development are typical in searching for and developing an oil and gas resource:

1. Geophysical Exploration
2. Drilling Phase
3. Field Development and Production
4. Plugging and Abandonment

These phases are discussed in detail below.

Phase One: Geophysical Exploration

While a geophysical exploration program may have already been conducted, for the sake of this report it is anticipated that one geophysical exploration program may be conducted during the 10-year initial term of the leases. Geophysical techniques are often implemented to identify subsurface geologic structures and determine drilling targets. The BLM reviews and approves geophysical operations on a case by case basis, and a lease is not necessary for such work. Gravity, magnetics, and seismic reflection are the most common techniques used. Both gravity and magnetic surveys cause very little disturbance as the instruments used are small and easily transportable in light vehicles or OHVs. These surveys can cover large areas and take only weeks to conduct. It is preferable to use existing roads, yet some overland travel is sometimes necessary. In addition, both gravity and magnetic surveys can be completed from aircraft, virtually eliminating surface disturbance.

Seismic reflection surveys- either 2D or 3D- are the most commonly used geophysical tool. They require a seismic energy source and an array of receptors that are laid down in rows on the ground surface. Shock waves are created by vibrating or thumping the ground. Reflected seismic waves are recorded by a series of surface equipment along a 3- to 5-mile line. The general principle of seismic reflection is to send elastic waves (using an energy source such as dynamite explosion or Vibroseis) into the Earth, where each layer within the Earth reflects a portion of the wave's energy back and allows the rest to refract through. These reflected energy waves are recorded over a predetermined time period by receivers that detect the motion of the ground in which they are placed. On land, the typical receiver used is a small, portable instrument known as a geophone, which converts ground motion into an analogue electrical

signal. In preparation for gathering the seismic data, the survey crew establishes a grid, with source lines running one direction and receiver lines running a different direction. The source lines mark the points where either explosives or vibroseis vehicles will be placed. The receiver lines mark points where geophones (small devices inserted into the ground that pick up reflected vibrations) are placed to take readings when either a small explosion is set off or, more commonly, the vibroseis vehicles are used. Either method is used to send vibrations underground that are reflected back to the surface where readings are taken by geophones on the receiver lines and transferred to a data recorder vehicle. A crew of 10 to 15 people with five to seven vehicles is used, and several square miles can be surveyed in a single day. The geophones are then retrieved from the ground, and moved to the next survey area.

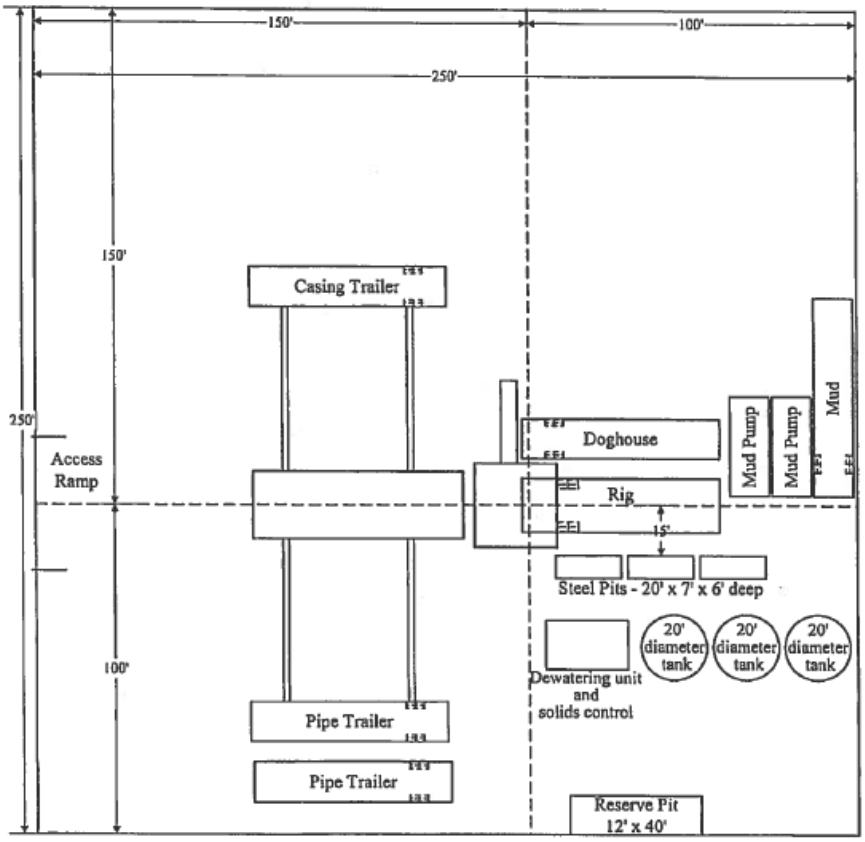
Phase Two: Drilling Phase

Given Idaho's well spacing requirements, it is assumed that a single well would be drilled in each section. If the proposed well is located on lands with federal minerals (i.e. on a federal lease), the lessee is required to submit an APD to BLM. If the proposed well is located on lands with private or state minerals, the lessee would submit a drilling permit application to the Idaho Department of Lands. Drilling on federal mineral estate would be analyzed by BLM in a site-specific NEPA document, and would involve coordination with the surface owner. Conditions of Approval, specific to the proposed activity and site, would be developed and attached to the drilling permit. These conditions, as well as the lease contract itself and any additional stipulations, would need to be complied with. A reclamation bond is required, and if necessary, a surface owner bond would be held by BLM on the surface owner's behalf.

Vehicle access to each drill pad would be required, to transport the drill rig, personnel, and other heavy equipment to the drill site. Existing roads may be used, however may require upgrading. Most of the individual parcels can be accessed off of the Little Willow Creek road, which is paved. Two-track and gravel roads that branch off of Little Willow Creek may require upgrading. Typically, roads are constructed with a 20-foot wide graveled running surface with adjacent ditches and berms, for a total disturbance width of about 40 feet. It may be necessary to haul in gravel to obtain a good road base, as well as a base for the well pad. In the area of the subject parcels, there are several good gravel roads that provide access to some part of the section that would be an appropriate drilling site. It is unlikely that the lessee would need access to the top of the bluffs on which many of the parcels lie. Given the existing road density in the area, it is assumed that an average of 1/4 of a mile of new road construction would be required to access the drill sites. Surface disturbance from the construction of 1/4 mile of road equals approximately one acre.

A drill pad is required to accommodate the rig and equipment. Previous drill pads in the Willow Field have been approximately 1.5 acres in size, however this report assumes a larger pad of 2.5 acres (300' x 350'). Topsoil and existing vegetation is scraped from the well pad site and stored on site for reclamation. The drill pad must be level, possibly requiring some cut-and-fill of the site. In addition to the drill rig, the well pad may house a reserve pit for storage or disposal of water, drill mud, and cuttings; several mud pits and pumps, drill pipe racks, a fuel tank, a water tank, a generator and several compressors, equipment storage, and several trailers for temporary

lab and office quarters. To date, reserve pits associated with developing the Willow Field have all been lined with a 12-mil synthetic liner. Below is a schematic diagram of an actual well pad (from Bridge Energy Resources' drilling permit application to IDL):



Getting the rig and ancillary equipment to the site may require 15 to 20 trips by full-sized tractor-trailers, with a similar amount for de-mobilizing the rig. There would be 10 to 40 daily trips for commuting and hauling in equipment. Drilling operations would likely occur 24 hours a day and seven days a week. It takes approximately one month to drill one well. A drilling operation generally has from 10 to 15 people on-site at all times, with more people coming and going periodically with equipment and supplies.

Well drilling also requires water. As much water as possible is recycled on site, yet about 5,000 to 15,000 gallons of water may be needed each day depending on well conditions. Initially, water would need to be provided, either by wells or trucked in, to meet demands. Many oil or gas wells encounter water at depth when drilling for oil and/or gas, as it may be part of the oil and gas reservoir, and can be utilized when production is ongoing.

Production wells drilled in the Willow Field to-date have been 24 inches in diameter at the surface, gradually narrowing (telescoping) to 8¾ inches at the bottom of the well. In order to

drill these deep, large-diameter holes, a large drilling rig is utilized. The top of the drill rig derrick could be as much as 155 feet above the ground surface, and the rig floor could be at least 25 feet above the ground surface. These rigs are typically equipped with diesel engines, fuel and drilling mud storage tanks, mud pumps, and other ancillary equipment. Once drilling commences, drilling fluid or mud is continuously circulated down the drill pipe and back to the surface equipment. The purpose of the drilling mud is to balance underground hydrostatic pressure, cool the drill bit, and flush out rock cuttings.

The risk of an uncontrolled flow from the reservoir to the surface (occasionally caused by encountering a pressurized thermal pocket) is greatly reduced by using a blowout preventer—a series of hydraulically-actuated steel rams that can close quickly around the drill string or casing to seal off a well. The BOP is pressure-tested after installation to ensure proper operation. Steel casing is run into completed sections of the borehole and cemented into place. The casing provides structural support to maintain the integrity of the borehole and isolates underground formations.

Exploration holes drilled to-date in the Willow Field have ranged in depth from 2500 to 6900 feet. At the conclusion of well testing, if paying quantities of oil and gas are not discovered, the operator is required to plug and abandon the well according to State standards. Cement plugs are placed above and below water-bearing units with drilling mud placed in the space between plugs. When abandonment is complete, the site is reclaimed, which includes pad and road recontouring, topsoil replacement, and seeding with approved mixtures. Erosion control measures would be incorporated into the reclamation design as needed.

The drilling site could be active for approximately one year, from the start of drill pad and access road construction; through drilling and well testing; to completion of plugging the hole and reclamation.

Phase Three: Field Development and Production

Where oil and gas flow to the surface naturally, control valves and collection pipes are attached to the well head. Otherwise a pump may be installed. Oil is typically produced along with water and gas. Once the raw hydrocarbon reaches the surface, it would be routed through a pipeline to a central production facility, which gathers and separates the produced fluids (oil, gas and water). A production facility is currently being constructed on private lands on the east side of the town of New Plymouth, and dehydration plant has been constructed on Highway 30, immediately north of Interstate 84. The production facility processes the hydrocarbon fluids and separates oil, gas and water. The oil must usually be free of dissolved gas before export. Similarly, the gas must be stabilized and free of liquids and unwanted components such as hydrogen sulphide and carbon dioxide. Any water produced would be treated at these facilities before disposal. Produced water at the well site is disposed of either through surface discharge, evaporation ponds or re-injection into the producing formation.

The producing life span of an oil or gas field varies depending on field characteristics. A field may produce for a few years to many decades. Commodity price, recovery technique, and the

political environment also affect the life of a field. Abandonment of wells may begin as soon as they are depleted or wells may be rested for a period of time or drilled to a different horizon, and put back into production.

Phase Four: Abandonment

If paying quantities of oil and gas are not discovered, or at the end of the producing life span of a producing well or field, the operator is required to plug and abandon the well according to Federal and State standards and reclaim the disturbed areas. To plug a well, cement plugs are placed above and below water-bearing units with drilling mud placed in the space between plugs. When well abandonment is complete, equipment and surface facilities are removed, and the site is reclaimed. In a producing field, underground pipelines are often plugged and left in place in order to avoid re-disturbing these areas. Site reclamation includes pad and road obliteration and recontouring, topsoil replacement, and seeding with approved mixtures. Erosion control measures would be incorporated into the reclamation design as needed.

CONCLUSION

Surface disturbance associated with the anticipated leasing of the federal mineral estate in the project area would be approximately 5 acres per well. One well can be drilled per section according to the State of Idaho's well spacing order. Therefore, depending on which alternative is selected, between 10 acres and 125 acres could be disturbed. Pad and access road construction, drilling and well testing, and reclamation would take an estimated 4-6 months, depending on well depth and drilling conditions encountered. It is reasonably likely that well testing would be favorable for production, in which case a pipeline would likely be installed to transport the hydrocarbons to a central production facility located off-lease, located on private land several miles to the south. It is anticipated that one geophysical survey program would be completed during the life of the lease. This disturbance would be temporary, on the order of weeks, and would result in minor to negligible surface impacts.

This RFDS meets the requirements of BLM's Manual Section 1624-2 in describing potential surface impacts that could occur as a result of leasing the federal mineral estate in the project area.

6.2 Appendix 2. State lease stipulations in the vicinity of the proposed Little Willow Creek lease area, Payette County, Idaho.

1. Construction Notification. Lessee shall notify and obtain approval from Idaho Department of Lands (IDL) prior to constructing well pads, roads, power lines, and related facilities that may require surface disturbance on the tract. Lessee shall submit a surface use plan of operations to IDL and obtain approval before beginning surface disturbance activities. Lessee shall comply with any mitigation measures stipulated in IDL's approval.
2. Surface Owner Notification. If the State does not own the surface, the Lessee must contact the owner of the surface in writing at least 30 days prior to any surface activity. A copy of the correspondence shall be sent to IDL.
3. Unstable Soils. Due to unstable soil conditions on this tract and/or topography that is rough and/or steep, surface use may be restricted or denied. Seismic activity may be restricted to surface shots.
4. Metalliferous/Gem Lease. This lease is issued subject to a prior existing State of Idaho metalliferous/gem lease. Lessee's rights to search, develop, and produce oil and gas may be restricted by such prior existing lease rights.
5. Wildlife Concerns. Potential wildlife conflicts have been identified for this tract. The applicant must contact the Idaho Department of Fish and Game (IDFG) in the area for advice on alleviating any possible conflicts caused by the Lessee's proposed activities. Documentation that IDFG requirements have been satisfied unless otherwise authorized by IDL is required. Additional mitigation measures may also be required.
6. Threatened and Endangered Plant Species. Plant species of concern have been identified on or near this tract. A vegetation survey in areas of proposed activity will be required prior to disturbance. Identified rare plant species will be avoided, unless otherwise authorized by the IDL.
7. Threatened and Endangered Animal Species. Animal species of concern have been identified on or near this tract. A survey in areas of proposed activity will be required prior to disturbance. Identified habitat of threatened and endangered species will be avoided, unless otherwise authorized by the IDL.
8. Navigable Waters and Infrastructure. Unless otherwise approved by IDL in writing, wells and related surface infrastructure, including new road construction, are prohibited within 1/4 mile of the mean high water mark of a navigable river, lake or reservoir, including direct tributary streams of navigable waterways, on or adjacent to this tract. No surface occupancy is allowed within the bed of a river, stream, lake or reservoir, islands and accretions or abandoned channels.
9. Floodplain. Due to the floodplain/wetlands area(s), surface use may be restricted or denied.
10. Surveys. If the lessee completes a successful oil and/or gas well, and if land title is disputed, the lessee shall fund professional land surveys as needed to determine the location and acreage encompassed by the spacing and/or pooling unit and the state lease acreage within that unit. Surveys shall be conducted by a licensed land surveyor acceptable to IDL, and shall be prepared pursuant to survey requirements provide by the IDL.
11. Public Trust Lands. This tract contains navigable riverbeds. No surface occupancy is allowed within the bed of the navigable river, abandoned channels, or on islands and

accretions. In addition, upon completion of a successful well, where river title is disputed, the Lessee will file an interpleader action under Rule 22 of Idaho Rules of Civil Procedure in the local District Court, or other court having jurisdiction, in which the leased lands are located for all acreage within the lease in which the title is disputed. The Lessee shall name all potential royalty claimants as defendants.

12. Existing Surface Uses. Due to existing surface uses (such as center pivots, wheel lines, etc.) development on this tract may be restricted.
13. Activity restrictions. No activity shall be allowed within 100 feet of any perennial or seasonal stream, pond, lake, wetland, spring, reservoir, well, aqueduct, irrigation ditch, canal, or related facilities without prior approval of the IDL.
14. Sage Grouse. Active sage-grouse lek(s) have been identified on or adjacent to this tract. No activities shall occur on the tract until the proposed action has been approved in writing by the Director of the Department. If surface activity is proposed on the tract, the Department will consult with the Director of Idaho Department of Fish and Game (IDFG) for their comments, concerns and recommendations. Additional mitigation measures may be required, including no-surface-occupancy buffers and/or timing restrictions, which may encompass part or the entire tract.
15. No Surface Occupancy. No Surface Occupancy shall be allowed on this tract.

6.3 Appendix 3. Legal description of lease parcels and applicability of Alternative C stipulations and lease notices.

Legal description of lease parcels.

Parcel	Legal Description			Acres
	Township/Range	**Section**	**Quartersection/Lot**	
A	T. 08 N R. 04 W	01	Lots 1-4; S½NE¼; S½NW¼; N½SE¼	364.78
		03	Lots 3 and 4; SW1/4NW1/4; W½SW1/4	185.11
		04	Lots 1 and 2; S½NE¼; SE¼NW¼; SE¼; E½SW¼	426.53
		05	Lots 1-3; SE¼NW¼; E½SW¼	223.22
		08	E½NW¼	79.39
		12	NW¼; SW¼	312.44
		13	N½SE¼; SE¼SW¼	117.49
		24	NE¼NW¼	39.32
	Total			**1,748.29**
B	T. 09 N R. 04 W	28	N½NE¼; SW¼NE¼; NW¼; W½SE¼; N½SW¼	430.33
		32	SW¼NW¼	38.88
		33	NE¼NW¼; NW¼SE¼	80.03
	Total			**549.25**
C	T. 09 N R. 04 W	26	All	628.28
		27	E½NE¼; SW¼NE¼; W½NW¼; N½SE¼; SE¼SE¼	312.27
		34	NE¼; NE¼SE¼; S½SE¼	276.04
		35	N½NW¼; SW¼NW¼; SW¼SW¼	157.90
	Total			**1,374.49**
D	T. 09 N R. 03 W	18	Lots 2-4	125.56
		19	Lots 1 and 4; NE¼NW¼	123.06
	T. 09 N R. 04 W	13	S½NE¼; E½NW¼; S½	469.41
		24	N½NE¼; SW¼NE¼; S½SE¼; NW¼SE¼; W½	551.35
		25	W½	316.36
	Total			**1,585.74**
E	T. 09 N R. 03 W	17	S½NE¼; SE¼; W½	544.94
		18	NE¼; N½SE¼; SE¼SE¼	273.15
		20	NW¼NE¼; N½NW¼; SW¼NW¼	155.79
		29	N½NE¼; NE¼NW¼	117.55
	Total			**1,091.43**
Total				**6,349.20**

Applicability of stipulations and lease notices by parcel.

Stipulation/Lease Notice	**Parcel[1]**				
	A	**B**	**C**	**D**	**E**
Freshwater Aquatic Habitat CSU-1: 500' buffer from surface waters	Y	N	N	Y	Y
Freshwater Aquatic Habitat CSU-2: 100' buffer from surface waters	Y	N	N	Y	Y
Special Status Plants CSU -3: Types 1-4	P	Y	P	P	P
Big Game Range CSU-4: No surface use December 1 – March 31 any species; May 1 – June 30 antelope	Y	Y	Y	Y	Y
Sensitive Wildlife Species CSU-5: No surface use ≤0.75 miles of ferruginous and Swainson's hawk nests March 15 – June 30	P	P	P	P	P
Sensitive Wildlife Species CSU-6: No surface use ≤0.75 miles of osprey nests April 15 – August 31	P	P	P	P	P

Stipulation/Lease Notice	Parcel[1]				
	A	**B**	**C**	**D**	**E**
Sensitive Wildlife Species CSU-7: No surface use ≤0.25 miles of burrowing owl nests March 15 – June 30	P	P	P	P	P
Wildlife Species of Concern CSU-8: No surface use ≤0.75 miles of golden eagle nests February 1 – June 30	P	P	P	P	P
Wildlife Species of Concern CSU-9: No surface use ≤0.75 miles of prairie falcon nests March 15 – June 30	P	P	P	P	P
Wildlife Species of Concern CSU -10: No surface use ≤0. 5 miles of heron rookery	P	P	P	P	P
Fragile Soils LN-1: Minimize adverse impacts to fragile soils	Y	Y	Y	Y	Y
Floodplain Management LN-2: Minimize adverse impacts to 100-year floodplain	Y	Y	N	N	N
Endangered Species S-1: Consultation and mitigation to protect listed species and critical habitat.	Y	Y	Y	Y	Y
Special Status Mammals LN-3: Minimize adverse impacts to SIDGS and pygmy rabbits.	P	P	P	P	P
Migratory Birds and Raptors LN-4: Compliance with MBTA by minimizing adverse impacts to migratory birds.	P	P	P	P	P
Migratory Birds and Raptors CSU-11: No surface use ≤1 mile of active bald eagle or peregrine falcon nest. No surface use December 1 – March 31 where wintering bald eagles or peregrine falcons are present.	P	P	P	P	P
Water Quality LN-5: Reduce impacts on water quality and quantity.	Y	Y	Y	Y	Y
Cultural Resources S-2: Comply with applicable statutes and executive orders.	Y	Y	Y	Y	Y
Cultural Resources LN-6: Cultural resource survey.	Y	Y	Y	Y	Y
Lands and Realty LN-7: Existing authorizations.	Y	Y	Y	Y	Y
Drainage LN-A: Wells on adjacent private lands.	Y	Y	Y	Y	Y
Split Estate LN-B: Surface use agreement required on split-estate.	Y	Y	Y	Y	Y

[1] Y – applies to at least a portion of the parcel. P – potentially applies based on subsequent survey work. N – would not apply to that parcel.

6.4 Appendix 4. Idaho BLM special status animal species known to, or potentially occurring, in the Little Willow Creek lease area, Payette County, Idaho.

Type 1. Federally Listed Species and Critical Habitat: Includes species that are listed under the Endangered Species Act as Threatened (T) or Endangered (E) and designated critical habitats.

Type 2. BLM Special Status Species: Includes FWS Candidate (C), Delisted within 5-years (D), Proposed (P), Experimental Population (XN), and Proposed Critical Habitat (PCH); and BLM Sensitive Species.

The proposed lease area does not currently provide habitat for any Type 1 species. The proposed lease area is outside the range or typical habitat of the following special status animal species that occur in the Four Rivers Field Office, so they will not be considered further: Idaho giant salamander, Cassin's finch, Columbian sharp-tailed grouse, flammulated owl, harlequin duck, Lewis' woodpecker, mountain quail, bull trout, redband trout, white sturgeon, ashy pebblesnail, California floater, bighorn sheep, coast mole, fisher, grizzly bear, northern Idaho ground squirrel, Piute ground squirrel, and wolverine.

Note* NI=No impacts due to leasing and associated activities
DI=direct impacts due to leasing and associated activities
ID=indirect impacts due to leasing and associated activities

Common Name	Scientific Name	Habitat	Management Considerations
Amphibians			
Northern Leopard Frog	*Rana pipiens*	Wetlands, riparian areas, and adjacent uplands	DI – Adverse water quality impacts could cause mortality or affect breeding, etc. Discussed in Section 3.6.2 (Aquatic Species).
Western Toad	*Bufo boreas*	Ponds, streams, and adjacent uplands.	DI – Adverse water quality impacts could cause mortality or affect breeding, etc. Discussed in Section 3.6.2 (Aquatic Species).
Woodhouse's Toad	*Bufo woodhousii*	Grasslands, shrublands, agricultural areas, and ponds.	DI – Adverse water quality impacts could cause mortality or affect breeding, etc. Discussed in Section 3.6.2 (Aquatic Species).
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	Winter migrant to lease area. Habitat includes lakes, reservoirs, streams, and uplands.	NI - No known nesting pairs are present. ID – Could occur for wintering birds where activities affect big game presence and winterkill. Discussed in Section 3.6.2 (Migratory Birds and Raptors).

Common Name	Scientific Name	Habitat	Management Considerations
Black Tern	*Chlidonias niger*	Open water lakes (>10 acres), ditches, and emergent wetlands.	ID – Activities could disturb migrating birds, but lease area doesn't provide nesting habitat.
Black-throated Sparrow	*Amphispiza bilineata*	Breeds in barren and grassy hillsides with scattered sagebrush and rabbitbrush.	DI/ID – Activities could reduce nesting foraging habitat, but lease area is on northern edge of species range.
Brewer's Sparrow	*Spizella breweri*	Sagebrush-steppe, nests in shrubs.	ID – Extensive sagebrush stands are not present; however, activities could affect species during migration.
Burrowing Owl	*Athene cunicularia*	Gently-sloping areas of shrubsteppe.	DI – Ground disturbing activities could destroy nests. ID - Activities could disturb or reduce prey species. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Ferruginous Hawk	*Buteo regalis*	Open country, nests on ground or rock outcrops, forages in shrubsteppe and grassland habitats.	ID – Activities could disturb or reduce prey species. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Golden Eagle	*Aquila chrysaetos*	Open country, nests on cliffs and artificial structures, forages in shrubsteppe and grassland habitats.	ID – Activities could disturb or reduce prey species. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Grasshopper Sparrow	*Ammodramus savannarum*	Shrubsteppe grasslands	DI/ID – Activities could reduce nesting and foraging habitat. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Greater Sage-grouse (C)	*Centrocercus urophasianus*	Sagebrush obligate.	NI - Outside currently delineated ranges, area lacks key habitat component.
Green-tailed Towhee	*Pipilo chlorurus*	Shrubsteppe in areas with high diversity of shrub species.	ID – Shrub stands are limited; however, activities could affect species during migration.
Loggerhead Shrike	*Lanius ludovicianus*	Shrubsteppe, open woodlands. Nests in tall shrubs and small trees.	ID – Activities could disturb or reduce nesting habitat and prey species. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Long-billed Curlew	*Numenius americanus*	Short-grass or mixed-prairie with flat rolling topography.	DI/ID – Activities could disrupt breeding, reduce nesting and foraging habitat. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Northern Goshawk	*Accipiter gentilis*	Aspen stands and conifer forests	NI – Habitat not present, occasional migrants could be affected by activities.
Olive-sided Flycatcher	*Contopus cooperi*	Montane or coniferous forests and riparian areas.	ID – Disturbance of birds using riparian areas during migration.
Sage Sparrow	*Amphispiza belli*	Sagebrush-steppe, nests in shrubs.	ID – Extensive sagebrush stands are not present; however, activities could affect species during migration.

Common Name	Scientific Name	Habitat	Management Considerations
Sage Thrasher	*Oreoscoptes montanus*	Sagebrush obligate	ID – Extensive sagebrush stands are not present; however, activities could affect species during migration.
Short-eared Owl	*Asio flammeus*	Large expanses of shrubsteppe and grasslands.	DI/ID – Activities could disrupt breeding, reduce nesting and foraging habitat. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Willow Flycatcher	*Empidonax trailii*	Dense willow riparian areas.	ID – Pollution could reduce prey species. Discussed in Section 3.6.2 (Migratory Birds and Raptors).
Yellow-billed Cuckoo (T)	*Coccyzus americanus*	Thick, wide riparian corridors, primarily dominated by cottonwoods. Known only as rare erratic breeder in the Snake River corridor mainly in southeast Idaho. Limited potential habitat occurs in area.	NI - Outside currently delineated ranges, area lacks key habitat component.
Mammals			
Big Brown Bat	*Eptesicus fuscus*	Rural areas and fields.	ID – Activities could reduce foraging success and prey habitat. Discussed in Section 3.6.2 (Bats).
Canyon Bat (formerly Western pipistrelle)	*Parastrellus hesperus*	Canyons and deserts in rock crevices, under rocks, and burrows	DI/ID – Activities could eliminate burrows, reduce foraging success and decrease prey habitat. Discussed in Section 3.6.2 (Bats).
Fringed Myotis	*Myotis thysanoides*	Caves, rock crevices, and open areas.	ID – Activities could reduce foraging success and prey habitat. Northeastern edge of range. Discussed in Section 3.6.2 (Bats).
Grey wolf	*Canus lupus*	Generalist habitat species. Follows big game herds.	ID - Could occur where activities affect big game presence.
Hoary Bat	*Lasiurus cinereus*	Trees, cavities, and open areas.	ID – Activities could reduce foraging success and prey habitat. Discussed in Section 3.6.2 (Bats).
Little Brown Bat	*Myotis lucifugus*	Forested lands near water, caves, and drier open areas.	ID – Activities could reduce foraging success and prey habitat. Discussed in Section 3.6.2 (Bats).
Long-eared Myotis	*Myotis evotis*	Coniferous forest and associated with forest-woodland riparian areas	ID – Insect prey base could be adversely affected by habitat alterations. Discussed in Section 3.6.2 (Bats).
Long-legged Myotis	*Myotis volans*	Coniferous forest and deserts; may change habitat seasonally	ID – Insect prey base could be adversely affected by habitat alterations. . Discussed in Section 3.6.2 (Bats).
Pallid Bat	*Antrozous pallidus*	Arid, semi-arid uplands, sparsely vegetated grasslands, buildings, and caves.	ID – Activities could reduce foraging success and prey habitat. Discussed in Section 3.6.2 (Bats).

Common Name	Scientific Name	Habitat	Management Considerations
Pygmy Rabbit	*Brachylagus idahoensis*	Thick big sagebrush with deep soils.	DI/ID – Burrow destruction, vehicle mortality, foraging habitat. Discussed in Section 3.6.2 (Burrowing Mammals).
Silver-haired Bat	*Lasionycteris noctivagans*	Riparian areas, ponds, and streams.	ID – Activities could reduce foraging success. Pollution could reduce prey species. Discussed in Section 3.6.2 (Bats).
Southern Idaho Ground Squirrel (C)	*Spermophilus brunneus endemicus*	Sagebrush and grasslands	DI/ID – Burrow destruction, vehicle mortality, foraging habitat. Discussed in Section 3.6.2 (Burrowing Mammals).
Spotted Bat	*Euderma maculatum*	Rocky canyons and cliffs, forages over sagebrush.	ID – Insect prey base could be adversely affected by habitat alterations. Discussed in Section 3.6.2 (Bats).
Townsend's Big-eared Bat	*Plecotus townsendii*	Winter in stable-climate caves, forage over sagebrush.	ID – Insect prey base could be adversely affected by habitat alterations. Discussed in Section 3.6.2 (Bats).
Western Small-footed Myotis	*Myotis ciliolabrum*	Winters in lava tube caves and rock crevices, under boulders, and beneath loose bark in summer	ID – Insect prey base could be adversely affected by habitat alterations. Discussed in Section 3.6.2 (Bats).
Yuma Myotis	*Myotis yumanensis*	Wide elevation range including riparian, desert scrub and mesic woodland and forested areas.	ID – Insect prey base could be adversely affected by habitat alterations. Discussed in Section 3.6.2 (Bats).
Reptiles			
Great basin Black-collared Lizard	*Crotaphytus bicinctores*	Deserts, presence of rocks and boulders.	DI/ID – Vehicle mortality, loss of habitat and prey. Discussed in Section 3.6.2
Longnose Snake	*Rhinocheilus lecontei*	Deserts, grasslands, and rocky canyons.	DI/ID – Vehicle mortality, loss of habitat and prey. Discussed in Section 3.6.2
Western Ground Snake	*Sonora semiannulata*	Deserts with loose or sandy soils.	DI/ID – Vehicle mortality, loss of habitat and prey. Discussed in Section 3.6.2

7.0 Maps

If you are viewing this via the following link on the NEPA Register:
https://www.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=renderDefaultPlanOrProjectSite&projectId=39064&dctmId=0b0003e8806d22d8
Please find the maps in the home page's sidebar under Maps. Select "Map Package to accompany Little Willow Creek Protective Leasing EA".